

# Reference Materials Index

Each material within this catalogue has a unique identifier which incorporates the manufacturer's reference material number..

Catalogue numbers are displayed in the format [group] space [group] space {manufacturer's code} e.g., 11 M BSCC-3. The manufacturer's code is BSCC-3. This code will appear on the certificate of analysis.

The alpha-numeric string preceding the manufacturer's code is to assist with placement of the material in the relevant section of the catalogue.

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Please Note: If you are unable to locate materials within this catalogue to meet your needs please send the specification of the materials you require. We will search our extensive database of existing materials and offer options for your consideration.

We will quote to manufacture and certify materials to your specification - subject to discussion and feasibility.

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**England**

**Tel: +44 (0) 20 8441 2024**  
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Herts EN6 1XT  
England**

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Account No.: **13140922 (IBAN)GB10NWBK60174913140922**  
Bank Code: **60 17 49**  
BIC: **NWBKGB2L**

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# 1. Iron Base

## Irons

## Blocks/Discs

| 1.1.1 Low-impurity      |                 | C       | Si      | S        | P       | Mn      | Ni     | Cr       | Mo      | Cu     | Sn      | Al     | Ti      | N       | Size (mm) |         |           |           |           |      |      |    |
|-------------------------|-----------------|---------|---------|----------|---------|---------|--------|----------|---------|--------|---------|--------|---------|---------|-----------|---------|-----------|-----------|-----------|------|------|----|
|                         |                 |         |         |          |         |         |        |          |         |        |         |        |         |         | Ø         | H       |           |           |           |      |      |    |
| CRM                     | 11 DB E098-1(D) | 0.0005  | 0.0005  | 0.0003   | <0.0001 | 0.00008 | ...    | 0.0057   | 0.0008  | ...    | ...     | ...    | ...     | 0.00024 | 36-39     | x 26    | w         |           |           |      |      |    |
|                         | 11 MI 27C       | 0.0012  | (0.001) | 0.0021   | 0.002   | (0.001) | 0.001  | 0.001    | 0.001   | 0.002  | 0.0008  | <0.001 | 0.001   | 0.0005  | continued |         |           |           |           |      |      |    |
| CRM                     | 11 A E097-1(D)  | 0.00025 | <0.01   | 0.0022   | 0.0016  | 0.0064  | 0.0025 | 0.0016   | <0.001  | 0.0020 | <0.0025 | ...    | <0.0015 | 0.0007  | continued |         |           |           |           |      |      |    |
| Continuation from above |                 | V       | Nb      | B        | Co      | As      | O      | Pb       | Ca      |        |         |        |         |         |           |         |           | Size (mm) |           |      |      |    |
|                         |                 |         |         |          |         |         |        |          |         |        |         |        |         |         | Ø         | H       |           |           |           |      |      |    |
|                         | 11 MI 27C       | 0.0006  | 0.001   | (0.0004) | 0.002   | <0.001  | 0.045  | (0.0004) | <0.005  |        |         |        |         |         |           |         |           | 31        | x 18      | w    |      |    |
|                         | 11 A E097-1(D)  | <0.001  | <0.001  | 0.0003   | 0.0037  | 0.0051  | (0.05) | <0.0005  | <0.0005 |        |         |        |         |         |           |         |           | 38        | x 30      | w    |      |    |
| 1.1.2 Low P             |                 | C       | Si      | S        | P       | Mn      | Cr     |          |         |        |         |        |         |         |           |         |           | Size (mm) |           |      |      |    |
|                         |                 |         |         |          |         |         |        |          |         |        |         |        |         |         | W         | D       | H         |           |           |      |      |    |
| CRM                     | 11 A 651/4      | 2.66    | 0.541   | 0.100    | 0.249   | 0.92    | (1)    |          |         |        |         |        |         |         |           |         |           | 50        | x 42      | x 12 | cc   |    |
| CRM                     | 11 A 652/4      | 2.34    | 0.878   | 0.129    | 0.071   | 1.19    | (1)    |          |         |        |         |        |         |         |           |         |           | 50        | x 42      | x 12 |      |    |
| CRM                     | 11 A 653/4      | 3.10    | 1.22    | 0.050    | 0.023   | 0.110   | (1)    |          |         |        |         |        |         |         |           |         |           | 50        | x 42      | x 12 |      |    |
| CRM                     | 11 A 654/4      | 2.28    | 1.635   | 0.170    | 0.130   | 0.74    | (1)    |          |         |        |         |        |         |         |           |         |           | 50        | x 42      | x 12 |      |    |
| CRM                     | 11 A 655/4      | 1.90    | 2.110   | 0.076    | 0.180   | 0.44    | (1)    |          |         |        |         |        |         |         |           |         |           | 50        | x 42      | x 12 |      |    |
| CRM                     | 11 A 656/8      | 2.61    | 2.59    | 0.107    | 0.062   | 0.823   | (1)    |          |         |        |         |        |         |         |           |         |           | 50        | x 42      | x 12 | cc   |    |
| CRM                     | 11 A 657/8      | 2.93    | 3.02    | 0.024    | 0.100   | 0.062   | (1)    |          |         |        |         |        |         |         |           |         |           | 50        | x 42      | x 12 |      |    |
| CRM                     | 11 A 658/9      | 3.429   | 1.982   | 0.071    | 0.179   | 0.508   | ...    |          |         |        |         |        |         |         |           |         |           | 50        | x 42      | x 12 |      |    |
| CRM                     | 11 A 659/8      | 3.96    | 1.40    | 0.039    | 0.025   | 1.00    | (1)    |          |         |        |         |        |         |         |           |         |           | 50        | x 42      | x 12 |      |    |
| CRM                     | 11 A 660/8      | 3.62    | 1.72    | 0.089    | 0.146   | 0.425   | (1)    |          |         |        |         |        |         |         |           |         |           | 50        | x 42      | x 12 |      |    |
| 1.1.3 High P            |                 | C       | Si      | S        | P       | Mn      | Cr     | B        |         |        |         |        |         |         |           |         |           |           | Size (mm) |      |      |    |
|                         |                 |         |         |          |         |         |        |          |         |        |         |        |         |         | W         | D       | H         |           |           |      |      |    |
| CRM                     | 11 A 661/4      | 2.56    | 2.96    | 0.068    | 0.84    | 0.30    | (1)    | ...      |         |        |         |        |         |         |           |         |           |           | 50        | x 42 | x 12 | cc |
| CRM                     | 11 A 662/4      | 2.95    | 2.33    | 0.087    | 0.30    | 0.76    | (1)    | ...      |         |        |         |        |         |         |           |         |           |           | 50        | x 42 | x 12 |    |
| CRM                     | 11 A 663/4      | 3.28    | 1.97    | 0.024    | 0.13    | 1.04    | (1)    | ...      |         |        |         |        |         |         |           |         |           |           | 50        | x 42 | x 12 |    |
| CRM                     | 11 A 664/4      | 2.84    | 2.71    | 0.112    | 0.44    | 0.57    | (1)    | ...      |         |        |         |        |         |         |           |         |           |           | 50        | x 42 | x 12 |    |
| CRM                     | 11 A 665/4      | 3.25    | 1.66    | 0.053    | 1.09    | 0.24    | (1)    | ...      |         |        |         |        |         |         |           |         |           |           | 50        | x 42 | x 12 |    |
|                         |                 |         |         |          |         |         |        |          |         |        |         |        |         |         | Ø         | H       |           |           |           |      |      |    |
|                         | 11 X HPC 1F     | 3.19    | 2.37    | 0.019    | 0.81    | 0.48    | ...    | (0.003)  |         |        |         |        |         |         |           |         |           |           | 40        | x 15 | cc   |    |
| CRM                     | 11 X HPC 2J     | 3.15    | 1.55    | 0.055    | 1.85    | 0.88    | ...    | ...      |         |        |         |        |         |         |           |         |           |           | 40        | x 15 |      |    |
|                         | 11 X HPC 3G     | 3.54    | 0.91    | 0.064    | 2.17    | 0.83    | ...    | (0.005)  |         |        |         |        |         |         |           |         |           |           | 40        | x 15 |      |    |
| CRM                     | 11 X HPC 4N     | 3.59    | 1.00    | 0.115    | 1.63    | 0.943   | ...    | (0.001)  |         |        |         |        |         |         |           |         |           |           | 40        | x 15 |      |    |
| 1.1.4 Nodular/Ductile   |                 | C       | Si      | S        | P       | Mn      | Ni     | Cr       | Mo      | Cu     | Mg      | Ti     | Al      | V       | Nb        | Co      | Others    | Size (mm) |           |      |      |    |
|                         |                 |         |         |          |         |         |        |          |         |        |         |        |         |         |           |         |           |           | W         | D    | H    |    |
| CRM                     | 11 A 666/9      | 3.39    | 1.76    | (0.005)  | ...     | 0.101   | 1.61   | (1)      | 0.095   | 0.067  | 0.079   | 0.066  | ...     | 0.056   | ...       | ...     | ...       | ...       | 40        | x 37 | x 12 | cc |
| CRM                     | 11 A 667/9      | 2.85    | 2.77    | (0.003)  | ...     | 0.190   | 1.38   | (1)      | 0.003   | 0.499  | 0.068   | <0.005 | ...     | 0.086   | ...       | ...     | ...       | ...       | 40        | x 37 | x 12 |    |
| CRM                     | 11 A 668/9      | 3.75    | 1.48    | (0.007)  | ...     | 0.679   | 0.15   | (1)      | 0.031   | 0.772  | 0.010   | 0.011  | ...     | 0.21    | ...       | ...     | ...       | ...       | 40        | x 37 | x 12 |    |
| CRM                     | 11 A 669/11     | 2.973   | 2.509   | ...      | ...     | 0.540   | 0.489  | 0.992    | 0.0492  | 0.201  | 0.0274  | 0.0453 | ...     | 0.479   | ...       | ...     | Ce 0.038  | ...       | 40        | x 37 | x 12 |    |
| CRM                     | 11 A 670/11     | 3.387   | 2.195   | ...      | ...     | 0.339   | 0.846  | 0.498    | 0.012   | 0.949  | 0.0385  | 0.0161 | ...     | 0.0174  | ...       | ...     | ...       | ...       | 40        | x 37 | x 12 |    |
|                         | 11 A SIMO 1     | 2.60    | 4.05    | 0.008    | 0.029   | 0.323   | 0.026  | 0.917    | 0.740   | 0.028  | 0.043   | 0.003  | 0.017   | 0.008   | ...       | 0.009   | ...       | ...       | 40        | x 37 | x 12 | cc |
|                         | 11 A SIMO 2     | 2.13    | 4.73    | 0.007    | 0.025   | 0.356   | 0.024  | 0.930    | 0.459   | 0.009  | 0.024   | 0.004  | 0.010   | 0.006   | ...       | 0.003   | ...       | ...       | 40        | x 37 | x 12 |    |
|                         |                 |         |         |          |         |         |        |          |         |        |         |        |         |         | Ø         | H       |           |           |           |      |      |    |
|                         | 11 MBS 28       | 2.88    | 2.16    | 0.001    | 0.034   | 0.22    | 1.04   | 0.068    | 0.002   | 0.009  | 0.095   | 0.01   | 0.02    | 0.006   | 0.036     | 0.001   | ...       | ...       | 32        | x 17 |      | cc |
| 1.1.5 Grey              |                 | C       | Si      | S        | P       | Mn      | Ni     | Cr       | Mo      | Cu     | Sn      | Ti     | V       | Al      | Co        | As      | Size (mm) |           |           |      |      |    |
|                         |                 |         |         |          |         |         |        |          |         |        |         |        |         |         |           |         | Ø         | H         |           |      |      |    |
|                         | 11 MBS 20E      | 3.24    | 2.29    | 0.044    | 0.042   | 0.80    | 0.156  | 0.088    | 0.042   | 0.23   | 0.093   | 0.017  | 0.007   | 0.006   | 0.006     | (0.003) | ...       | ...       | 44        | x 19 |      | c  |
|                         | 11 MBS 20G      | 3.33    | 3.02    | 0.029    | 0.028   | 0.58    | 0.38   | 0.086    | 0.19    | 0.54   | 0.12    | 0.012  | 0.018   | 0.008   | 0.022     | 0.004   | ...       | ...       | 38-47     | x 13 |      |    |
|                         | 11 MBS 20K      | 3.21    | 2.47    | 0.025    | 0.060   | 0.68    | 0.28   | 0.117    | 0.21    | 0.56   | 0.058   | 0.019  | 0.013   | 0.004   | 0.013     | 0.004   | ...       | ...       | 38-47     | x 13 |      |    |
|                         | 11 MBS 20P      | 3.22    | 2.62    | 0.044    | 0.032   | 0.63    | 0.14   | 0.079    | 0.033   | 0.067  | 0.099   | 0.018  | 0.017   | 0.008   | 0.018     | (0.004) | ...       | ...       | 38-47     | x 13 |      |    |
|                         | 11 MBS 20R      | 3.25    | 2.72    | 0.034    | 0.047   | 0.62    | 0.096  | 0.094    | 0.053   | 0.35   | 0.104   | 0.015  | 0.007   | 0.005   | 0.006     | 0.004   | ...       | ...       | 38-47     | x 13 |      |    |
|                         | 11 MBS 20W      | 3.27    | 2.64    | 0.036    | 0.045   | 0.62    | 0.082  | 0.092    | 0.054   | 0.29   | 0.086   | 0.015  | 0.007   | 0.004   | 0.005     | 0.004   | ...       | ...       | 38-47     | x 13 |      |    |











# 1. Iron Base

# Steels

# Blocks/Discs

| 1.2.1 Plain Carbon |        |         |        |        |        |        |        |         |        |         |         |         |         |          |                |           | Typical Alloy Type | Size (mm) |
|--------------------|--------|---------|--------|--------|--------|--------|--------|---------|--------|---------|---------|---------|---------|----------|----------------|-----------|--------------------|-----------|
| C                  | Si     | S       | P      | Mn     | Ni     | Cr     | Mo     | Cu      | Sn     | Al      | Nb      | V       | N       | Others   |                | Ø H       |                    |           |
| 12 M BS 56E        | 0.48   | 0.24    | 0.025  | 0.010  | 0.72   | 0.015  | 0.021  | 0.005   | 0.015  | 0.0006  | 0.062   | <0.002  | <0.002  | 0.0056   | Co, As         | AISI 1045 | 35-44 x 19         | W         |
| 12 M BS 57F        | 0.196  | 0.202   | 0.027  | 0.009  | 0.554  | 0.07   | 0.12   | 0.018   | 0.197  | 0.008   | (0.002) | ...     | 0.063   | 0.0077   |                | AISI 1020 | 35-44 x 19         |           |
| 12 M BS 64C        | 0.92   | 0.22    | 0.002  | 0.015  | 0.22   | 0.038  | 0.26   | 0.008   | 0.016  | 0.001   | 0.005   | 0.003   | 0.005   | 0.0084   |                | AISI 1095 | 35-44 x 19         |           |
| 12 M BS 1931       | 0.194  | 0.235   | 0.018  | 0.007  | 0.84   | 0.42   | 0.50   | 0.168   | 0.116  | 0.007   | 0.021   | ...     | 0.002   | 0.0079   | Co, As         | AISI 8620 | 35-44 x 19         |           |
| 12 M BS 1932       | 0.221  | 0.208   | 0.022  | 0.010  | 0.84   | 0.412  | 0.49   | 0.158   | 0.177  | 0.013   | 0.024   | ...     | 0.002   | 0.0080   | Co, As         | AISI 8620 | 35-44 x 19         |           |
| 12 M BS 3931       | 0.420  | 0.27    | 0.018  | 0.010  | 0.91   | 0.10   | 0.97   | 0.176   | 0.128  | 0.008   | 0.023   | ...     | 0.003   | 0.0073   | As, O          | AISI 4140 | 35-44 x 19         |           |
| 12 M BS 3941       | 0.41   | 0.25    | 0.023  | 0.016  | 0.80   | 0.019  | 0.068  | 0.006   | 0.053  | (0.002) | 0.002   | 0.031   | 0.003   | 0.0070   |                | AISI 1040 | 35-44 x 19         |           |
| 12 M BS 3942       | 0.47   | 0.26    | 0.032  | 0.023  | 0.72   | 0.14   | 0.165  | 0.037   | 0.281  | 0.012   | 0.004   | 0.019   | 0.0019  | (0.0088) |                | AISI 1040 | 35-44 x 19         |           |
| 12 M BS 3952       | 0.208  | 0.264   | 0.021  | 0.011  | 0.546  | 0.112  | 0.105  | 0.519   | 0.202  | ...     | 0.048   | ...     | ...     | (0.0005) |                |           | 35-44 x 19         |           |
| 12 M BS 4941       | 0.490  | 0.27    | 0.017  | 0.012  | 0.79   | 0.074  | 0.96   | 0.039   | 0.106  | 0.006   | 0.024   | ...     | 0.164   | 0.0076   | Co, O          |           | 41 x 12            |           |
| 12 M BS 4942       | 0.414  | 0.22    | 0.021  | 0.015  | 0.56   | 0.16   | 0.97   | 0.54    | 0.165  | 0.014   | (0.004) | ...     | 0.28    | 0.0080   | As, Ca         | ASTM A193 | 38 x 12            |           |
| CRM 12 MI 254A     | 0.500  | 0.211   | 0.024  | 0.010  | 0.78   | 0.044  | 0.050  | 0.013   | 0.091  | 0.005   | 0.025   | 0.001   | 0.002   | 0.0096   | As, B          | AISI 1050 | 32 x 19            | W         |
| CRM 12 A 432/1     | 0.102  | 0.043   | 0.039  | 0.024  | 1.34   | 0.14   | 0.31   | (0.02)  | (0.04) | ...     | (0.01)  | <0.002  | ...     | ...      |                |           | 38 x 19            | W         |
| CRM 12 A 433/1     | 0.195  | 0.18    | 0.069  | 0.074  | 0.60   | 0.064  | 0.26   | (0.01)  | (0.06) | ...     | <0.01   | 0.02    | ...     | ...      |                |           | 38 x 19            |           |
| CRM 12 A 434/1     | 0.41   | 0.31    | 0.027  | 0.50   | 1.49   | 0.044  | 0.055  | (0.01)  | (0.05) | ...     | <0.01   | 0.078   | ...     | ...      |                |           | 38 x 19            |           |
| CRM 12 A 435/1     | 0.52   | 0.54    | 0.031  | 0.033  | 0.41   | 0.06   | 0.14   | (<0.01) | (0.05) | ...     | <0.01   | 0.039   | ...     | ...      |                |           | 38 x 19            |           |
| CRM 12 A 431/2     | 0.0249 | 0.015   | 0.0065 | 0.121  | 0.902  | 0.040  | 0.049  | (0.004) | ...    | ...     | ...     | 0.0040  | ...     | 0.0052   |                |           | 38 x 19            | W         |
| CRM 12 A 432/2     | 0.0065 | 0.0822  | 0.036  | 0.0171 | 0.712  | 0.0196 | 0.0166 | (0.002) | ...    | ...     | ...     | 0.0174  | ...     | 0.0066   |                |           | 38 x 19            |           |
| CRM 12 A 433/2     | 0.096  | 0.0071  | 0.0083 | 0.011  | 1.188  | 0.037  | 0.0262 | (0.004) | ...    | ...     | ...     | 0.0590  | ...     | ...      |                |           | 38 x 19            |           |
| CRM 12 A 434/2     | 0.275  | 0.510   | 0.0141 | 0.0611 | 1.546  | 0.037  | 0.238  | (0.014) | ...    | ...     | ...     | 0.038   | ...     | 0.0104   |                |           | 38 x 19            |           |
| CRM 12 A 435/2     | 0.489  | 0.328   | 0.0424 | 0.0373 | 0.390  | 0.133  | 0.184  | (0.018) | ...    | ...     | ...     | 0.134   | ...     | ...      |                |           | 38 x 19            |           |
| CRM 12 A 215/3     | 0.91   | 0.23    | 0.031  | 0.011  | 0.68   | 0.038  | 0.04   | (0.006) | 0.052  | ...     | 0.004   | ...     | ...     | ...      |                |           | 38 x 19            | W         |
| CRM 12 A E057-2(D) | 0.0507 | (0.003) | 0.0127 | 0.0120 | 0.246  | 0.0096 | 0.0114 | ...     | 0.0146 | ...     | 0.059   | ...     | ...     | 0.0023   |                |           | 38 x 30            |           |
| CRM 12 A E059-2(D) | 0.721  | 0.188   | 0.0084 | 0.0046 | 0.495  | 0.0198 | 0.0090 | 0.0018  | 0.0074 | ...     | 0.00045 | ...     | ...     | 0.0051   | sol Al         | 0.00020   | 38 x 30            |           |
| CRM 12 A E064-1(D) | 0.0026 | 0.0065  | 0.0104 | 0.0091 | 0.1641 | 0.0115 | 0.0184 | 0.00077 | 0.0077 | 0.00051 | 0.033   | 0.0146  | 0.00015 | 0.0026   | Co, As, Ti     |           | 38 x 30            |           |
| CRM 12 A E084-1(D) | 0.391  | 0.265   | 0.029  | 0.018  | 0.860  | 0.154  | ...    | 0.033   | 0.267  | 0.023   | ...     | ...     | ...     | ...      |                |           | 38 x 30            |           |
| CRM 12 A E086-1(D) | 0.297  | 0.206   | 0.0371 | 0.0238 | 0.879  | 0.168  | 0.150  | ...     | 0.320  | 0.0263  | ...     | ...     | ...     | ...      | As             | 0.0230    | 38 x 30            |           |
| CRM 12 A E090-1(D) | 1.054  | 0.281   | 0.0095 | 0.0128 | 0.226  | 0.053  | 0.121  | 0.0089  | ...    | ...     | ...     | 0.00043 | 0.204   | 0.0146   | Ga, Pb, Sb, Zn |           | 38 x 30            |           |
| CRM 12 A 601/2     | 0.102  | 0.263   | 0.024  | 0.034  | 1.30   | (0.03) | (0.14) | (0.006) | (0.04) | ...     | 0.033   | ...     | (0.002) | ...      |                |           | 44 x 19            | C         |
| CRM 12 A 602/2     | 0.94   | 0.057   | 0.031  | 0.023  | 0.66   | (0.02) | (0.03) | (0.004) | (0.06) | ...     | 0.096   | ...     | (0.001) | ...      |                |           | 44 x 19            |           |
| CRM 12 A 603/2     | 0.78   | 0.97    | 0.056  | 0.020  | 0.236  | (0.03) | (0.04) | (0.004) | (0.05) | ...     | 0.076   | ...     | (0.001) | ...      |                |           | 44 x 19            |           |
| CRM 12 A 604/2     | 0.199  | 0.75    | 0.072  | 0.016  | 1.91   | (0.09) | (0.06) | (0.02)  | (0.07) | ...     | 0.008   | ...     | (0.001) | ...      |                |           | 44 x 19            |           |
| CRM 12 A 605/2     | 0.400  | 0.54    | 0.015  | 0.054  | 0.345  | (0.05) | (0.06) | (0.01)  | (0.06) | ...     | 0.027   | ...     | (0.001) | ...      | Zr (0.12)      |           | 44 x 19            |           |

|            | C     | Si     | S      | P      | Mn    | Ni     | Cr     | Mo    | Cu    | Al    | V     | W     | Ti     | Size (mm) |
|------------|-------|--------|--------|--------|-------|--------|--------|-------|-------|-------|-------|-------|--------|-----------|
|            |       |        |        |        |       |        |        |       |       |       |       |       |        | Ø H       |
| 12 CM 5050 | 0.108 | 0.029  | 0.07   | 0.0038 | 1.15  | 0.252  | 0.379  | ...   | 0.276 | 0.073 | ...   | ...   | ...    | 35 x 30   |
| 12 CM 5051 | 0.172 | 0.1    | 0.012  | 0.014  | 1.07  | 0.210  | 0.241  | ...   | 0.14  | ...   | ...   | ...   | ...    | each      |
| 12 CM 5052 | 0.29  | 0.156  | 0.026  | 0.032  | 0.62  | 0.181  | 0.153  | ...   | 0.193 | ...   | ...   | ...   | ...    |           |
| 12 CM 5053 | 0.30  | 0.247  | 0.04   | 0.023  | 0.86  | 0.065  | 0.092  | ...   | 0.097 | ...   | ...   | ...   | ...    | Set Only  |
| 12 CM 5054 | 0.44  | 0.46   | 0.04   | 0.039  | 0.41  | 0.062  | 0.275  | ...   | 0.325 | 0.40  | ...   | ...   | ...    |           |
| 12 CM 5055 | 0.58  | 0.374  | 0.0033 | 0.054  | 0.163 | 0.343  | 0.34   | ...   | 0.38  | 0.403 | ...   | ...   | ...    |           |
| 12 CM 5057 | 0.181 | 0.235  | 0.009  | 0.0265 | 0.617 | 0.426  | 0.062  | 0.004 | 0.256 | 0.11  | ...   | ...   | ...    | 35 x 30   |
| 12 CM 5058 | 0.465 | 0.338  | 0.037  | 0.046  | 0.206 | 0.174  | 0.087  | 0.007 | 0.086 | 0.26  | ...   | ...   | 0.003  | each      |
| 12 CM 5059 | 0.276 | 0.137  | 0.012  | 0.0133 | 0.412 | 0.245  | 0.090  | 0.004 | 0.034 | 0.20  | ...   | ...   | ...    |           |
| 12 CM 5060 | 0.583 | 0.387  | 0.046  | 0.037  | 0.11  | 0.079  | 0.188  | 0.007 | 0.077 | 0.18  | ...   | ...   | 0.0034 | Set Only  |
| 12 CM 5061 | 0.371 | 0.467  | 0.031  | 0.031  | 0.394 | 0.109  | 0.290  | 0.007 | 0.137 | 0.24  | ...   | ...   | 0.0035 |           |
| 12 CM 5062 | 0.087 | 0.692  | 0.01   | 0.0051 | 0.209 | 0.041  | 0.491  | 0.004 | 0.392 | 0.075 | ...   | ...   | 0.0046 |           |
| 12 CM 5063 | 0.692 | 0.282  | 0.126  | 0.0278 | 0.712 | 0.507  | 0.280  | 0.160 | 0.161 | 0.019 | 0.108 | 0.155 | 0.132  | 35 x 30   |
| 12 CM 5064 | 0.982 | 0.368  | 0.0308 | 0.0132 | 0.342 | 0.394  | 0.162  | 0.083 | 0.091 | 0.023 | 0.063 | 0.248 | 0.145  | each      |
| 12 CM 5065 | 0.369 | 0.189  | 0.0026 | 0.0172 | 0.02  | 0.084  | 0.228  | 0.229 | 0.226 | 0.176 | 0.173 | 0.091 | 0.051  |           |
| 12 CM 5066 | 0.056 | 0.031  | 0.0257 | 0.003  | 0.058 | 0.025  | 0.493  | 0.303 | 0.283 | 0.072 | 0.242 | 0.382 | 0.012  | Set Only  |
| 12 CM 5067 | 1.27  | 0.517  | 0.0252 | 0.0396 | 1.27  | 0.215  | 0.094  | 0.014 | 0.063 | 0.130 | 0.049 | 0.033 | 0.168  |           |
| 12 CM 5068 | 0.189 | 0.133  | 0.0374 | 0.0449 | 0.226 | 0.286  | 0.377  | 0.399 | 0.330 | 0.108 | 0.286 | 0.455 | 0.19   |           |
| 12 CM 5076 | 0.034 | 0.212  | 0.0013 | 0.0066 | 0.136 | 0.083  | 0.0133 | ...   | 0.073 | 0.369 | ...   | ...   | ...    | 30 x 30   |
| 12 CM 5077 | 0.013 | 0.002  | 0.022  | 0.0032 | 0.026 | 0.019  | 0.0020 | ...   | 0.102 | ...   | ...   | ...   | ...    | each      |
| 12 CM 5078 | 0.018 | 0.061  | 0.0092 | 0.0073 | 0.063 | 0.0202 | 0.0026 | ...   | 0.074 | 0.129 | ...   | ...   | ...    |           |
| 12 CM 5079 | 0.087 | 0.0146 | 0.016  | 0.0064 | 0.40  | 0.028  | 0.0053 | ...   | 0.085 | 0.014 | ...   | ...   | ...    | Set Only  |
| 12 CM 5080 | 0.088 | 0.032  | 0.0097 | 0.167  | 0.41  | 0.0107 | 0.0032 | ...   | 0.142 | 0.029 | ...   | ...   | ...    |           |

| 1.2.1A Ultra-Low Carbon Steels |        |         |        |          |        |         |         |         |         |  | Size (mm)                  |              |   |
|--------------------------------|--------|---------|--------|----------|--------|---------|---------|---------|---------|--|----------------------------|--------------|---|
| C                              | Si     | S       | P      | Mn       | Ni     | Cr      | Cu      | Al      |         |  | W x D x H                  |              |   |
| 12 M BS LC-1                   | 0.0036 | (0.026) | 0.0013 | (0.011)  | (0.45) | (0.001) | <0.002  | (0.002) | (0.058) |  |                            | 44 x 44 x 13 | W |
| 12 M BS LC-1R                  | 0.0013 | (0.025) | 0.0013 | (0.012)  | (0.43) | (0.002) | (0.001) | (0.002) | (0.033) |  | 12 M BS LC-1R - LC6        | 44 x 44 x 13 |   |
| 12 M BS LC-2                   | 0.0040 | (0.025) | 0.0024 | (0.012)  | (0.45) | (0.002) | <0.002  | (0.002) | (0.038) |  | sold as a set of 6 pcs     | each         |   |
| 12 M BS LC-3                   | 0.0054 | (0.024) | 0.0046 | (0.012)  | (0.45) | (0.002) | (0.002) | (0.001) | (0.044) |  |                            | Set only     |   |
| 12 M BS LC-4                   | 0.0077 | (0.024) | 0.0070 | (0.012)  | (0.46) | (0.002) | (0.002) | <0.001  | (0.035) |  | LC1R-LC5 are               |              |   |
| 12 M BS LC-5                   | 0.0108 | (0.022) | 0.0087 | (0.012)  | (0.46) | (0.001) | (0.002) | <0.002  | (0.031) |  | rectangular blocks.        | Ø H          |   |
| 12 M BS LC-6                   | 0.0020 | (0.051) | 0.0008 | (0.0007) | (0.47) | (0.006) | (0.002) | (0.001) | (0.036) |  | LC6 is a cylindrical disc. | 38 x 13      |   |

# 1. Iron Base

# Steels

# Blocks/Discs

| 1.2.2 Residuals in Mild Steel |        |          |        |        |       |        |        |          |         |         |         |          |          |           |               |            | Size (mm) |   |
|-------------------------------|--------|----------|--------|--------|-------|--------|--------|----------|---------|---------|---------|----------|----------|-----------|---------------|------------|-----------|---|
|                               | C      | Si       | S      | P      | Mn    | Ni     | Cr     | Mo       | Cu      | Co      | Sn      | Al       | W        | Ti        | V             | As         | Ø         | H |
| 12 X 12746T                   | 0.032  | 0.16     | 0.08   | 0.068  | 1.93  | 0.21   | 0.23   | 0.61     | 0.50    | 0.11    | 0.25    | 0.01     | 0.12     | 0.05      | 0.01          | 0.075      | 40 x 15   | C |
| 12 X 12747T                   | 0.06   | 0.35     | 0.025  | 0.045  | 1.67  | 0.38   | 0.43   | 0.52     | 0.41    | 0.21    | 0.17    | 0.025    | ...      | 0.15      | ...           | <0.005     | 40 x 15   |   |
| 12 X 12748S                   | 0.10   | 0.42     | 0.044  | 0.040  | 1.26  | 0.45   | 0.43   | 0.33     | 0.33    | 0.39    | 0.08    | 0.09     | ...      | 0.09      | ...           | 0.12       | 40 x 15   |   |
| 12 X 12749U                   | 0.21   | 0.53     | 0.054  | 0.041  | 1.40  | 0.32   | 0.49   | 0.22     | 0.20    | 0.46    | 0.03    | 0.14     | ...      | <0.01     | ...           | 0.07       | 40 x 15   |   |
| 12 X 12750S                   | 0.202  | 0.57     | 0.058  | 0.022  | 0.54  | 0.70   | 0.70   | 0.11     | 0.11    | 0.61    | 0.22    | 0.27     | ...      | 0.11      | ...           | 0.12       | 40 x 15   |   |
| 12 X 349                      | 0.24   | 0.26     | 0.024  | 0.021  | 0.69  | 0.23   | 0.10   | 0.06     | 0.20    | 0.006   | 0.16    | 0.32     | 0.08     | 0.085     | 0.002         | 0.005      | 40 x 15   | W |
| 12 X 350                      | 0.18   | 0.45     | 0.032  | 0.029  | 0.70  | 0.18   | 0.31   | 0.10     | 0.15    | 0.005   | 0.03    | 0.35     | 0.29     | 0.052     | 0.002         | 0.07       | 40 x 15   |   |
| CRM 12 X 352B                 | 0.275  | 0.414    | 0.126  | 0.070  | 0.200 | 0.376  | 0.313  | 0.261    | 0.140   | 0.020   | 0.110   | 0.257    | 0.202    | 0.29      | 0.029         | 0.036      | continued |   |
| CRM 12 A 111                  | 0.0258 | 0.0253   | 0.0054 | 0.0033 | 0.155 | 0.0387 | 0.0197 | 0.0008   | 0.0171  | 0.0144  | 0.0015  | 0.0348   | ...      | 0.0004    | 0.0009        | 0.0017     | continued |   |
| Continuation from above       |        |          |        |        |       |        |        |          |         |         |         |          |          |           |               |            | Size (mm) |   |
|                               |        | Nb       | Pb     | Bi     | Se    | Sb     | Zn     | Ca       | N       |         |         |          |          |           |               |            | Ø         | H |
| 12 X 352B                     |        | 0.104    | 0.006  | 0.008  | 0.006 | 0.023  | 0.005  | ...      | (0.006) |         |         |          |          |           |               |            | 42 x 17   | W |
| 12 A 111                      |        | (0.0005) | ...    | ...    | ...   | ...    | ...    | (0.0002) | 0.0034  |         |         |          |          |           |               |            | 44 x 50   |   |
|                               |        |          |        |        |       |        |        |          |         |         |         |          |          |           |               |            | Size (mm) |   |
|                               | C      | Si       | S      | P      | Mn    | Co     | Al     | Al       | Nb      | V       | Pb      | B        | Sb       | Zr        |               |            |           |   |
| 12 X 353A                     | 0.075  | 0.10     | 0.007  | 0.004  | 1.01  | 0.025  | 0.015  | ...      | 0.12    | 0.02    | ...     | (0.0004) | 0.11     | 0.09      | 40 x 15       |            |           | W |
| 12 X 354A                     | 0.27   | 0.19     | 0.015  | 0.066  | 0.86  | 0.03   | 0.01   | ...      | 0.07    | 0.02    | ...     | (0.0002) | 0.05     | 0.03      | 40 x 15       |            |           |   |
| 12 X 355A                     | 0.20   | 0.48     | 0.024  | 0.028  | 0.62  | 0.05   | <0.01  | ...      | 0.02    | 0.11    | ...     | 0.001    | 0.08     | <0.01     | 40 x 15       |            |           |   |
| 12 X 356A                     | 0.36   | 0.37     | 0.031  | 0.049  | 0.44  | 0.12   | 0.05   | ...      | 0.02    | 0.09    | ...     | 0.007    | 0.02     | 0.01      | 40 x 15       |            |           |   |
| 12 X 357A                     | 0.45   | 0.23     | 0.062  | 0.016  | 0.24  | 0.21   | 0.06   | ...      | <0.001  | 0.19    | ...     | 0.014    | <0.005   | <0.005    | 40 x 15       |            |           |   |
| CRM 12 A 456/2                | 0.112  | 0.297    | 0.0221 | 0.0212 | 0.220 | 0.0504 | 0.0018 | <0.002   | 0.0057  | 0.0221  | 0.0189  | 0.0015   | 0.0172   | (0.013)   | 38 x 19       |            |           | W |
| CRM 12 A 457/2                | 0.307  | 0.105    | 0.0448 | 0.0098 | 0.327 | 0.0217 | 0.087  | 0.082    | 0.0174  | 0.153   | 0.0098  | 0.0046   | 0.050    | 0.025     | 38 x 19       |            |           |   |
| CRM 12 A 458/2                | 0.198  | 0.504    | 0.0314 | 0.0281 | 0.479 | 0.198  | 0.055  | 0.052    | 0.0510  | 0.105   | 0.0140  | 0.0069   | 0.089    | (0.062)   | 38 x 19       |            |           |   |
| CRM 12 A 459/2                | 0.467  | 0.640    | 0.0481 | 0.0482 | 0.909 | 0.0890 | 0.0154 | 0.0134   | 0.0102  | 0.0585  | 0.0044  | 0.0110   | 0.0121   | 0.074     | 38 x 19       |            |           |   |
| CRM 12 A 460/2                | 0.383  | 0.126    | 0.0099 | 0.0374 | 0.616 | 0.0106 | 0.0240 | 0.0193   | 0.068   | 0.0322  | 0.0005  | 0.0027   | 0.0006   | <0.0005   | 38 x 19       |            |           |   |
| 1.2.3 Low Alloy               |        |          |        |        |       |        |        |          |         |         |         |          |          |           |               |            | Size (mm) |   |
|                               | C      | Si       | S      | P      | Mn    | Ni     | Cr     | Mo       | Cu      | Co      | Sn      | Al       | V        | N         | Alloy Type    | Ø          | H         |   |
| 12 M BS 42A                   | 0.52   | 0.258    | 0.078  | 0.012  | 1.08  | 0.147  | 0.8    | 0.195    | 0.285   | (0.007) | (0.009) | 0.025    | 0.004    | 0.008     | AISI 4140 mod | 35-45 x 19 | W         |   |
| 12 M BS 43A                   | 0.49   | 0.25     | 0.026  | 0.008  | 0.81  | 0.24   | 0.93   | 0.06     | 0.18    | 0.008   | 0.011   | 0.003    | 0.15     | 0.0074    | AISI 6150     | 35-45 x 19 |           |   |
| 12 M BS 45A                   | 0.133  | 0.69     | 0.022  | 0.016  | 0.46  | 0.15   | 1.16   | 0.52     | 0.17    | 0.009   | 0.011   | 0.032    | 0.004    | 0.0081    | ASTM A182-F11 | 35-45 x 19 |           |   |
| 12 M BS 46A                   | 0.139  | 0.18     | 0.030  | 0.018  | 0.55  | 0.20   | 2.37   | 0.93     | 0.13    | 0.011   | 0.008   | 0.022    | 0.013    | 0.0140    | ASTM A182-F22 | 35-45 x 19 |           |   |
| 12 M BS 47B                   | 0.122  | 0.22     | 0.022  | 0.014  | 0.39  | 0.105  | 4.78   | 0.45     | 0.12    | ...     | 0.006   | 0.018    | 0.004    | 0.023     | ASTM A182-F5  | 35-45 x 19 |           |   |
| 12 M BS 48A                   | 0.121  | 0.68     | 0.011  | 0.012  | 0.43  | 0.29   | 8.75   | 0.95     | 0.13    | 0.022   | 0.014   | 0.018    | 0.014    | 0.021     | ASTM A182-F9  | 35-45 x 19 |           |   |
| 12 M BS 49                    | 0.36   | 0.93     | 0.014  | 0.014  | 0.33  | 0.2    | 3.51   | 2.40     | 0.070   | 2.00    | ...     | 0.004    | 0.062    | 0.019     |               | 35-45 x 19 |           |   |
| 12 M BS 51F                   | 0.190  | 0.24     | 0.018  | 0.016  | 0.52  | 1.68   | 0.157  | 0.224    | 0.23    | 0.009   | 0.009   | 0.021    | 0.003    | 0.0060    | AISI 4620     | 35-45 x 19 |           |   |
| 12 M BS 52D                   | 0.436  | 0.18     | 0.088  | 0.068  | 0.97  | 0.18   | 0.16   | 0.09     | 0.060   | 0.012   | 0.004   | 0.028    | 0.002    | 0.0025    | AISI 1140 mod | 35-45 x 19 |           |   |
| 12 M BS 58E                   | 0.100  | 0.29     | 0.002  | 0.009  | 0.63  | 3.22   | 1.40   | 0.110    | 0.154   | 0.013   | 0.003   | 0.029    | 0.006    | 0.0033    | AISI 9310     | 35-45 x 19 |           |   |
| 12 M BS 60D                   | 0.406  | 0.22     | 0.009  | 0.014  | 0.82  | 1.76   | 0.76   | 0.23     | 0.075   | 0.011   | 0.004   | 0.032    | 0.010    | 0.0070    | AISI 4340     | 35-45 x 19 |           |   |
| 12 M BS 61D                   | 0.216  | 0.27     | 0.025  | 0.009  | 0.81  | 0.44   | 0.51   | 0.17     | 0.19    | 0.006   | 0.009   | 0.023    | 0.002    | 0.0098    | AISI 8620     | 35-45 x 19 |           |   |
| 12 M BS 68C                   | 0.38   | 0.305    | 0.008  | 0.018  | 0.60  | 0.166  | 1.77   | 0.36     | 0.178   | 0.011   | 0.008   | 1.06     | 0.007    | 0.0045    | Nitriding     | 35-45 x 19 |           |   |
| 12 M BS 69B                   | 0.26   | 1.27     | 0.013  | 0.008  | 1.28  | 1.71   | 0.28   | 0.39     | 0.086   | 0.035   | 0.006   | (0.024)  | 0.002    | 0.0057    | AMS 6418      | 35-45 x 19 |           |   |
| 12 M BSA485-1                 | 0.98   | 0.62     | 0.004  | 0.019  | 1.10  | 0.13   | 1.07   | 0.029    | 0.16    | 0.010   | 0.011   | 0.017    | 0.003    | 0.0060    | ASTM A485-1   | 39 x 12    |           |   |
| 12 M BS 1972                  | 0.130  | 0.24     | 0.017  | 0.012  | 0.51  | 3.28   | 1.53   | 0.052    | 0.089   | 0.012   | 0.006   | 0.014    | 0.003    | 0.0096    | AISI 3310     | 39 x 19    |           |   |
| CRM 12 M BS 1981              | 0.142  | 0.666    | 0.016  | 0.008  | 0.490 | 0.129  | 1.20   | 0.470    | 0.152   | 0.009   | 0.007   | 0.022    | 0.004    | 0.0085    | F-11          | 39 x 19    |           |   |
| CRM 12 M BS 1982              | 0.128  | 0.255    | 0.026  | 0.012  | 0.441 | 0.197  | 2.09   | 0.89     | 0.177   | 0.010   | 0.013   | 0.021    | 0.003    | 0.0097    | F-22          | 39 x 19    |           |   |
| CRM 12 M BS 2001              | 0.168  | 0.22     | 0.030  | 0.005  | 0.67  | 0.083  | 0.071  | 0.019    | 0.305   | 0.008   | 0.012   | 0.002    | 0.0006   | 0.0090    | AISI 1018     | 39 x 19    |           |   |
| 12 M BS 2952                  | 1.03   | 0.32     | 0.014  | 0.013  | 0.33  | 0.135  | 1.36   | 0.044    | 0.106   | 0.007   | 0.006   | 0.024    | 0.005    | 0.0084    | E52100        | 44 x 19    |           |   |
| CRM 12 M BS 2992              | 0.195  | 0.210    | 0.011  | 0.008  | 0.72  | 0.47   | 0.53   | 0.164    | 0.026   | 0.010   | 0.0017  | 0.036    | 0.001    | 0.0042    | AISI 8620     | 44 x 19    |           |   |
| 12 M BS 3961                  | 0.215  | 0.236    | 0.022  | 0.016  | 0.565 | 1.67   | 0.510  | 0.27     | 0.133   | (0.010) | (0.008) | 0.022    | (0.002)  | 0.0079    | E4320         | 44 x 19    |           |   |
| 12 M BS 3962                  | 0.168  | 0.244    | 0.018  | 0.007  | 0.58  | 1.83   | 0.138  | 0.219    | 0.146   | 0.007   | 0.007   | 0.023    | (0.001)  | 0.0072    | AISI 4617     | 44 x 19    |           |   |
| 12 M BS 6418                  | 0.255  | 1.54     | 0.004  | 0.010  | 1.42  | 1.74   | 0.34   | 0.42     | 0.11    | 0.010   | 0.006   | 0.027    | 0.003    | 0.0066    | AISI 6418     | 57 x 12    |           |   |
| 12 M BS 8822                  | 0.228  | 0.26     | 0.025  | 0.011  | 0.92  | 0.47   | 0.52   | 0.34     | 0.17    | 0.019   | 0.011   | 0.022    | 0.003    | 0.0085    | AISI 8822     | 44 x 12    |           |   |
| 12 M BS 1951                  | 0.30   | 0.33     | 0.011  | 0.009  | 0.78  | 0.42   | 0.49   | 0.17     | 0.20    | 0.007   | 0.008   | 0.020    | 0.004    | (0.0091)  | AISI 8630     | 35-45 x 19 | W         |   |
| 12 M BS 1962                  | 0.41   | 0.242    | 0.011  | 0.007  | 0.94  | 0.16   | 1.05   | 0.229    | 0.008   | 0.010   | 0.018   | 0.004    | 0.0095   | AISI 4140 | 35-45 x 19    |            |           |   |
| 12 M BS 2971                  | 0.187  | 0.237    | 0.024  | 0.015  | 1.01  | 0.111  | 0.152  | 0.040    | 0.065   | ...     | (0.005) | 0.022    | (0.002)  | 0.0084    | LF-2          | 35-45 x 19 |           |   |
| 12 M BS 2972                  | 0.462  | 0.204    | 0.016  | 0.011  | 0.70  | 0.129  | 0.119  | 0.021    | 0.270   | ...     | (0.026) | (0.002)  | 0.024    | 0.0088    | AISI 1045     | 35-45 x 19 |           |   |
| 12 M BSA330V                  | 0.318  | 0.240    | 0.0009 | 0.008  | 0.91  | 1.91   | 0.91   | 0.475    | 0.181   | 0.011   | 0.010   | 0.021    | 0.094    | 0.0076    | AISI 4330 mod | 35-45 x 19 |           |   |
| 12 M BSA340M                  | 0.414  | 1.65     | <0.001 | 0.004  | 0.74  | 0.178  | 0.78   | 0.35     | 0.134   | 0.013   | 0.008   | 0.076    | 0.056    | 0.002     | AISI 300M     | 35-45 x 19 |           |   |
| 12 M BSA620                   | 0.189  | 0.25     | 0.018  | 0.006  | 0.57  | 1.75   | 0.072  | 0.24     | 0.216   | 0.012   | 0.013   | 0.032    | (0.0008) | 0.0078    | AISI 4620     | 35-45 x 19 |           |   |
| 12 M BS9325                   | 0.25   | 0.32     | 0.007  | 0.008  | 0.91  | 3.29   | 1.48   | 0.31     | 0.13    | 0.010   | 0.009   | 0.030    | 0.004    | 0.0089    | AISI 9325     | 38 x 12    | C         |   |
| 12 M BS4820                   | 0.188  | 0.25     | 0.025  | 0.010  | 0.57  | 3.29   | 0.12   | 0.21     | 0.11    | 0.008   | (0.008) | 0.020    | (0.002)  | 0.0079    | AISI 4820     | 38 x 12    |           |   |
| CRM 12DB E035-2(D)            | 1.277  | 0.216    | 0.0111 | 0.0038 | 0.305 | 0.0190 | 0.0104 | 0.0056   | 0.0085  | ...     | ...     | 0.0193   | ...      | 0.0230    |               | 35 x 30    | HIP       |   |
| CRM 12 A 112                  | 0.394  | 0.289    | 0.0026 | 0.0043 | 0.436 | 1.461  | 1.236  | 0.190    | 0.149   | 0.0175  | 0.0086  | 0.0148   | 0.0088   | 0.0024    |               | 44 x 50    |           |   |
| CRM 12 A E186-1(D)            | 0.610  | 1.72     | 0.035  | 0.022  | 0.870 | 0.190  | 0.218  | 0.048    | 0.281   | ...     | ...     | 0.014    | ...      | ...       |               | 38 x 30    |           |   |
| CRM 12 T 1750                 | 0.359  | 0.246    | 0.075  | 0.0128 | 1.801 | 0.187  | 0.227  | 0.0433   | 0.320   | ...     | 0.0137  | 0.0175   | 0.114    | 0.0107    |               | 38 x 25    | W         |   |
| CRM 12 JN 100LA               | 1.00   | 0.28     | 0.018  | 0.012  | 0.33  | 0.027  | 1.52   | 0.012    | 0.019   | 0.007   | ...     | 0.005    | 0.004    | 0.0046    |               | 34 x 20    | W         |   |
| CRM 12 J 24                   | 0.1744 | ...      | 0.0010 | 0.0151 | ...   | ...    | 1.048  | 0.578    | ...     | ...     | ...     | ...      | ...      | ...       |               | 30 x 15    |           |   |

# 1. Iron Base

# Steels

# Blocks/Discs

| 1.2.3 Low Alloy (continued) |        |       |          |        |       |       |        |       |        |         |          |        |          |        |                | Size (mm) |   |
|-----------------------------|--------|-------|----------|--------|-------|-------|--------|-------|--------|---------|----------|--------|----------|--------|----------------|-----------|---|
|                             | C      | Si    | S        | P      | Mn    | Ni    | Cr     | Mo    | Cu     | Co      | Sn       | Al     | V        | N      | Others         | Ø         | H |
| CRM 12 X 15217P             | 0.52   | 1.47  | 0.069    | 0.072  | 0.97  | 0.57  | 1.04   | 0.30  | 0.19   | 0.195   | 0.05     | 0.04   | 0.78     | ...    |                | 40 x 15   | c |
| CRM 12 X 15251S             | 0.734  | 1.81  | 0.050    | 0.048  | 1.19  | 1.30  | 0.778  | 0.270 | 0.180  | 0.295   | 0.012    | 0.038  | 0.485    | 0.009  | As, Ti         | 43 x 20   |   |
| CRM 12 X 15252P             | 0.094  | 0.26  | 0.054    | 0.082  | 1.03  | 2.00  | 0.75   | 0.24  | 0.17   | 0.15    | 0.05     | 0.03   | 0.35     | ...    |                | 40 x 15   |   |
| CRM 12 X 15253P             | 0.19   | 0.42  | 0.077    | 0.065  | 1.31  | 0.53  | 1.49   | 0.54  | 0.31   | 0.07    | 0.13     | 0.08   | 0.25     | ...    |                | 40 x 15   |   |
| CRM 12 X 15254W             | 0.343  | 1.00  | 0.058    | 0.055  | 1.24  | 0.392 | 2.13   | 0.80  | 0.141  | 0.498   | 0.045    | 0.480  | 0.242    | 0.015  | As, Bi, Nb, Pb | 43 x 20   |   |
| CRM 12 X 15255N             | 0.41   | 1.04  | 0.070    | 0.12   | 1.21  | 0.25  | 1.46   | 0.19  | 0.30   | 0.060   | 0.12     | 0.11   | 0.43     | 0.026  | As, B, Bi, Nb  | 40 x 15   |   |
| CRM 12 X 15256N             | 0.09   | 0.16  | 0.042    | 0.046  | 0.51  | 3.51  | 0.32   | 0.07  | 0.06   | 0.28    | 0.15     | 0.03   | 0.64     | ...    |                | 40 x 15   |   |
| CRM 12 X 15258M             | 0.49   | 1.05  | 0.053    | 0.060  | 1.10  | 0.28  | 0.28   | 0.22  | 0.14   | 0.33    | 0.06     | 0.04   | 0.24     | ...    |                | 40 x 15   |   |
| CRM 12 X 15259N             | 0.67   | 1.83  | 0.11     | 0.043  | 0.31  | 3.97  | 0.47   | 0.42  | 0.54   | 0.11    | 0.089    | 0.26   | 0.40     | 0.005  | W, Ti, Nb, Zr  | 40 x 15   |   |
| CRM 12 X 15260U             | 0.43   | 0.31  | 0.064    | 0.040  | 2.02  | 0.69  | 3.04   | 0.11  | 0.11   | 0.12    | 0.03     | 0.60   | 0.53     | ...    |                | 40 x 15   |   |
| CRM 12 X 15261Q             | 0.59   | 1.57  | 0.075    | 0.115  | 0.56  | 0.13  | 0.49   | 1.41  | 0.30   | 0.31    | 0.03     | 1.65   | 0.13     | ...    | W              | 40 x 15   |   |
| CRM 12 X 15266S             | 0.27   | 0.14  | 0.055    | 0.094  | 1.03  | 1.27  | 4.07   | 0.28  | 0.21   | 0.19    | 0.01     | 0.47   | 0.06     | ...    |                | 40 x 15   |   |
| CRM 12 X LA1A               | 0.06   | 0.73  | 0.045    | 0.013  | 1.32  | 0.21  | 0.95   | <0.01 | 0.034  | ...     | ...      | <0.01  | 0.41     | ...    |                | 40 x 15   | w |
| CRM 12 X LA2B               | 0.19   | 0.97  | 0.043    | 0.033  | 0.55  | 0.74  | 0.81   | 0.10  | 0.44   | <0.01   | ...      | 1.45   | 0.09     | 0.006  |                | 44 x 15   |   |
| CRM 12 X LA3A               | 0.48   | 0.13  | 0.040    | 0.032  | 1.50  | 0.31  | 0.37   | 0.30  | 0.20   | ...     | ...      | 0.06   | 0.19     | ...    |                | 40 x 15   |   |
| CRM 12 X LA4A               | 0.67   | 0.28  | 0.021    | 0.044  | 0.24  | 0.46  | 0.64   | 0.46  | 0.29   | ...     | ...      | 0.19   | 0.36     | ...    |                | 40 x 15   |   |
| CRM 12 X LA5A               | 0.81   | 0.67  | 0.015    | 0.057  | 0.98  | 0.13  | 0.12   | 0.19  | 0.09   | ...     | ...      | 0.19   | 0.58     | ...    |                | 40 x 15   |   |
| CRM 12 X LA6A               | 0.01   | 0.06  | 0.006    | 0.005  | 0.10  | 0.03  | 0.03   | <0.01 | 0.01   | ...     | ...      | <0.01  | <0.01    | ...    |                | 40 x 15   |   |
| CRM 12 DB 179-2(D)          | 0.598  | 0.579 | (0.0006) | 0.0267 | 0.539 | 0.078 | 1.08   | 0.070 | 0.111  | (0.015) | ...      | ...    | 0.188    | 0.0068 | W 1.87         | 35 x 30   | w |
| CRM 12 DB 187-1(D)          | 0.195  | 0.026 | 0.025    | 0.014  | 1.354 | 0.096 | 1.186  | 0.035 | 0.161  | 0.014   | 0.011    | 0.046  | ...      | 0.014  | B 0.0004       | 35 x 30   |   |
| CRM 12 DB 192-1(D)          | 0.1875 | 0.219 | 0.0010   | 0.0029 | 1.377 | 0.755 | 0.0717 | 0.482 | 0.0453 | 0.0055  | (0.0030) | 0.0308 | (0.003)  | 0.0118 |                | 35 x 30   |   |
| CRM 12 DB 193-1(D)          | 0.139  | 0.404 | 0.0086   | 0.0063 | 0.972 | 1.178 | 0.182  | 0.347 | 0.598  | 0.0073  | ...      | 0.0257 | (0.0019) | 0.0108 | As 0.0062      | 35 x 30   |   |

|                |       |       |        |       |       |       |       |       |       |       |        |        |        |        |          | Size (mm)     |         |   |
|----------------|-------|-------|--------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|----------|---------------|---------|---|
|                | C     | Si    | S      | P     | Mn    | Ni    | Cr    | Mo    | Cu    | Co    | Sn     | Al     | V      | N      | O        | Others        | Ø       | H |
| CRM 12 MI 28C  | 0.16  | 0.25  | 0.011  | 0.011 | 0.76  | 0.24  | 0.073 | 0.042 | 0.23  | 0.008 | 0.016  | 0.010  | 0.024  | 0.0084 | 0.0074   | As, B         | 31 x 18 |   |
| CRM 12 MI 28E  | 0.169 | 0.171 | 0.0026 | 0.009 | 0.68  | 0.145 | 0.079 | 0.033 | 0.120 | 0.008 | 0.010  | 0.011  | 0.019  | 0.0088 | 0.0052   | As            | 31 x 18 |   |
| CRM 12 MI 30E  | 0.408 | 0.264 | 0.0071 | 0.011 | 0.92  | 0.180 | 1.06  | 0.209 | 0.301 | 0.012 | 0.017  | 0.014  | 0.005  | 0.0063 | 0.0014   | As            | 31 x 18 |   |
| CRM 12 MI 31D  | 0.412 | 0.264 | 0.0053 | 0.009 | 0.79  | 1.71  | 0.830 | 0.238 | 0.171 | 0.012 | 0.010  | 0.023  | 0.005  | 0.0084 | 0.0013   | As            | 31 x 18 |   |
| CRM 12 MI 32A  | 0.20  | 0.23  | 0.024  | 0.011 | 0.80  | 0.49  | 0.45  | 0.18  | 0.12  | 0.007 | 0.006  | 0.003  | 0.068  | 0.0093 | (0.0037) | Nb, Ti        | 31 x 18 |   |
| CRM 12 MI 32B  | 0.20  | 0.25  | 0.024  | 0.016 | 0.81  | 0.44  | 0.54  | 0.15  | 0.14  | 0.009 | 0.011  | 0.038  | 0.004  | 0.0078 | 0.0030   | B, Nb, Ti     | 31 x 18 |   |
| CRM 12 MI 33B  | 0.19  | 0.22  | 0.014  | 0.010 | 0.54  | 1.68  | 0.17  | 0.22  | 0.15  | 0.010 | 0.010  | 0.022  | 0.002  | 0.0070 | 0.0020   | B, Nb, Ti     | 31 x 18 |   |
| CRM 12 MI 33C  | 0.184 | 0.25  | 0.017  | 0.009 | 0.562 | 1.71  | 0.133 | 0.236 | 0.223 | 0.008 | 0.009  | 0.025  | 0.0021 | 0.0078 | 0.0021   | Ti, W         | 31 x 18 |   |
| CRM 12 MI 34A  | 0.51  | 0.22  | 0.010  | 0.01  | 0.78  | 0.14  | 0.99  | 0.044 | 0.18  | 0.009 | 0.009  | 0.014  | 0.17   | 0.0076 | (0.0014) | Nb, Ti        | 31 x 18 |   |
| CRM 12 MI 34B  | 0.48  | 0.29  | 0.021  | 0.021 | 0.81  | 0.14  | 0.94  | 0.053 | 0.21  | 0.009 | 0.012  | 0.024  | 0.16   | 0.0089 | 0.0018   | B, Nb, Ti     | 31 x 18 |   |
| CRM 12 MI 35B  | 0.13  | 0.58  | 0.015  | 0.006 | 0.45  | 0.084 | 1.12  | 0.46  | 0.11  | 0.008 | 0.006  | 0.016  | 0.005  | 0.0079 | 0.0016   | B, Nb, Ti     | 31 x 18 |   |
| CRM 12 MI 35C  | 0.115 | 0.56  | 0.014  | 0.012 | 0.44  | 0.102 | 1.09  | 0.52  | 0.271 | 0.011 | 0.017  | 0.029  | 0.005  | 0.0093 | 0.0016   | As, B, Ti     | 31 x 18 |   |
| CRM 12 MI 36A  | 0.099 | 0.22  | 0.013  | 0.006 | 0.55  | 0.16  | 2.08  | 0.93  | 0.17  | 0.012 | 0.009  | 0.024  | 0.008  | 0.0105 | (0.0027) | Nb, Ti        | 31 x 18 |   |
| CRM 12 MI 36B  | 0.14  | 0.21  | 0.038  | 0.010 | 0.49  | 0.18  | 2.18  | 0.95  | 0.13  | 0.012 | 0.008  | 0.030  | 0.006  | 0.0102 | 0.0018   | Nb, Ti        | 31 x 18 |   |
| CRM 12 MI 37B  | 0.119 | 0.235 | 0.016  | 0.011 | 0.431 | 0.11  | 4.82  | 0.470 | 0.137 | 0.017 | 0.008  | 0.025  | 0.012  | 0.0155 | 0.0024   | B, Nb, Ti, W  | 31 x 18 |   |
| CRM 12 MI 49C  | 1.04  | 0.26  | 0.013  | 0.009 | 0.31  | 0.064 | 1.35  | 0.015 | 0.082 | 0.007 | 0.005  | 0.016  | 0.008  | 0.0078 | (0.0012) | Nb, Ti        | 31 x 18 |   |
| CRM 12 MI 143B | 0.29  | 0.28  | 0.009  | 0.009 | 0.48  | 0.14  | 0.93  | 0.20  | 0.13  | 0.009 | 0.012  | 0.018  | 0.004  | 0.008  | 0.0023   | B             | 31 x 18 |   |
| CRM 12 MI 143C | 0.297 | 0.21  | 0.011  | 0.006 | 0.56  | 0.155 | 0.95  | 0.22  | 0.22  | 0.011 | 0.020  | 0.038  | 0.003  | 0.0089 | 0.0014   | As            | 31 x 18 |   |
| CRM 12 MI 200B | 0.452 | 0.219 | 0.026  | 0.013 | 0.755 | 0.089 | 0.132 | 0.018 | 0.228 | 0.007 | 0.009  | 0.003  | 0.024  | 0.0097 | 0.004    | Ca, Ti        | 31 x 18 |   |
| CRM 12 MI 209A | 0.34  | 0.20  | 0.028  | 0.007 | 0.82  | 0.076 | 0.065 | 0.017 | 0.11  | 0.006 | 0.007  | 0.004  | 0.055  | 0.0062 | (0.0034) | As, Ti        | 31 x 18 |   |
| CRM 12 MI 209B | 0.321 | 0.25  | 0.031  | 0.008 | 0.66  | 0.064 | 0.08  | 0.011 | 0.17  | 0.007 | 0.008  | 0.003  | 0.024  | 0.0083 | 0.0039   | As            | 31 x 18 |   |
| CRM 12 MI 210A | 0.39  | 0.22  | 0.023  | 0.015 | 0.82  | 0.11  | 0.11  | 0.022 | 0.27  | 0.008 | 0.011  | 0.003  | 0.052  | 0.0124 | (0.0033) | As            | 31 x 18 |   |
| CRM 12 MI 210B | 0.40  | 0.20  | 0.005  | 0.011 | 0.67  | 0.028 | 0.058 | 0.016 | 0.020 | 0.003 | 0.0013 | 0.029  | 0.0014 | 0.0059 | 0.0012   | As, V         | 31 x 18 |   |
| CRM 12 MI 213A | 0.16  | 0.15  | 0.034  | 0.015 | 0.66  | 0.15  | 0.15  | 0.048 | 0.41  | 0.008 | 0.018  | 0.0018 | 0.002  | 0.0082 | 0.011    | As, B, Nb, Pb | 31 x 18 |   |
| CRM 12 MI 229A | 0.218 | 0.331 | 0.010  | 0.008 | 0.86  | 0.029 | 0.015 | 0.493 | 0.014 | 0.011 | 0.002  | 0.027  | 0.006  | 0.0071 | 0.0013   | B, Nb, Ti     | 31 x 18 |   |
| CRM 12 MI 252A | 0.419 | 0.248 | 0.009  | 0.024 | 0.91  | 0.507 | 0.501 | 0.206 | 0.107 | 0.008 | 0.007  | 0.017  | 0.005  | 0.0085 | (0.001)  | B, Pb, Nb     | 31 x 18 |   |
| CRM 12 MI 252B | 0.419 | 0.236 | 0.019  | 0.007 | 0.91  | 0.461 | 0.486 | 0.223 | 0.084 | 0.005 | 0.021  | 0.028  | 0.004  | 0.0081 | 0.0016   | B, Sb, Pb     | 31 x 18 |   |

|           | C     | Si   | S     | P     | Mn   | Ni   | Cr   | Mo   | Cu   | Co   | V    | Ti   | Al   | Nb   |           |  |
|-----------|-------|------|-------|-------|------|------|------|------|------|------|------|------|------|------|-----------|--|
| 12 MT 051 | 0.43  | 0.63 | 0.031 | 0.043 | 1.45 | 0.97 | 1.09 | 0.31 | 0.48 | 0.08 | 0.12 | 0.12 | 0.13 | 0.06 |           |  |
| 12 MT 484 | 0.22  | 0.42 | 0.034 | 0.050 | 1.28 | 0.49 | 1.22 | 0.27 | 0.23 | 0.11 | 0.14 | 0.25 | 0.25 | 0.22 | continued |  |
| 12 MT 697 | 0.150 | 1.49 | 0.045 | 0.053 | 1.51 | 1.60 | 1.37 | 1.03 | 1.00 | 0.47 | 0.44 | 0.28 | 0.65 | 0.20 |           |  |

| Continuation from above |       |      |       |       |        |         |        |  |  |  |  |  |  |  |  | Size (mm) |   |
|-------------------------|-------|------|-------|-------|--------|---------|--------|--|--|--|--|--|--|--|--|-----------|---|
|                         | Zr    | Ta   | B     | Sn    | Pb     | As      | Ce     |  |  |  |  |  |  |  |  | Ø         | H |
| 12 MT 051               | 0.1   | ...  | 0.006 | 0.081 | ...    | (0.037) | <0.005 |  |  |  |  |  |  |  |  | various   | c |
| 12 MT 484               | 0.04  | 0.15 | ...   | 0.061 | 0.0026 | 0.016   | 0.016  |  |  |  |  |  |  |  |  |           |   |
| 12 MT 697               | 0.090 | ...  | ...   | ...   | ...    | ...     | ...    |  |  |  |  |  |  |  |  |           |   |

|                |       |       |       |       |      |      |       |       |      |       |      |      |      |        |        | Size (mm) |   |
|----------------|-------|-------|-------|-------|------|------|-------|-------|------|-------|------|------|------|--------|--------|-----------|---|
|                | C     | Si    | S     | P     | Mn   | Ni   | Cr    | Mo    | Cu   | Co    | V    | W    | Al   | N      | O      | Ø         | H |
| CRM 12 MI 164A | 0.004 | 0.019 | 0.070 | 0.004 | 1.57 | 1.29 | 0.032 | 0.009 | 0.88 | 0.006 | 0.78 | 1.44 | 0.72 | 0.0003 | 0.0005 | 31 x 18   | w |
| CRM 12 MI 165A | 0.003 | 0.021 | 0.086 | 0.005 | 1.65 | 1.43 | 0.036 | 0.009 | 1.40 | 0.006 | 1.13 | 1.57 | 0.80 | 0.0004 | 0.0004 | 31 x 18   |   |
| CRM 12 MI 166A | 0.003 | 0.91  | 0.073 | 0.005 | 1.29 | 0.77 | 0.014 | 1.08  | 0.64 | 0.004 | 0.40 | 1.02 | 0.55 | 0.0002 | 0.0006 | 31 x 18   |   |
| CRM 12 MI 167A | 0.003 | 1.08  | 0.087 | 0.019 | 1.36 | 1.00 | 0.016 | 1.25  |      |       |      |      |      |        |        |           |   |

# 1. Iron Base

# Steels

# Blocks/Discs

| 1.2.3 Low Alloy (continued) |            | C      | Si    | S      | P      | Mn    | Ni     | Cr     | Mo    | Cu     | Al      | V       | Ti     | Nb     | Others            | Size (mm) |            |           |           |
|-----------------------------|------------|--------|-------|--------|--------|-------|--------|--------|-------|--------|---------|---------|--------|--------|-------------------|-----------|------------|-----------|-----------|
|                             |            |        |       |        |        |       |        |        |       |        |         |         |        |        |                   | Ø         | H          |           |           |
| CRM                         | 12 HY K3   | 1.03   | 0.32  | 0.010  | (0.02) | 0.46  | 0.18   | 1.63   | ...   | 0.09   | ...     | ...     | ...    | ...    |                   |           | 32-35 x 19 |           |           |
| CRM                         | 12 HY K4   | 0.52   | 0.46  | 0.025  | (0.02) | 0.84  | (0.1)  | 1.23   | ...   | 0.28   | ...     | 0.20    | ...    | ...    |                   |           | 32-35 x 19 |           |           |
| CRM                         | 12 HY K6   | 0.51   | 0.30  | 0.026  | (0.02) | 0.79  | 1.72   | 0.96   | 0.37  | 0.26   | ...     | ...     | ...    | ...    |                   |           | 32-35 x 19 |           |           |
| CRM                         | 12 HY K9   | 0.096  | 0.59  | 0.018  | (0.01) | 1.53  | 0.97   | 0.64   | 0.56  | 0.73   | (0.01)  | 0.27    | 0.11   | (0.04) |                   |           | 32-35 x 19 |           |           |
|                             | 12 T 1749  | 0.4    | 0.19  | 0.015  | 0.01   | 0.733 | 0.19   | 1.734  | 0.257 | 0.188  | 1.034   | (0.003) | 0.003  | ...    |                   |           | 41 x 25 c  |           |           |
|                             | 12 CM 5127 | 0.076  | 1.64  | 0.0094 | 0.0072 | 1.1   | 0.025  | 0.013  | 0.02  | 0.034  | 0.019   | 0.391   | 0.272  | 0.012  |                   |           | 35 x 25    |           |           |
|                             | 12 CM 5128 | 0.222  | 1.18  | 0.037  | 0.023  | 0.95  | 0.224  | 0.254  | 0.532 | 0.148  | 0.235   | 0.34    | 0.574  | 0.088  |                   |           | each       |           |           |
|                             | 12 CM 5129 | 0.316  | 0.568 | 0.013  | 0.047  | 0.613 | 0.782  | 1.46   | 0.116 | 0.239  | 0.19    | 0.451   | 0.299  | 0.022  |                   |           | Set Only   |           |           |
|                             | 12 CM 5130 | 0.625  | 0.548 | 0.034  | 0.045  | 0.758 | 0.742  | 1.06   | 0.212 | 0.378  | 0.019   | 0.195   | 0.65   | 0.067  |                   |           | Set Only   |           |           |
|                             | 12 CM 5131 | 0.42   | 0.127 | 0.019  | 0.015  | 1.39  | 1.5    | 0.465  | 0.333 | 0.135  | 0.092   | 0.029   | 0.076  | 0.033  |                   |           | Set Only   |           |           |
|                             | 12 CM 5132 | 0.847  | 0.752 | 0.013  | 0.027  | 0.29  | 0.441  | 0.753  | 0.484 | 0.233  | ...     | 0.132   | ...    | 0.041  |                   |           | Set Only   |           |           |
|                             | 12 CM 5133 | 0.17   | 0.248 | 0.025  | 0.016  | 1.73  | 0.077  | 0.416  | 0.062 | 0.116  | 0.055   | 0.061   | 0.12   | 0.072  |                   |           | Set Only   |           |           |
|                             | 12 CM 5124 | 1.12   | 0.815 | 0.04   | 0.038  | 0.1   | 2.45   | 1.05   | 0.03  | 0.043  | 0.492   | 0.479   | 0.407  | ...    | Sn                |           | 35 x 30    |           |           |
|                             | 12 CM 5125 | 0.015  | 0.098 | 0.013  | 0.071  | 2.06  | 0.048  | 2.6    | 1.06  | 0.498  | 0.0038  | 0.0051  | 0.666  | ...    | Sn                |           | each       |           |           |
|                             | 12 CM 5126 | 0.654  | 1.57  | 0.059  | 0.0066 | 1.06  | 1.05   | 0.095  | 0.532 | 0.894  | 0.203   | 1.02    | 0.0029 | ...    | Sn                |           | Set Only   |           |           |
|                             | 12 CM 5112 | 0.542  | 0.194 | 0.007  | 0.018  | 0.56  | 0.011  | 0.018  | ...   | 0.015  | 0.005   | ...     | ...    | ...    | N, As             |           | 32 x 28    |           |           |
|                             | 12 CM 5113 | 0.07   | 0.029 | 0.023  | 0.011  | 1.04  | 0.375  | 0.355  | ...   | 0.382  | 0.019   | ...     | ...    | ...    | N, As             |           | each       |           |           |
|                             | 12 CM 5114 | 0.025  | 0.85  | 0.0185 | 0.008  | 0.134 | 0.023  | 0.047  | ...   | 0.017  | 0.02    | ...     | ...    | ...    | N, As             |           | Set Only   |           |           |
|                             | 12 CM 5115 | 0.531  | 0.123 | 0.022  | 0.033  | 1.35  | 0.192  | 0.202  | ...   | 0.197  | 0.028   | ...     | ...    | ...    | N, As             |           | Set Only   |           |           |
|                             | 12 CM 5116 | 0.108  | 0.545 | 0.059  | 0.049  | 0.337 | 0.474  | 0.512  | ...   | 0.48   | 0.033   | ...     | ...    | ...    | N, As             |           | Set Only   |           |           |
|                             | 12 CM 5117 | 0.336  | 0.283 | 0.01   | 0.019  | 0.6   | 0.312  | 0.314  | ...   | 0.316  | 0.013   | ...     | ...    | ...    | N, As             |           | Set Only   |           |           |
|                             | 12 CM 5118 | 0.549  | 0.39  | 0.012  | 0.02   | 1.21  | 0.018  | 0.41   | ...   | 0.302  | 0.036   | ...     | ...    | ...    | N, As             |           | Set Only   |           |           |
|                             | 12 CM 5119 | 0.224  | 0.7   | 0.061  | 0.063  | 1.02  | 0.117  | 0.139  | ...   | 0.13   | 0.034   | ...     | ...    | ...    | N, As             |           | Set Only   |           |           |
|                             | 12 CM 5120 | 0.475  | 0.261 | 0.03   | 0.019  | 0.7   | 0.0041 | 0.0077 | ...   | 0.0064 | ...     | ...     | ...    | ...    | N, As             |           | Set Only   |           |           |
|                             | 12 CM 5099 | 0.367  | 0.621 | 0.019  | 0.026  | 0.86  | 0.242  | 0.901  | 0.35  | 0.253  | ...     | ...     | ...    | ...    |                   |           | 32 x 28    |           |           |
|                             | 12 CM 5100 | 0.265  | 0.378 | 0.04   | 0.03   | 1.12  | 0.135  | 1.27   | 0.44  | 0.303  | ...     | ...     | ...    | ...    |                   |           | each       |           |           |
|                             | 12 CM 5101 | 0.105  | 0.113 | 0.01   | 0.043  | 1.75  | 0.064  | 1.76   | 0.601 | 0.113  | ...     | ...     | ...    | ...    |                   |           | Set Only   |           |           |
|                             | 12 CM 5102 | 0.658  | 1.55  | 0.025  | 0.0042 | 0.271 | 0.403  | 0.313  | 0.093 | 0.576  | ...     | ...     | ...    | ...    |                   |           | Set Only   |           |           |
|                             | 12 CM 5103 | 0.454  | 1.03  | 0.046  | 0.012  | 0.66  | 0.391  | 0.597  | 0.255 | 0.513  | ...     | ...     | ...    | ...    |                   |           | Set Only   |           |           |
|                             | 12 CM 5011 | 0.158  | 1.6   | 0.038  | 0.051  | 1.69  | 0.271  | 0.535  | 0.116 | 0.492  | ...     | 0.128   | ...    | ...    | W                 |           | 35 x 30    |           |           |
|                             | 12 CM 5012 | 0.471  | 0.98  | 0.051  | 0.026  | 0.855 | 0.386  | 0.042  | 0.223 | 0.301  | ...     | 0.209   | ...    | ...    | W                 |           | each       |           |           |
|                             | 12 CM 5013 | 0.294  | 1.43  | 0.028  | 0.039  | 1.08  | 0.178  | 0.146  | 0.029 | 0.106  | ...     | 0.065   | ...    | ...    | W                 |           | Set Only   |           |           |
|                             | 12 CM 5014 | 0.221  | 1.18  | 0.006  | 0.014  | 1.37  | 0.104  | 0.31   | 0.034 | 0.102  | ...     | 0.016   | ...    | ...    | W                 |           | Set Only   |           |           |
|                             | 12 CM 5038 | 0.483  | 0.194 | 0.041  | 0.01   | 0.343 | 1.09   | 0.717  | 1.02  | 0.497  | 0.484   | 0.3     | 0.141  | 0.212  | Co, B, Zr, As, Pb |           | 35 x 25    |           |           |
|                             | 12 CM 5039 | 0.658  | 0.069 | 0.0018 | 0.0044 | 0.12  | 0.774  | 0.35   | 0.266 | 0.358  | 1.51    | 0.447   | 0.483  | 0.025  | Co, Zr, As, Sn    |           | each       |           |           |
|                             | 12 CM 5040 | 0.106  | 0.481 | 0.014  | 0.022  | 1.07  | 1.46   | 1.45   | 1.21  | 0.108  | 0.08    | 0.083   | 0.099  | ...    | Co, B, Zr, As, Pb |           | Set Only   |           |           |
|                             | 12 CM 5041 | 0.345  | 0.41  | 0.052  | 0.036  | 0.674 | 1.94   | 1.04   | 0.116 | 0.999  | 0.271   | 0.198   | 0.242  | 0.311  | Co, B, Zr, As, Pb |           | Set Only   |           |           |
|                             | 12 CM 5042 | 0.211  | 0.174 | 0.021  | 0.046  | 1.36  | 0.487  | 0.124  | 0.472 | 0.233  | 0.866   | 0.619   | 0.812  | 0.139  | Co, B, Zr, As, Sn |           | Set Only   |           |           |
|                             | 12 CM 5043 | 0.034  | 0.663 | 0.011  | 0.069  | 1.96  | 0.102  | 1.93   | 0.674 | 0.08   | 0.0093  | 0.042   | 0.017  | 0.218  | Co, B, Zr, As, Sn |           | Set Only   |           |           |
|                             | 12 CM 5069 | 0.477  | 0.351 | 0.031  | 0.0193 | 1.15  | 0.787  | 0.05   | 0.088 | 0.0117 | 0.471   | 0.072   | 0.046  | ...    | W, B              |           | 32 x 28    |           |           |
|                             | 12 CM 5070 | 0.278  | 1.7   | 0.052  | 0.031  | 0.295 | 0.847  | 1.41   | 0.58  | 0.139  | 0.0092  | 0.143   | 0.232  | ...    | W, B              |           | each       |           |           |
|                             | 12 CM 5071 | 0.0425 | 0.919 | 0.021  | 0.0068 | 0.429 | 0.648  | 0.92   | 0.22  | 0.125  | 0.066   | 0.135   | 0.066  | ...    | W, B              |           | Set Only   |           |           |
|                             | 12 CM 5072 | 0.425  | 0.204 | 0.034  | 0.042  | 0.405 | 1.99   | 0.416  | 0.49  | 0.244  | 0.57    | 0.234   | 0.177  | ...    | W, B              |           | Set Only   |           |           |
|                             | 12 CM 5073 | 0.541  | 0.452 | 0.0036 | 0.0107 | 0.63  | 1.29   | 0.313  | 0.38  | 0.029  | 0.434   | 0.15    | 0.164  | ...    | W, B              |           | Set Only   |           |           |
|                             | 12 CM 5074 | 0.163  | 0.367 | 0.04   | 0.036  | 1.31  | 0.521  | 1.52   | 0.46  | 0.179  | 0.287   | 0.21    | 0.126  | ...    | W, B              |           | Set Only   |           |           |
|                             | 12 CM 5075 | 0.347  | 1.37  | 0.013  | 0.046  | 0.385 | 3.18   | 0.62   | 0.31  | 0.03   | 0.281   | 0.037   | 0.077  | ...    | W, B              |           | Set Only   |           |           |
|                             |            | C      | Si    | S      | P      | Mn    | Ni     | Cr     | Mo    | Cu     | Co      | Al      | V      | W      | Ti                | Sn        | N          | Size (mm) |           |
|                             |            |        |       |        |        |       |        |        |       |        |         |         |        |        |                   |           |            | Ø         | H         |
| CRM                         | 12 A 404/1 | 0.74   | 0.87  | 0.024  | 0.057  | 0.31  | 0.40   | 0.48   | 0.31  | 0.34   | ...     | ...     | 0.11   | ...    | ...               | ...       | ...        |           | 38 x 19 w |
| CRM                         | 12 A 401/2 | 0.935  | 0.602 | 0.0078 | 0.0265 | 1.197 | 0.019  | 0.138  | 0.495 | 0.101  | 0.0042  | 0.074   | 0.496  | ...    | ...               | ...       | (0.015)    |           | 38 x 19 w |
| CRM                         | 12 A 402/2 | 1.311  | 0.111 | 0.0138 | 0.0161 | 0.228 | 0.808  | 0.652  | 0.140 | 0.302  | ...     | 0.161   | 0.194  | ...    | ...               | ...       | 0.0069     |           | 38 x 19   |
| CRM                         | 12 A 403/2 | 0.750  | 0.209 | 0.0381 | 0.055  | 1.677 | 0.223  | 0.463  | 0.088 | 0.221  | ...     | 0.0485  | 0.341  | ...    | ...               | ...       | (0.01)     |           | 38 x 19   |
| CRM                         | 12 A 404/2 | 0.696  | 1.121 | 0.0228 | 0.0479 | 0.532 | 0.393  | 0.774  | 0.307 | 0.427  | ...     | 0.017   | 0.107  | ...    | ...               | ...       | 0.0089     |           | 38 x 19   |
| CRM                         | 12 A 405/2 | 0.044  | 0.947 | 0.058  | 0.0095 | 0.903 | 0.102  | 0.206  | 0.025 | 0.022  | (0.009) | 0.330   | 0.411  | ...    | ...               | ...       | (0.011)    |           | 38 x 19   |
| CRM                         | 12 A 406/2 | 0.173  | 0.342 | 0.043  | 0.0102 | 0.447 | 1.62   | 2.001  | 0.98  | 0.289  | (0.006) | 0.013   | 0.010  | ...    | ...               | (0.001)   | (0.009)    |           | 38 x 19 w |
| CRM                         | 12 A 407/2 | 0.490  | 0.66  | 0.0105 | 0.038  | 0.195 | 0.527  | 3.03   | 0.83  | 0.397  | 0.0068  | 0.040   | 0.19   | ...    | ...               | ...       | (0.011)    |           | 38 x 19   |
| CRM                         | 12 A 408/2 | 0.289  | 0.237 | 0.030  | 0.056  | 0.557 | 4.13   | 0.111  | 0.098 | 0.694  | ...     | 0.154   | 0.067  | ...    | ...               | (0.002)   | 0.0075     |           | 38 x 19   |
| CRM                         | 12 A 409/2 | 0.086  | 1.18  | 0.0179 | 0.0141 | 0.559 | 3.02   | 1.318  | 0.599 | 0.205  | ...     | 0.094   | 0.008  | ...    | ...               | ...       | 0.0108     |           | 38 x 19   |
| CRM                         | 12 A 410/2 | 0.428  | 1.10  | 0.041  | 0.074  | 0.419 | 2.07   | 1.684  | 0.432 | 0.436  | 0.0248  | 0.046   | 0.44   | ...    | ...               | ...       | 0.0155     |           | 38 x 19   |
| CRM                         | 12 A 612/1 | 0.12   | 0.28  | (0.02) | ...    | 0.60  | 0.97   | 4.14   | 0.80  | (0.06) | ...     | ...     | 0.21   | ...    | ...               | ...       | ...        |           | 44 x 19 c |
| CRM                         | 12 A 613/1 | 0.20   | 0.58  | (0.02) | ...    | 0.96  | 2.01   | 1.99   | 1.04  | (0.06) | ...     | ...     | 0.30   | ...    | ...               | ...       | ...        |           | 44 x 19   |
| CRM                         | 12 A 614/1 | 0.41   | 0.39  | (0.02) | ...    | 1.30  | 3.05   | 1.18   | 0.60  | (0.06) | ...     | ...     | 0.27   | ...    | ...               | ...       | ...        |           | 44 x 19   |
| CRM                         | 12 A 615/1 | 0.30   | 0.17  | (0.02) | ...    | 1.68  | 4.01   | 0.49   | 0.21  | (0.06) | ...     | ...     | 0.1    | ...    | ...               | ...       | ...        |           | 44 x 19   |
|                             | 12 CM 2111 | 0.125  | 0.484 | 0.0434 | 0.0103 | 1.19  | 0.413  | 0.63   | ...   | 0.154  | ...     | ...     | ...    | 0.90   | 0.132             | ...       | ...        |           | 32 x 28   |
|                             | 12 CM 2112 | 0.0226 | 0.581 | 0.037  | 0.0104 | 0.807 | 0.294  | 1.40   | ...   | 0.040  | ...     | ...     | ...    | 1.22   | 0.276             | ...       | ...        |           | each      |
|                             | 12 CM 2113 | 0.345  | 0.688 | 0.0226 | 0.0210 | 0.554 | 0.145  | 0.095  | ...   | 0.018  | ...     | ...     | ...    | 1.73   | 0.066             | ...       | ...        |           | Set Only  |
|                             | 12 CM 2114 | 0.500  | 0.967 | 0.0059 |        |       |        |        |       |        |         |         |        |        |                   |           |            |           |           |

# 1. Iron Base

# Steels

# Blocks/Discs

| 1.2.3 Low Alloy (continued)    |               | C         | Si        | S         | P         | Mn        | Ni        | Cr        | Mo        | Cu       | Co        | Sn       | Al        | V        | Ti               | Nb       | Zr       | Size (mm)  |            |
|--------------------------------|---------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|----------|-----------|----------|-----------|----------|------------------|----------|----------|------------|------------|
|                                |               |           |           |           |           |           |           |           |           |          |           |          |           |          |                  |          |          | Ø          | H          |
| CRM                            | 12 HY B1      | 0.98      | 1.79      | 0.020     | 0.019     | 0.075     | 4.08      | 1.83      | ...       | 0.50     | ...       | ...      | ...       | ...      | ...              | ...      | 0.074    | ...        | 32-35 x 19 |
| CRM                            | 12 HY B1/1    | 0.97      | 1.58      | 0.032     | 0.017     | 0.205     | 3.96      | 1.66      | ...       | 0.14     | ...       | ...      | ...       | ...      | ...              | ...      | 0.001    | ...        | 32-35 x 19 |
| CRM                            | 12 HY B2/2    | 0.065     | 0.38      | 0.064     | 0.087     | 1.22      | 1.49      | ...       | 1.06      | 0.32     | ...       | ...      | 0.10      | 0.87     | 0.25             | ...      | ...      | ...        | 32-35 x 19 |
| CRM                            | 12 HY B4      | 0.55      | 1.72      | 0.043     | 0.047     | 1.07      | ...       | ...       | ...       | 0.49     | ...       | ...      | ...       | ...      | ...              | ...      | 0.09     | ...        | 32-35 x 19 |
| CRM                            | 12 HY B5/1    | 0.12      | 0.41      | 0.054     | 0.023     | 1.85      | 1.99      | 0.09      | 1.39      | 0.15     | ...       | ...      | 0.35      | 0.50     | 0.53             | ...      | ...      | ...        | 32-35 x 19 |
| CRM                            | 12 E 500      | 0.106     | 0.282     | 0.0048    | 0.016     | 0.844     | 0.018     | 0.612     | 0.0013    | 0.270    | 0.0046    | 0.002    | 0.046     | 0.0092   | 0.0014           | 0.008    | ...      | ...        | 35 x 20    |
| CRM                            | 12 E 501      | 0.277     | 0.208     | 0.030     | 0.016     | 0.723     | 0.063     | 1.05      | 0.210     | 0.083    | 0.008     | 0.008    | 0.034     | 0.0076   | 0.0015           | ...      | ...      | ...        | 35 x 20    |
| CRM                            | 12 E 502      | 0.210     | 0.198     | 0.026     | 0.018     | 0.823     | 0.408     | 0.485     | 0.155     | 0.121    | 0.0083    | ...      | 0.024     | ...      | 0.0016           | ...      | ...      | ...        | 35 x 20    |
|                                | 12 M BS12B    | 0.95      | 0.365     | 0.010     | 0.010     | 0.081     | 0.127     | 1.58      | 0.30      | 0.12     | 0.023     | 0.024    | 0.016     | 0.105    | 0.055            | 0.156    | 0.005    | ...        | ...        |
|                                | 12 M BS13B    | 0.211     | 0.015     | 0.005     | 0.018     | 0.316     | 0.43      | 0.081     | 0.050     | 0.023    | 0.19      | 0.061    | 0.016     | 0.010    | 0.004            | 0.003    | (0.01)   | continued  | ...        |
|                                | 12 M BS14B    | 0.642     | 1.26      | 0.006     | 0.028     | 1.71      | 0.95      | 0.050     | 0.004     | 1.14     | 0.009     | 0.097    | 0.024     | 0.010    | 0.030            | 0.041    | <0.001   | ...        | ...        |
|                                | 12 M BS15A    | 0.142     | 0.058     | 0.008     | 0.016     | 1.12      | 0.029     | 0.044     | 0.008     | 0.030    | 0.005     | 0.002    | 0.041     | 0.012    | 0.008            | 0.041    | 0.022    | ...        | ...        |
| CRM                            | 12 M BS CCS-2 | 0.200     | 0.310     | 0.040     | 0.046     | 0.885     | 0.314     | 0.269     | 0.100     | 0.096    | 0.055     | 0.017    | 0.038     | 0.080    | 0.037            | 0.049    | 0.002    | ...        | ...        |
|                                | 12 M BS XCCS  | 0.042     | 0.010     | 0.014     | 0.003     | 0.32      | 0.017     | 0.014     | 0.005     | 0.018    | 0.003     | 0.006    | 0.069     | <0.002   | <0.001           | <0.002   | <0.002   | continued  | ...        |
|                                | 12 M BS XCCT  | 0.158     | 0.28      | 0.011     | 0.005     | 0.52      | 1.27      | 0.65      | 0.020     | 0.027    | 0.017     | 0.002    | 0.006     | 0.031    | 0.002            | 0.001    | <0.002   | ...        | ...        |
|                                | 12 M BS XCCV  | 0.44      | 0.28      | 0.024     | 0.012     | 1.75      | 0.018     | 0.041     | 0.007     | 0.015    | 0.006     | 0.001    | 0.033     | <0.003   | 0.002            | <0.002   | <0.002   | ...        | ...        |
|                                | 12 CG 01666   | 0.162     | 0.191     | 0.0096    | 0.044     | 0.626     | 3.29      | 3.03      | 0.331     | 0.314    | ...       | 0.0045   | 0.033     | 0.215    | 0.227            | ...      | ...      | ...        | ...        |
|                                | 12 CG 01667   | 0.137     | 0.105     | 0.057     | 0.058     | 3.74      | 4.22      | 0.864     | 0.061     | 0.063    | ...       | 0.064    | 0.018     | 0.503    | 0.345            | ...      | ...      | ...        | ...        |
|                                | 12 CG 01668   | 0.227     | 0.324     | 0.021     | 0.038     | 0.771     | 1.15      | 2.22      | 0.577     | 0.244    | ...       | 0.010    | 0.054     | 0.347    | 0.335            | ...      | ...      | ...        | ...        |
|                                | 12 CG 01669   | 0.061     | 0.104     | 0.020     | 0.049     | 2.71      | 2.86      | 4.88      | 1.41      | 0.342    | ...       | 0.036    | 0.012     | 0.404    | 0.109            | ...      | ...      | continued  | ...        |
|                                | 12 CG 01670   | 0.193     | 0.242     | 0.027     | 0.030     | 1.03      | 1.78      | 1.42      | 0.811     | 0.121    | ...       | 0.0098   | 0.043     | 0.215    | 0.202            | ...      | ...      | ...        | ...        |
|                                | 12 CG 01671   | 0.273     | 0.458     | 0.036     | 0.034     | 1.92      | 0.924     | 3.59      | 0.196     | 0.247    | ...       | 0.028    | 0.170     | 0.301    | 0.116            | ...      | ...      | ...        | ...        |
|                                | 12 CG 01672   | 0.481     | 0.920     | 0.055     | 0.0072    | 0.345     | 0.151     | 0.194     | 0.422     | 0.526    | ...       | 0.0042   | 0.440     | 0.013    | 0.046            | ...      | ...      | ...        | ...        |
|                                | 12 CG 01673   | 0.435     | 0.551     | 0.0007    | 0.032     | 0.452     | 0.177     | 0.147     | 0.447     | 0.539    | ...       | 0.0072   | 0.551     | 0.061    | 0.051            | ...      | ...      | ...        | ...        |
| CRM                            | 12 HY A11/1   | 0.043     | 1.46      | 0.0137    | 0.011     | 0.21      | 0.04      | 0.02      | 1.20      | 0.047    | ...       | 0.002    | 0.02      | 0.46     | 0.17             | 0.16     | ...      | ...        | ...        |
| CRM                            | 12 HY A12     | 0.031     | 1.19      | 0.082     | 0.014     | 0.31      | 2.43      | 1.25      | 0.47      | 0.18     | 0.012     | ...      | 0.18      | 0.042    | 0.05             | (0.03)   | ...      | ...        | ...        |
| CRM                            | 12 HY A13     | 0.104     | 0.81      | 0.073     | 0.053     | 0.49      | 1.93      | 0.14      | 0.91      | 0.166    | 0.011     | 0.060    | 0.042     | 0.23     | 0.11             | ...      | ...      | ...        | ...        |
| CRM                            | 12 HY A14     | 0.12      | 0.73      | 0.052     | 0.041     | 0.75      | 1.32      | 0.59      | 0.25      | 0.20     | 0.070     | 0.10     | (0.01)    | 0.67     | 0.12             | 0.044    | ...      | ...        | ...        |
| CRM                            | 12 HY A15     | 0.34      | 0.70      | 0.042     | 0.071     | 0.99      | 0.32      | 0.79      | 0.55      | 0.29     | ...       | 0.13     | 0.03      | 0.80     | 0.09             | 0.16     | ...      | continued  | ...        |
| CRM                            | 12 HY A16/1   | 0.36      | 0.55      | 0.023     | 0.063     | 1.13      | 0.92      | 1.45      | 0.062     | 0.25     | ...       | 0.007    | 0.10      | 0.44     | 0.085            | ...      | ...      | ...        | ...        |
| CRM                            | 12 HY A17     | 0.78      | 0.37      | 0.024     | 0.039     | 1.79      | 0.59      | 0.24      | 0.074     | 0.53     | 0.039     | 0.05     | 0.016     | 0.15     | 0.022            | 0.043    | ...      | ...        | ...        |
| CRM                            | 12 HY A18     | 1.16      | 0.15      | 0.007     | 0.014     | 1.99      | 0.125     | 0.90      | ...       | 0.066    | ...       | 0.016    | (0.02)    | 0.10     | 0.011            | 0.035    | ...      | ...        | ...        |
| CRM                            | 12 HY A19/1   | 0.22      | 0.33      | 0.016     | 0.019     | 0.84      | 0.11      | 1.04      | 0.012     | 0.11     | ...       | 0.004    | 0.10      | 0.34     | 0.23             | 0.12     | ...      | ...        | ...        |
| CRM                            | 12 HY B3      | 0.20      | 0.53      | 0.025     | (0.012)   | 0.14      | ...       | 5.94      | ...       | 0.25     | ...       | ...      | ...       | 1.16     | ...              | ...      | ...      | ...        | ...        |
| CRM                            | 12 HY B12     | 0.43      | 0.34      | 0.048     | 0.028     | 0.76      | 1.62      | 1.32      | 0.21      | 0.41     | 0.011     | 0.032    | 0.007     | 0.026    | 0.011            | 0.022    | (0.002)  | ...        | ...        |
| CRM                            | 12 HY B14     | 1.16      | 1.21      | 0.005     | 0.028     | 0.65      | 0.16      | 3.17      | 1.25      | 0.107    | 0.30      | ...      | ...       | 0.14     | 0.26             | 0.41     | ...      | ...        | ...        |
| CRM                            | 12 HY B15     | 0.98      | 0.80      | 0.031     | 0.030     | 0.69      | 0.15      | 3.70      | 1.20      | 0.14     | 0.21      | ...      | 0.13      | 0.33     | 0.32             | ...      | ...      | continued  | ...        |
| CRM                            | 12 HY B16     | 0.16      | 1.95      | 0.051     | 0.068     | 2.05      | 3.74      | 0.26      | 0.11      | 0.09     | ...       | ...      | (0.037)   | 0.53     | 0.075            | 0.11     | ...      | ...        | ...        |
| CRM                            | 12 HY B20     | 0.008     | 0.005     | 0.013     | 0.012     | 0.09      | 0.038     | 0.03      | <0.01     | 0.034    | <0.01     | (0.003)  | (0.01)    | <0.005   | <0.002           | ...      | ...      | ...        | ...        |
| <b>Continuation from above</b> |               | <b>Sb</b> | <b>Se</b> | <b>Pb</b> | <b>As</b> | <b>Ca</b> | <b>Ta</b> | <b>B</b>  | <b>Ce</b> | <b>W</b> | <b>Mg</b> | <b>N</b> | <b>Zn</b> | <b>O</b> | <b>Size (mm)</b> |          |          |            |            |
|                                |               |           |           |           |           |           |           |           |           |          |           |          |           |          |                  | <b>Ø</b> | <b>H</b> |            |            |
|                                | 12 M BS12B    | 0.014     | 0.012     | 0.004     | 0.002     | 0.0008    | 0.024     | <0.00005  | 0.020     | 0.014    | (0.0003)  | 0.0141   | 0.0003    | (0.007)  | ...              | ...      | ...      | 32 x 17    | cc         |
|                                | 12 M BS13B    | 0.027     | 0.023     | 0.0009    | 0.050     | <0.0001   | 0.005     | <0.0002   | <0.0005   | 0.04     | (0.00005) | 0.0099   | 0.0003    | (0.02)   | ...              | ...      | ...      | 32 x 17    | ...        |
|                                | 12 M BS14B    | 0.043     | 0.025     | 0.021     | 0.010     | 0.0012    | (0.002)   | (0.00002) | 0.009     | (0.002)  | (0.0004)  | 0.0090   | 0.0009    | (0.005)  | ...              | ...      | ...      | 32 x 17    | ...        |
|                                | 12 M BS15A    | (0.003)   | ...       | (0.0003)  | 0.003     | (0.0005)  | ...       | (0.0002)  | (0.003)   | (0.004)  | ...       | ...      | ...       | ...      | ...              | ...      | ...      | 32 x 17    | ...        |
|                                | 12 M BS CCS-2 | 0.024     | ...       | 0.0032    | 0.016     | (0.0001)  | 0.02      | 0.0037    | ...       | 0.042    | ...       | (0.0006) | ...       | (0.0010) | ...              | ...      | ...      | 36-41 x 19 | w          |
|                                | 12 M BS XCCS  | 0.0006    | ...       | <0.002    | 0.003     | ...       | ...       | ...       | ...       | ...      | ...       | 0.0047   | ...       | 0.0027   | ...              | ...      | ...      | 36-41 x 19 | ...        |
|                                | 12 M BS XCCT  | 0.0004    | ...       | <0.001    | 0.004     | ...       | ...       | ...       | ...       | ...      | ...       | 0.0076   | ...       | (0.005)  | ...              | ...      | ...      | 36-41 x 19 | ...        |
|                                | 12 M BS XCCV  | <0.0003   | ...       | <0.001    | 0.002     | ...       | ...       | ...       | ...       | ...      | ...       | 0.0056   | ...       | (0.0018) | ...              | ...      | ...      | 36-41 x 19 | ...        |
|                                | 12 CG 01666   | ...       | ...       | 0.0009    | 0.019     | ...       | ...       | 0.0061    | 0.018     | 0.457    | ...       | 0.010    | ...       | ...      | ...              | ...      | ...      | 38 x 30    | ...        |
|                                | 12 CG 01667   | ...       | ...       | 0.0011    | 0.028     | ...       | ...       | 0.0005    | 0.0006    | 0.109    | ...       | 0.0079   | ...       | ...      | ...              | ...      | ...      | each       | ...        |
|                                | 12 CG 01668   | ...       | ...       | ...       | 0.011     | ...       | ...       | 0.0044    | 0.0019    | 0.755    | ...       | 0.0054   | ...       | ...      | ...              | ...      | ...      | ...        | ...        |
|                                | 12 CG 01669   | ...       | ...       | ...       | 0.016     | ...       | ...       | 0.0019    | ...       | 1.99     | ...       | 0.035    | ...       | ...      | ...              | ...      | ...      | Set only   | ...        |
|                                | 12 CG 01670   | ...       | ...       | 0.0018    | 0.040     | ...       | ...       | 0.0052    | ...       | 0.775    | ...       | 0.026    | ...       | ...      | ...              | ...      | ...      | ...        | ...        |
|                                | 12 CG 01671   | ...       | ...       | 0.0007    | 0.025     | ...       | ...       | 0.011     | ...       | 0.210    | ...       | 0.027    | ...       | ...      | ...              | ...      | ...      | ...        | ...        |
|                                | 12 CG 01672   | ...       | ...       | 0.015     | 0.0047    | ...       | ...       | 0.030     | ...       | 0.429    | ...       | 0.0068   | ...       | ...      | ...              | ...      | ...      | ...        | ...        |
|                                | 12 CG 01673   | ...       | ...       | 0.0014    | 0.0063    | ...       | ...       | 0.023     | 0.128     | 0.237    | ...       | 0.0044   | ...       | ...      | ...              | ...      | ...      | ...        | ...        |
|                                | 12 HY A11/1   | <0.001    | ...       | ...       | ...       | ...       | ...       | ...       | ...       | ...      | ...       | ...      | ...       | ...      | ...              | ...      | ...      | 32-35 x 19 | w          |
|                                | 12 HY A12     | 0.013     | ...       | ...       | 0.007     | ...       | ...       | ...       | ...       | ...      | ...       | ...      | ...       | ...      | ...              | ...      | ...      | 32-35 x 19 | ...        |
|                                | 12 HY A13     | 0.024     | ...       | ...       | 0.070     | ...       | ...       | (0.002)   | ...       | ...      | ...       | ...      | ...       | ...      | ...              | ...      | ...      | 32-35 x 19 | ...        |
|                                | 12 HY A14     | 0.047     | ...       | ...       | 0.13      | ...       | ...       | 0.004     | ...       | ...      | ...       | ...      | ...       | ...      | ...              | ...      | ...      | 32-35 x 19 | ...        |
|                                | 12 HY A15     | ...       | ...       | (0.004)   | 0.06      | ...       | ...       | 0.008     | ...       | ...      | ...       | ...      | ...       | ...      | ...              | ...      | ...      | 32-35 x 19 | ...        |
|                                | 12 HY A16/1   | <0.001    | ...       | ...       | 0.007     | ...       | ...       | ...       | ...       | ...      | ...       | ...      | ...       | ...      | ...              | ...      | ...      | 32-35 x 19 | ...        |
|                                | 12 HY A17     | (0.10)    | ...       | ...       | 0.032     | ...       | ...       | (0.012)   | ...       | ...      | ...       | ...      | ...       | ...      | ...              | ...      | ...      | 32-35 x 19 | ...        |
|                                | 12 HY A18     | 0.005     | ...       | ...       | 0.003     | ...       | ...       | (0.011)   | ...       | ...      | ...       | ...      | ...       | ...      | ...              | ...      | ...      | 32-35 x 19 | ...        |
|                                | 12 HY A19/1   | <0.001    | ...       | ...       | ...       | ...       | ...       | 0.006     | ...       | ...      | ...       | ...      | ...       | ...      | ...              | ...      | ...      | 32-35 x 19 | ...        |
|                                | 12 HY B3      | ...       | ...       | ...       | ...       | ...       | ...       | ...       | ...       | 1.19     | ...       | ...      | ...       | ...      | ...              | ...      | ...      | 32-35 x 19 | ...        |
|                                | 12 HY B12     | ...       | ...       | ...       | 0.011     | ...       | ...       | 0.0035    | ...       | ...      | ...       | ...      | ...       | ...      | ...              | ...      | ...      | 32-35 x 19 | ...        |
|                                | 12 HY B14     | ...       | ...       | ...       | ...       | ...       | ...       | 0.0006    | (0.002)   | ...      | ...       | ...      | ...       | ...      | ...              | ...      | ...      | 32-35 x 19 | ...        |
|                                | 12 HY B15     | ...       | ...       | ...       | ...       | ...       | ...       | ...       | ...       | ...      | ...       | ...      | ...       | ...      | ...              | ...      | ...      | 32-35 x 19 | ...        |
|                                | 12 HY B16     | ...       | ...       | ...       | ...       | ...       | ...       | ...       | ...       | ...      | ...       | ...      | ...       | ...      | ...              | ...      | ...      | 32-35 x 19 | ...        |
|                                | 12 HY B20     | ...       | ...       | (0.002)   | (0.003)   | ...       | ...       | ...       | ...       | ...      | ...       | ...      | ...       | ...      | ...              | ...      | ...      | 32-35 x 19 | ...        |

# 1. Iron Base

# Steels

# Blocks/Discs

## 1.2.3 Low Alloy (continued)

|                  | C     | Si    | S      | P     | Mn   | Ni    | Cr    | Mo    | Cu    | Sn      | Al      | Ca       | Co    |           |
|------------------|-------|-------|--------|-------|------|-------|-------|-------|-------|---------|---------|----------|-------|-----------|
| 12 M BS 2931     | 0.202 | 0.23  | 0.025  | 0.012 | 0.75 | 0.106 | 0.154 | 0.019 | 0.23  | 0.010   | 0.002   | 0.0009   | 0.009 |           |
| 12 M BS 4931     | 0.352 | 0.27  | 0.016  | 0.011 | 0.80 | 0.070 | 0.093 | 0.024 | 0.217 | 0.009   | (0.001) | ...      | 0.006 |           |
| 12 M BS 4932     | 0.234 | 0.25  | 0.015  | 0.010 | 0.76 | 0.080 | 0.144 | 0.033 | 0.15  | 0.008   | (0.001) | 0.001    | 0.005 | continued |
| CRM 12 M BS 3993 | 0.152 | 0.260 | 0.094  | 0.012 | 1.16 | 0.045 | 0.072 | 0.010 | 0.111 | 0.006   | 0.002   | (0.0002) | 0.006 |           |
| 12 M BS LF3      | 0.183 | 0.206 | 0.018  | 0.006 | 0.52 | 3.36  | 0.098 | 0.056 | 0.08  | 0.006   | 0.017   | (0.0001) | 0.056 |           |
| 12 M BS 230      | 0.387 | 0.302 | 0.027  | 0.016 | 0.86 | 0.052 | 0.81  | 0.22  | 0.030 | 0.001   | 0.042   | ...      | 0.007 |           |
| 12 M BS 231      | 0.84  | 0.39  | 0.051  | 0.036 | 1.42 | 0.105 | 0.135 | 0.145 | 0.054 | 0.027   | 0.020   | <0.001   | 0.117 |           |
| 12 M BS 232      | 0.032 | 1.11  | 0.018  | 0.154 | 0.44 | 0.058 | 0.112 | 0.55  | 0.049 | 0.007   | 0.085   | ...      | 0.007 |           |
| 12 M BS 233      | 0.071 | 0.28  | 0.0043 | 0.022 | 2.00 | 0.018 | 0.031 | 0.006 | 0.013 | (0.001) | 0.040   | (0.002)  | 0.005 | continued |
| 12 M BS 3972     | 0.195 | 0.106 | 0.056  | 0.083 | 1.30 | 1.19  | 0.108 | 0.032 | 0.082 | 0.012   | 0.031   | ...      | 0.010 |           |
| 12 M BS 4971     | 0.251 | 0.215 | 0.033  | 0.050 | 0.56 | 0.088 | 0.402 | 0.027 | 0.106 | 0.010   | 0.03    | <0.0005  | 0.02  |           |

| Continuation from above | As      | V       | N      | O       | B      | Ti       | Nb      | Sb      | W       | Typical Alloy Type | Size (mm) Ø H |   |
|-------------------------|---------|---------|--------|---------|--------|----------|---------|---------|---------|--------------------|---------------|---|
| 12 M BS 2931            | 0.007   | 0.002   | 0.0119 | 0.005   | ...    | ...      | ...     | ...     | ...     | AISI 1018          | 37-38 x 19    | w |
| 12 M BS 4931            | 0.005   | 0.058   | 0.008  | 0.0034  | ...    | (0.002)  | ...     | ...     | ...     | AISI 1035          | 37-38 x 19    |   |
| 12 M BS 4932            | (0.005) | 0.06    | 0.008  | 0.0028  | ...    | ...      | ...     | ...     | ...     | AISI 1026          | 37-38 x 19    |   |
| 12 M BS 3993            | 0.004   | 0.002   | 0.0071 | (0.003) | ...    | (0.0008) | ...     | ...     | ...     | AISI 1117          | 37-38 x 19    |   |
| 12 M BS LF3             | 0.006   | (0.002) | 0.0054 | 0.004   | 0.0001 | ...      | ...     | ...     | ...     | ASTM A350          | 37-38 x 19    |   |
|                         |         |         |        |         |        |          |         |         |         |                    | W D H         |   |
| 12 M BS 230             | 0.004   | 0.004   | 0.0048 | 0.0024  | ...    | (0.001)  | <0.002  | ...     | (0.002) |                    | 32 x 32 x 19  |   |
| 12 M BS 231             | 0.022   | 0.108   | 0.0045 | (0.004) | 0.0028 | 0.001    | 0.006   | 0.050   | 0.001   |                    | 32 x 32 x 19  |   |
| 12 M BS 232             | 0.008   | 0.088   | 0.0056 | (0.002) | 0.0005 | 0.26     | (0.002) | (0.002) | <0.003  |                    | 32 x 32 x 19  |   |
| 12 M BS 233             | 0.004   | 0.103   | 0.0107 | ...     | ...    | 0.0017   | 0.040   | ...     | <0.005  |                    | 32 x 32 x 19  |   |
| 12 M BS 3972            | 0.012   | 0.191   | 0.0065 | 0.0038  | 0.0104 | 0.163    | (0.001) | ...     | <0.008  |                    | 35 x 35 x 19  |   |
| 12 M BS 4971            | 0.008   | 0.015   | 0.0099 | 0.004   | ...    | 0.027    | 0.033   | ...     | (0.001) |                    | 35 x 35 x 19  |   |

|           | C     | Si   | S     | P     | Mn   | Ni    | Cr   | Mo   | Cu    | Al    | Ti    | Co    | V     | Size (mm) Ø H |
|-----------|-------|------|-------|-------|------|-------|------|------|-------|-------|-------|-------|-------|---------------|
| 12 RI 103 | 0.045 | 1.53 | 0.030 | 0.021 | 1.36 | 0.200 | 1.20 | 0.18 | 0.110 | 0.043 | 0.080 | 0.029 | 0.590 | 45 x 20       |
| 12 RI 104 | 0.250 | 1.62 | 0.020 | 0.039 | 2.05 | 1.425 | 0.71 | 0.98 | 0.450 | 0.178 | 0.185 | 0.077 | 0.380 | 45 x 20       |
| 12 RI 107 | 0.140 | 0.15 | 0.024 | 0.025 | 2.37 | 6.310 | 0.29 | 0.28 | 0.200 | 0.98  | 0.063 | 0.007 | 0.105 | 45 x 20       |
| 12 RI 108 | 0.520 | 0.48 | 0.019 | 0.020 | 0.57 | 0.250 | 0.22 | 0.04 | 0.105 | 0.020 | ...   | 0.008 | 0.020 | 45 x 20       |

|               | C       | Si    | S      | P     | Mn    | Ni    | Cr    | Mo    | Cu    | Co    | Sn     | Al      | V     | Ti    | Nb       |           |
|---------------|---------|-------|--------|-------|-------|-------|-------|-------|-------|-------|--------|---------|-------|-------|----------|-----------|
| CRM 12 D 180B | (0.003) | 0.001 | 0.0038 | 0.004 | 0.047 | 0.018 | 0.013 | 0.001 | 0.006 | 0.003 | 0.0011 | (0.001) | 0.000 | 0.000 | (0.0001) |           |
| CRM 12 D 181A | 0.225   | 0.435 | 0.007  | 0.039 | 0.971 | 0.725 | 0.660 | 0.385 | 0.093 | 0.050 | 0.113  | 0.016   | 0.302 | 0.149 | 0.058    |           |
| CRM 12 D 182A | 1.38    | 0.123 | 0.006  | 0.008 | 0.370 | 2.82  | 0.122 | 0.011 | 0.293 | 0.171 | 0.004  | 0.023   | 0.027 | 0.004 | 0.001    |           |
| CRM 12 D 183A | 0.047   | 1.02  | 0.012  | 0.009 | 1.74  | 1.09  | 0.204 | 0.036 | 0.568 | 0.119 | 0.051  | 0.15    | 0.004 | 0.003 | 0.006    |           |
| CRM 12 D 184A | 1.013   | 0.348 | (0.01) | 0.028 | 2.23  | 0.250 | 2.33  | 0.016 | 0.089 | 0.007 | 0.008  | 0.022   | 0.017 | 0.010 | 0.013    | continued |
| CRM 12 D 185A | 0.566   | 0.23  | (0.02) | 0.024 | 0.715 | 3.84  | 0.032 | 0.123 | 0.179 | 0.032 | 0.003  | 0.060   | 0.178 | 0.022 | 0.20     |           |
| CRM 12 D 186A | 0.393   | 1.41  | 0.007  | 0.013 | 1.315 | 1.58  | 1.51  | 0.255 | 0.227 | 0.006 | 0.018  | 0.042   | 0.021 | 0.047 | 0.004    |           |
| CRM 12 D 187A | 0.119   | 0.567 | 0.018  | 0.035 | 0.525 | 0.085 | 3.51  | 0.565 | 0.036 | 0.071 | 0.013  | 0.019   | 0.558 | 0.087 | 0.028    |           |
| CRM 12 D 188A | 0.332   | 0.775 | 0.033  | 0.006 | 0.169 | 0.445 | 5.11  | 1.28  | 0.057 | 0.006 | 0.005  | 0.093   | 0.802 | 0.034 | 0.122    |           |
| CRM 12 D 189A | 0.175   | 0.286 | 0.051  | 0.032 | 0.262 | 5.34  | 1.065 | 0.837 | 0.060 | 0.007 | 0.029  | 0.041   | 0.054 | 0.326 | 0.017    |           |

| Continuation from above | Zr      | Sb      | Pb     | As      | Ta      | B      | W       | Bi     | N        | Size (mm) Ø H |
|-------------------------|---------|---------|--------|---------|---------|--------|---------|--------|----------|---------------|
| 12 D 180B               | 0.000   | 0.0004  | ...    | 0.001   | ...     | ...    | ...     | ...    | (0.0028) | 45 x 30       |
| 12 D 181A               | 0.001   | 0.016   | 0.0005 | 0.027   | 0.039   | 0.0069 | 0.188   | ...    | (0.005)  | 45 x 30       |
| 12 D 182A               | 0.001   | 0.001   | ...    | 0.005   | 0.000   | 0.0003 | 0.016   | ...    | 0.0049   | 45 x 30       |
| 12 D 183A               | 0.078   | 0.001   | ...    | 0.005   | ...     | 0.0005 | 0.354   | 0.0000 | 0.0036   | 45 x 30       |
| 12 D 184A               | (0.002) | 0.002   | ...    | 0.006   | 0.000   | 0.0005 | (0.001) | ...    | 0.0104   | 45 x 30       |
| 12 D 185A               | 0.002   | 0.011   | 0.002  | 0.022   | 0.085   | 0.0116 | (0.001) | ...    | 0.0051   | 45 x 30       |
| 12 D 186A               | (0.002) | 0.002   | ...    | 0.007   | 0.009   | 0.0009 | 0.054   | ...    | (0.005)  | 45 x 30       |
| 12 D 187A               | 0.013   | 0.023   | 0.003  | (0.007) | 0.015   | 0.0006 | 0.67    | 0.003  | 0.0122   | 45 x 30       |
| 12 D 188A               | 0.052   | 0.006   | 0.001  | (0.005) | 0.022   | 0.0047 | 0.091   | ...    | 0.0076   | 45 x 30       |
| 12 D 189A               | 0.005   | (0.003) | 0.002  | 0.080   | (0.005) | 0.0030 | 1.30    | ...    | (0.004)  | 45 x 30       |

|             | C     | Si    | S      | P     | Mn    | Ni    | Cr    | Cu    | Al     | Soluble Al | Total Al | Sn     | V     | Ti     | Zr     | Sb     | B      | N      | Size (mm) Ø H |
|-------------|-------|-------|--------|-------|-------|-------|-------|-------|--------|------------|----------|--------|-------|--------|--------|--------|--------|--------|---------------|
| 12 CG 01385 | 0.022 | 4.14  | 0.0091 | 0.076 | 1.88  | 0.182 | 0.289 | 0.559 | 1.18   | 1.19       | 0.071    | 0.0046 | 0.072 | 0.021  | 0.0008 | 0.022  | 0.0046 | 0.0046 | 37 x 30       |
| 12 CG 01386 | 0.063 | 1.50  | 0.017  | 0.062 | 1.42  | 0.368 | 0.222 | 0.250 | 0.46   | 0.464      | 0.033    | 0.0061 | 0.032 | 0.084  | 0.0012 | 0.013  | 0.0061 | 0.0061 | each          |
| 12 CG 01387 | 0.106 | 1.03  | 0.029  | 0.045 | 0.547 | 0.569 | 0.186 | 0.146 | 0.777  | 0.783      | 0.019    | 0.0058 | 0.026 | 0.018  | 0.0011 | 0.012  | 0.0058 | 0.0058 |               |
| 12 CG 01388 | 0.120 | 0.163 | 0.037  | 0.040 | 0.257 | 0.836 | 0.090 | 0.157 | 1.46   | 1.47       | 0.017    | 0.0024 | 0.014 | 0.014  | 0.0004 | 0.0087 | 0.0024 | 0.0024 | Set only      |
| 12 CG 01389 | 0.040 | 4.16  | 0.031  | 0.020 | 1.10  | 0.101 | 0.043 | 0.063 | 0.066  | 0.069      | 0.0055   | 0.0025 | 0.011 | 0.0034 | 0.021  | 0.0055 | 0.0025 | 0.0025 |               |
| 12 CG 01390 | 0.033 | 3.39  | 0.0087 | 0.019 | 2.08  | 0.060 | 0.627 | 0.350 | 0.0047 | 0.0067     | 0.105    | 0.0050 | 0.036 | 0.0035 | 0.0011 | 0.022  | 0.0050 | 0.0050 |               |
| 12 CG 01391 | 0.036 | 2.47  | 0.011  | 0.061 | 1.75  | 0.159 | 0.495 | 0.278 | 1.17   | 1.18       | 0.072    | 0.0042 | 0.043 | 0.023  | 0.0008 | 0.021  | 0.0042 | 0.0042 |               |

|            | C     | Si   | S     | P     | Mn   | Ni   | Cr    | Cu   | Mo    | Co    | V     | W     | Al    | Sn    | As    | Sb    | B      | Size (mm) Ø H |
|------------|-------|------|-------|-------|------|------|-------|------|-------|-------|-------|-------|-------|-------|-------|-------|--------|---------------|
| 12 MI 194A | 0.517 | 0.49 | 0.025 | 0.039 | 1.04 | 0.79 | 0.70  | 0.26 | 0.40  | 0.052 | 0.333 | 0.13  | 0.102 | 0.017 | 0.031 | 0.015 | 0.0058 | 44 x 25       |
| 12 MI 195A | 0.255 | 1.16 | 0.007 | 0.018 | 1.85 | 1.01 | 0.214 | 0.52 | 0.052 | 0.102 | 0.083 | 0.38  | 0.013 | 0.084 | 0.021 | 0.013 | 0.0040 | 44 x 25       |
| 12 MI 195B | 0.255 | 1.16 | 0.005 | 0.018 | 1.84 | 1.00 | 0.216 | 0.52 | 0.052 | 0.101 | 0.082 | 0.38  | 0.029 | 0.084 | 0.021 | 0.011 | 0.0039 | 44 x 25       |
| 12 MI 196A | 1.08  | 0.35 | 0.014 | 0.040 | 2.40 | 0.61 | 2.35  | 0.25 | 0.129 | 0.013 | 0.157 | 0.189 | 0.015 | 0.033 | 0.025 | 0.006 | 0.0017 | 44 x 25       |

# 1. Iron Base

# Steels

# Blocks/Discs

| 1.2.3 Low Alloy (continued)   |  |          |         |         |         |         |        |        |          |            |         |          |         |         |        |                  |                  |          |                  |    |
|-------------------------------|--|----------|---------|---------|---------|---------|--------|--------|----------|------------|---------|----------|---------|---------|--------|------------------|------------------|----------|------------------|----|
|                               |  | C        | Si      | S       | P       | Mn      | Ni     | Cr     | Cu       | Soluble Al |         | Total Al | Sn      | V       | Ti     | Zr               | Sb               |          |                  |    |
| 12 JH ST1                     |  | 0.0010   | 0.006   | 0.0012  | <0.001  | 0.005   | 0.001  | 0.006  | 0.001    | 0.001      | 0.002   | 0.002    | 0.001   | 0.001   | 0.001  | 0.001            | 0.001            |          |                  |    |
| 12 JH ST2                     |  | 0.101    | 0.60    | 0.0025  | ...     | 0.13    | 0.04   | 3.89   | 0.09     | ...        | ...     | 0.066    | 0.40    | 0.025   | ...    | 0.011            |                  |          |                  |    |
| 12 JH ST3                     |  | 0.149    | 0.41    | 0.0032  | ...     | 0.72    | 0.10   | 3.21   | 0.70     | 0.009      | 0.010   | 0.044    | 0.017   | 0.092   | ...    | 0.017            |                  |          |                  |    |
| 12 JH ST4                     |  | 0.20     | 0.076   | 0.016   | 0.012   | 1.93    | 0.51   | 2.53   | 0.12     | 0.075      | 0.076   | 0.025    | ...     | 0.29    | ...    | 0.052            |                  |          |                  |    |
| 12 JH ST5                     |  | 0.25     | 0.27    | ...     | 0.017   | 1.59    | 1.05   | 2.03   | 0.06     | 0.038      | 0.039   | 0.010    | 0.30    | 0.018   | ...    | 0.065            |                  |          |                  |    |
| 12 JH ST6                     |  | 0.35     | 0.38    | ...     | 0.057   | 1.30    | 1.57   | 1.51   | 0.50     | 0.021      | 0.022   | ...      | 0.053   | 0.056   | 0.008  | 0.1              |                  |          |                  |    |
| 12 JH ST7                     |  | 0.50     | 0.33    | 0.025   | 0.043   | 1.02    | 2.11   | 1.03   | 0.21     | 0.035      | 0.036   | ...      | 0.11    | 0.20    | 0.014  | ...              |                  |          |                  |    |
| 12 JH ST8                     |  | 0.65     | 0.17    | 0.020   | 0.030   | 0.53    | 2.61   | 0.52   | 0.32     | 0.12       | 0.121   | ...      | 0.16    | 0.17    | 0.027  | ...              |                  |          |                  |    |
| 12 JH ST9                     |  | 0.84     | 0.23    | ...     | 0.020   | 0.34    | 3.31   | 0.09   | 0.15     | 0.061      | 0.062   | ...      | 0.22    | ...     | 0.053  | ...              |                  |          |                  |    |
| 12 JH ST10                    |  | 1.09     | 0.22    | 0.007   | 0.005   | 0.14    | 4.05   | 0.06   | 0.07     | 0.11       | 0.111   | ...      | 0.51    | ...     | 0.079  | ...              |                  |          |                  |    |
| Continuation from above       |  |          |         |         |         |         |        |        |          |            |         |          |         |         |        |                  |                  |          |                  |    |
|                               |  | B        | Mo      | Co      | Nb      | W       | Ta     | Pb     | As       | Ca         | Ce      |          |         |         |        |                  | Size (mm)<br>Ø H |          |                  |    |
| 12 JH ST1                     |  | 0.0001   | 0.001   | 0.001   | <0.001  | 0.001   | 0.001  | 0.001  | 0.001    | 0.0001     | 0.001   |          |         |         |        |                  | 34 x 20          |          |                  |    |
| 12 JH ST2                     |  | ...      | 0.52    | 0.024   | 0.095   | ...     | 0.21   | ...    | ...      | ...        | 0.034   |          |         |         |        |                  | each             |          |                  |    |
| 12 JH ST3                     |  | ...      | 0.40    | 0.16    | 0.066   | ...     | 0.10   | ...    | 0.010    | ...        | 0.018   |          |         |         |        |                  |                  |          |                  |    |
| 12 JH ST4                     |  | ...      | 0.30    | 0.053   | 0.021   | ...     | 0.042  | ...    | ...      | ...        | 0.022   |          |         |         |        |                  |                  |          |                  |    |
| 12 JH ST5                     |  | ...      | 0.095   | 0.104   | 0.040   | ...     | 0.010  | ...    | 0.018    | 0.0004     | 0.010   |          |         |         |        |                  |                  |          |                  |    |
| 12 JH ST6                     |  | ...      | 0.19    | 0.20    | 0.012   | ...     | ...    | 0.045  | 0.052    | 0.0010     | ...     |          |         |         |        |                  | Set Only         |          |                  |    |
| 12 JH ST7                     |  | 0.0024   | 0.60    | ...     | ...     | 0.05    | 0.41   | 0.025  | ...      | 0.0019     | ...     |          |         |         |        |                  |                  |          |                  |    |
| 12 JH ST8                     |  | 0.0028   | 1.04    | ...     | ...     | 0.10    | ...    | 0.072  | ...      | 0.0021     | ...     |          |         |         |        |                  |                  |          |                  |    |
| 12 JH ST9                     |  | 0.0043   | 0.85    | ...     | ...     | 0.19    | ...    | 0.13   | ...      | 0.0026     | ...     |          |         |         |        |                  |                  |          |                  |    |
| 12 JH ST10                    |  | 0.0066   | 0.051   | ...     | ...     | 0.16    | ...    | 0.15   | ...      | 0.0016     | ...     |          |         |         |        |                  |                  |          |                  |    |
| Continuation from above       |  |          |         |         |         |         |        |        |          |            |         |          |         |         |        |                  |                  |          |                  |    |
|                               |  | C        | Si      | S       | P       | Mn      | Ni     | Cr     | Mo       | Cu         | Co      | Sn       | Al      | V       | Ti     | Nb               | Size (mm)<br>Ø H |          |                  |    |
| CRM 12 B 1761                 |  | 1.03     | 0.18    | 0.035   | 0.04    | 0.678   | 1.99   | 0.22   | 0.103    | 0.30       | (0.028) | (0.05)   | 0.06    | 0.053   | 0.18   | 0.02             |                  |          |                  |    |
| CRM 12 B 1762                 |  | 0.337    | 0.35    | 0.03    | 0.034   | 2.00    | 1.15   | 0.92   | 0.35     | 0.12       | 0.062   | 0.046    | 0.069   | 0.200   | 0.095  | 0.07             |                  |          |                  |    |
| CRM 12 B 1763                 |  | 0.203    | 0.63    | 0.023   | 0.012   | 1.58    | 0.51   | 0.50   | 0.50     | 0.43       | 0.095   | 0.011    | 0.043   | 0.30    | 0.31   | 0.10             |                  |          |                  |    |
| CRM 12 B 1764                 |  | 0.592    | 0.057   | 0.012   | 0.02    | 1.21    | 0.202  | 1.48   | 0.20     | 0.51       | (0.01)  | (0.02)   | 0.009   | 0.106   | 0.028  | 0.042            | continued        |          |                  |    |
| CRM 12 B 1765                 |  | 0.006    | (0.004) | 0.0038  | 0.0052  | 0.144   | 0.154  | 0.051  | 0.005    | 0.0013     | 0.0012  | 0.002    | (0.006) | 0.004   | 0.0055 | 0.0004           |                  |          |                  |    |
| CRM 12 B 1766                 |  | 0.015    | 0.01    | 0.0024  | 0.002   | 0.067   | 0.021  | 0.024  | 0.0035   | 0.015      | 0.002   | 0.001    | 0.012   | 0.009   | 0.0005 | 0.005            |                  |          |                  |    |
| CRM 12 B 1767                 |  | 0.052    | 0.026   | 0.009   | 0.0031  | 0.022   | 0.002  | 0.0015 | 0.02     | 0.0014     | 0.005   | 0.006    | 0.004   | 0.033   | 0.011  | 0.01             |                  |          |                  |    |
| Continuation from above       |  |          |         |         |         |         |        |        |          |            |         |          |         |         |        |                  |                  |          |                  |    |
|                               |  | Zr       | As      | B       | W       | Ta      | N      | ppm Ca | ppm Pb   | ppm As     | ppm Bi  | ppm Mg   | ppm Sb  | ppm Te  | ppm Ce | Size (mm)<br>Ø H |                  |          |                  |    |
| 12 B 1761                     |  | 0.01     | 0.011   | 0.0020  | (0.02)  | 0.05    | 0.0044 | ...    | ...      | ...        | ...     | ...      | ...     | ...     | ...    | 34 x 19          | W                |          |                  |    |
| 12 B 1762                     |  | 0.03     | 0.018   | 0.0049  | (0.01)  | 0.02    | 0.0022 | ...    | ...      | ...        | ...     | ...      | ...     | ...     | ...    | 34 x 19          |                  |          |                  |    |
| 12 B 1763                     |  | 0.04     | 0.055   | 0.0054  | (0.03)  | 0.01    | 0.0044 | ...    | ...      | ...        | ...     | ...      | ...     | ...     | ...    | 34 x 19          |                  |          |                  |    |
| 12 B 1764                     |  | 0.0015   | 0.010   | 0.0010  | <0.01   | 0.029   | 0.0023 | ...    | ...      | ...        | ...     | ...      | ...     | ...     | ...    | 34 x 19          |                  |          |                  |    |
| 12 B 1765                     |  | (0.0002) | 0.0010  | 0.0009  | ...     | (0.004) | 0.0010 | ...    | 3        | 2          | ...     | <1       | 10      | (30)    | ...    | 34 x 19          |                  |          |                  |    |
| 12 B 1766                     |  | (0.0004) | 0.0035  | 0.00012 | (0.001) | (0.006) | 0.0033 | ...    | 30       | 5          | ...     | <5       | 5       | (30)    | (20)   | 34 x 19          |                  |          |                  |    |
| 12 B 1767                     |  | (0.004)  | 0.0005  | 0.0010  | ...     | (0.002) | 0.0008 | (3)    | (1)      | 8          | (20)    | <1       | ...     | (3)     | ...    | 34 x 19          |                  |          |                  |    |
| 1.2.4 Calcium Treated Steel   |  |          |         |         |         |         |        |        |          |            |         |          |         |         |        |                  |                  |          |                  |    |
|                               |  | C        | Si      | S       | P       | Mn      | Ni     | Cr     | Mo       | Cu         | Sn      | B        | Al      | Nb      | V      | As               | Ca               | N        | Size (mm)<br>Ø H |    |
| 12 M BS CA3A                  |  | 0.351    | 0.33    | 0.008   | 0.022   | 1.46    | 0.270  | 0.044  | 0.009    | 0.025      | 0.047   | 0.0017   | 0.036   | 0.044   | 0.105  | 0.014            | 0.001            | (0.0133) | 32 x 17          | CC |
| 12 M BS CA4A                  |  | 0.252    | 0.31    | 0.006   | 0.034   | 1.12    | 0.017  | 0.068  | 0.046    | 0.032      | 0.034   | 0.0013   | 0.011   | 0.068   | 0.014  | 0.029            | 0.0001           | (0.0101) | 32 x 17          |    |
| 12 M BSCSN.2D                 |  | 0.467    | 0.17    | 0.031   | 0.012   | 0.60    | 0.071  | 0.072  | 0.008    | 0.073      | 0.0046  | ...      | 0.046   | ...     | 0.004  | 0.004            | 0.0033           | 0.0173   | 35 x 20          | W  |
| 12 M BS 54D                   |  | 0.688    | 0.46    | 0.046   | 0.023   | 0.75    | 0.202  | 0.20   | 0.153    | 0.153      | <0.001  | 0.0010   | 0.030   | 0.030   | 0.102  | <0.001           | 0.0017           | 0.0009   | 35 x 20          |    |
| 12 M BS 3932                  |  | 0.321    | 0.33    | 0.018   | 0.016   | 0.54    | 0.19   | 1.00   | 0.229    | 0.200      | 0.012   | ...      | 0.020   | ...     | 0.005  | 0.004            | 0.0043           | 0.0070   | 37 x 19          |    |
| CRM 12 M BS 4972              |  | 0.460    | 0.335   | 0.024   | 0.015   | 0.74    | 0.056  | 0.058  | 0.012    | 0.220      | 0.028   | 0.0002   | 0.002   | <0.002  | 0.012  | 0.005            | 0.0013           | 0.0089   | 37 x 19          |    |
| CRM 12 A E096-2(D)            |  | 0.1050   | 0.262   | 0.0016  | 0.0128  | 1.320   | 0.0253 | 0.0243 | 0.0020   | 0.0170     | ...     | ...      | 0.0460  | 0.0252  | ...    | ...              | 0.0020           | ...      | 38 x 30          | W  |
| CRM 12 A E195-1(D)            |  | (0.73)   | 0.466   | 0.0121  | 0.0160  | 0.571   | 0.327  | 1.566  | 0.768    | 0.0355     | ...     | ...      | ...     | ...     | 0.312  | ...              | 0.0017           | 0.0100   | 38 x 30          |    |
| CRM 12 MI 155B                |  | 0.207    | 0.313   | 0.028   | 0.009   | 0.635   | 3.57   | 0.149  | 0.239    | 0.152      | 0.008   | 0.0002   | 0.027   | 0.0024  | 0.003  | 0.0038           | 0.0026           | 0.0080   | 31 x 18          | W  |
| CRM 12 DB E194-1(D)           |  | 0.1532   | 0.431   | 0.00059 | 0.0097  | 1.188   | 0.3417 | 0.733  | 0.2857   | 0.0751     | ...     | 0.0020   | 0.0837  | ...     | 0.0243 | 0.0042           | 0.0026           | 0.0115   | 35 x 30          | W  |
| CRM 12 TI 1667                |  | 0.679    | 0.240   | 0.0017  | 0.0135  | 0.668   | 0.0188 | 0.235  | (0.0013) | 0.0115     | ...     | (0.0002) | 0.0216  | ...     | 0.0012 | 0.0016           | 0.0019           | 0.0048   | 37 x 25          | W  |
| 1.2.5 Structural Alloy Steels |  |          |         |         |         |         |        |        |          |            |         |          |         |         |        |                  |                  |          |                  |    |
|                               |  | C        | Si      | S       | P       | Mn      | Ni     | Cr     | Mo       | Cu         | Sn      | V        | As      | Pb      | Sb     | Bi               | Size (mm)<br>Ø H |          |                  |    |
| 12 CG 01364                   |  | 0.285    | 0.236   | 0.012   | 0.030   | 0.315   | 0.102  | 2.37   | 1.27     | ...        | 0.0085  | 0.351    | 0.024   | 0.00029 | 0.0058 | 0.00005          | 32 x 28          |          |                  |    |
| 12 CG 01365                   |  | 0.282    | 0.265   | 0.016   | 0.024   | 0.466   | 0.248  | 1.62   | 1.09     | ...        | 0.030   | 0.252    | 0.019   | 0.0015  | 0.0058 | 0.0002           | each             |          |                  |    |
| 12 CG 01366                   |  | 0.318    | 0.325   | 0.025   | 0.034   | 0.348   | 0.204  | 1.93   | 1.19     | ...        | 0.014   | 0.301    | 0.037   | 0.0037  | 0.0086 | 0.0022           |                  |          |                  |    |
| 12 CG 01367                   |  | 0.244    | 0.400   | 0.050   | 0.017   | 0.505   | 0.292  | 1.50   | 0.987    | ...        | 0.033   | 0.193    | 0.042   | 0.0036  | 0.0084 | 0.0027           | Set Only         |          |                  |    |
| 12 CG 01368                   |  | 0.325    | 0.179   | 0.0080  | 0.040   | 0.264   | 0.059  | 2.51   | 1.47     | ...        | 0.016   | 0.164    | 0.019   | 0.0056  | 0.0047 | 0.0052           |                  |          |                  |    |
| 12 CM 5021                    |  | 0.440    | 1.37    | 0.033   | 0.013   | 1.35    | 2.29   | 1.21   | 0.035    | 0.346      | 0.206   | 0.303    | 0.283   | ...     | ...    | ...              | 33 x 33          |          |                  |    |
| 12 CM 5022                    |  | 0.141    | 0.161   | 0.036   | 0.026   | 0.216   | 1.02   | 1.52   | 0.374    | 0.073      | 0.222   | 0.242    | 0.082   | ...     | 0.034  | 0.017            | each             |          |                  |    |
| 12 CM 5023                    |  | 0.329    | 0.819   | 0.015   | 0.023   | 0.701   | 1.16   | 1.08   | 0.166    | 0.162      | 0.104   | 0.162    | 0.172   | ...     | 0.02   | 0.0092           |                  |          |                  |    |
| 12 CM 5024                    |  | 0.293    | 0.398   | 0.019   | 0.022   | 1.02    | 1.53   | 1.14   | 0.162    | 0.197      | 0.172   | 0.128    | 0.149   | ...     | 0.017  | 0.021            | Set Only         |          |                  |    |
| 12 CM 5025                    |  | 0.214    | 0.392   | 0.0031  | 0.012   | 1.05    | 1.46   | 0.581  | 0.094    | 0.236      | 0.291   | 0.199    | 0.231   | ...     | 0.0068 | 0.0024           |                  |          |                  |    |
| 12 CM 5026                    |  | 0.481    | 1.11    | 0.0034  | 0.034   | 0.511   | 0.518  | 1.52   | 0.253    | 0.111      | 0.202   | 0.131    | 0.117   | ...     | 0.041  | 0.0067           |                  |          |                  |    |
| 12 CM 5027                    |  | 0.589    | 1.77    | 0.031   | 0.046   | 0.805   | 0.229  | 1.95   | 0.294    | 0.302      | 0.070   | 0.052    | 0.053   | ...     | 0.029  | 0.014            |                  |          |                  |    |

# 1. Iron Base

# Stainless Steels

# Blocks/Discs

| 1.3.2 Austenitic    |       |         |          |          |         |         |          |         |         |           |           |               |         |              |           |          | Size (mm) |    |   |   |
|---------------------|-------|---------|----------|----------|---------|---------|----------|---------|---------|-----------|-----------|---------------|---------|--------------|-----------|----------|-----------|----|---|---|
|                     | C     | Si      | S        | P        | Mn      | Ni      | Cr       | Mo      | Cu      | Co        | Sn        | Al            | Ti      | Nb           | N         | Ø        | H         |    |   |   |
| 13 M BS 80F         | 0.062 | 0.63    | 0.35     | 0.036    | 1.76    | 8.58    | 17.10    | 0.48    | 0.41    | 0.16      | 0.010     | 0.001         | ...     | 0.016        | 0.035     |          |           |    |   |   |
| 13 M BS 81V-1       | 0.032 | 0.55    | 0.0012   | 0.023    | 1.76    | 9.13    | 19.14    | 0.134   | 0.10    | 0.056     | 0.003     | 0.003         | 0.002   | 0.011        | 0.048     |          |           |    |   |   |
| 13 M BS 82E         | 0.062 | 0.58    | 0.001    | 0.027    | 1.61    | 12.49   | 22.38    | 0.31    | 0.26    | 0.12      | 0.006     | 0.006         | 0.003   | 0.062        | 0.072     |          |           |    |   |   |
| 13 M BS 84J         | 0.017 | 0.57    | 0.025    | 0.035    | 1.46    | 10.34   | 17.12    | 2.08    | 0.46    | 0.23      | 0.007     | (0.002)       | (0.002) | 0.024        | 0.059     |          |           |    |   |   |
| 13 M BS 85D         | 0.049 | 0.55    | 0.024    | 0.025    | 1.69    | 10.03   | 17.09    | 0.59    | 0.45    | 0.97      | (0.006)   | 0.13          | 0.48    | 0.065        | 0.016     |          |           |    |   |   |
| 13 M BS 87F         | 0.055 | 0.67    | 0.025    | 0.024    | 1.64    | 10.12   | 17.30    | 0.29    | 0.28    | 0.17      | 0.004     | 0.004         | 0.004   | 0.57         | 0.037     |          |           |    |   |   |
| 13 M BS 316A        | 0.065 | 0.74    | 0.026    | 0.029    | 1.48    | 10.15   | 17.25    | 2.05    | 0.35    | 0.16      | 0.008     | 0.004         | (0.003) | 0.029        | 0.045     |          |           |    |   |   |
| 13 M BS 316B        | 0.047 | 0.31    | 0.028    | 0.033    | 1.27    | 10.09   | 16.21    | 2.03    | 0.35    | 0.18      | 0.012     | 0.003         | (0.002) | 0.007        | 0.044     |          |           |    |   |   |
| 13 M BS 317L        | 0.027 | 0.67    | 0.0014   | 0.029    | 1.17    | 13.53   | 18.16    | 3.07    | 0.23    | 0.14      | 0.005     | (0.005)       | ...     | 0.031        | 0.056     |          | continued |    |   |   |
| 13 M BS 321A        | 0.061 | 0.48    | 0.012    | 0.030    | 1.22    | 9.38    | 17.20    | 0.20    | 0.284   | 0.15      | 0.010     | 0.038         | 0.51    | 0.021        | 0.0075    |          |           |    |   |   |
| 13 M BS 321C        | 0.037 | 0.58    | 0.022    | 0.025    | 1.72    | 10.58   | 17.16    | 0.30    | 0.28    | 0.048     | 0.006     | 0.044         | 0.38    | 0.008        | 0.0082    |          |           |    |   |   |
| 13 M BS 347A        | 0.051 | 0.54    | 0.020    | 0.026    | 1.50    | 9.20    | 17.44    | 0.326   | 0.31    | 0.054     | 0.007     | (0.002)       | (0.002) | 0.79         | 0.044     |          |           |    |   |   |
| 13 M BS 347B        | 0.051 | 0.51    | 0.026    | 0.028    | 1.57    | 9.16    | 17.24    | 0.38    | 0.15    | 0.05      | 0.006     | 0.002         | (0.002) | 0.71         | 0.056     |          |           |    |   |   |
| 13M BS SS3951       | 0.014 | 0.61    | 0.031    | 0.023    | 1.56    | 9.18    | 18.17    | 0.303   | 0.22    | 0.16      | 0.007     | 0.002         | (0.002) | 0.085        | 0.077     |          |           |    |   |   |
| 13M BS SS3952       | 0.017 | 0.53    | 0.017    | 0.029    | 0.82    | 10.04   | 18.06    | 0.28    | 0.38    | 0.11      | 0.017     | 0.004         | 0.002   | 0.005        | 0.017     |          |           |    |   |   |
| 13 M BS 9722        | 0.031 | 0.55    | 0.0014   | 0.020    | 1.70    | 9.15    | 19.13    | 0.128   | 0.108   | 0.054     | ...       | ...           | ...     | ...          | 0.047     |          |           |    |   |   |
| CRM 13 M BS 9841    | 0.067 | 0.54    | 0.024    | 0.024    | 1.69    | 19.55   | 24.30    | 0.57    | 0.356   | 0.116     | 0.006     | <0.006        | (0.002) | 0.07         | 0.064     |          |           |    |   |   |
| CRM 13 M BS 9842    | 0.059 | 0.99    | 0.0016   | 0.025    | 1.50    | 20.02   | 24.19    | 0.111   | 0.147   | 0.237     | 0.005     | 0.014         | 0.003   | 0.026        | 0.037     |          |           |    |   |   |
| CRM 13 M BS 9941    | 0.021 | 0.33    | 0.024    | 0.027    | 1.78    | 13.68   | 18.48    | 3.24    | 0.424   | 0.178     | 0.007     | 0.004         | (0.002) | 0.015        | 0.036     |          |           |    |   |   |
| CRM 13 M BS 9942    | 0.021 | 0.49    | 0.006    | 0.025    | 1.84    | 13.55   | 18.21    | 3.30    | 0.305   | 0.086     | 0.006     | 0.004         | (0.002) | 0.005        | 0.071     |          |           |    |   |   |
| 13 Ti 1819          | 0.112 | 0.616   | 0.0112   | 0.023    | 0.903   | 7.1     | 17.31    | 0.11    | 0.064   | 0.117     | ...       | ...           | ...     | ...          | 0.029     |          |           |    |   |   |
| 13 Ti 1820          | 0.021 | 0.428   | 0.0079   | (0.021)  | 1.61    | 9.07    | 19.51    | 0.115   | 0.045   | 0.151     | ...       | ...           | ...     | ...          | 0.064     |          | continued |    |   |   |
| 13 Ti 1821          | 0.037 | 0.542   | (0.004)  | (0.025)  | 1.72    | 10.42   | 17.04    | 2.04    | 0.058   | 0.266     | ...       | ...           | 0.297   | ...          | 0.0125    |          |           |    |   |   |
| 13 Ti 1824          | 0.124 | 0.444   | (0.0033) | 0.027    | 1.70    | 19.02   | 25.01    | 0.205   | 0.20    | 0.193     | ...       | 0.062         | 0.066   | (0.014)      | ...       |          |           |    |   |   |
| 13 JH ST21          | 0.13  | 0.18    | 0.026    | 0.003    | 0.40    | 4.03    | 27.02    | (0.001) | (0.003) | (0.003)   | ...       | ...           | (0.003) | <0.001       | ...       |          |           |    |   |   |
| 13 JH ST22          | 0.036 | 0.39    | 0.005    | 0.028    | 0.57    | 19.85   | 25.00    | (0.001) | (0.004) | (0.009)   | ...       | ...           | (0.010) | <0.001       | ...       |          |           |    |   |   |
| 13 JH ST23          | 0.094 | 0.78    | 0.019    | 0.010    | 1.59    | 10.01   | 22.50    | 0.98    | 0.047   | (0.020)   | ...       | ...           | (0.002) | (0.003)      | ...       |          |           |    |   |   |
| 13 JH ST24          | 0.084 | 0.58    | 0.015    | 0.004    | 0.78    | 13.93   | 20.20    | 1.50    | 0.029   | (0.008)   | ...       | ...           | (0.002) | <0.001       | ...       |          | continued |    |   |   |
| 13 JH ST25          | 0.025 | 1.35    | 0.025    | 0.003    | 1.35    | 8.76    | 18.40    | 2.47    | 0.012   | 0.058     | ...       | ...           | (0.003) | <0.001       | ...       |          |           |    |   |   |
| 13 JH ST26          | 0.044 | 1.01    | 0.008    | 0.021    | 1.19    | 17.62   | 16.18    | 0.49    | (0.008) | 0.21      | ...       | ...           | 0.075   | 0.29         | ...       |          |           |    |   |   |
| 13 JH ST27          | 0.057 | 1.19    | 0.011    | 0.019    | 1.00    | 15.74   | 13.39    | 0.008   | (0.007) | 0.014     | ...       | ...           | 0.24    | 1.53         | ...       |          |           |    |   |   |
| 13 JH ST28          | 0.016 | 0.12    | 0.003    | 0.034    | 0.23    | 29.62   | 10.34    | (0.001) | (0.006) | (0.002)   | ...       | ...           | 0.49    | 0.72         | ...       |          |           |    |   |   |
|                     |       |         |          |          |         |         |          |         |         |           |           |               |         |              |           |          | W         | Pb |   |   |
| CRM 13 CM 2157      | 0.061 | 0.644   | 0.027    | 0.0085   | 0.663   | 10.35   | 15.36    | 0.62    | 0.152   | 0.074     | 0.0082    | 0.044         | 0.072   | 0.32         | 0.0055    | 33 x 33  | W         |    |   |   |
| CRM 13 CM 2158      | 0.164 | 0.413   | 0.016    | 0.037    | 0.981   | 11.52   | 12.46    | 0.35    | 0.363   | 0.093     | 0.093     | 0.074         | 0.21    | 0.61         | 0.026     | each     |           |    |   |   |
| CRM 13 CM 2159      | 0.241 | 0.96    | 0.018    | 0.04     | 1.98    | 13.12   | 9.32     | 0.69    | 0.276   | 0.13      | 0.0057    | 0.038         | 0.51    | 0.71         | 0.019     |          |           |    |   |   |
| CRM 13 CM 2160      | 0.184 | 0.92    | 0.02     | 0.028    | 1.57    | 16.12   | 7.40     | 0.50    | 0.303   | 0.16      | 0.049     | 0.24          | 1.03    | 0.49         | 0.022     | Set only |           |    |   |   |
| CRM 13 CM 2161      | 0.096 | 0.732   | 0.038    | 0.018    | 0.654   | 9.05    | 17.16    | 0.26    | 0.126   | 0.059     | 0.035     | 0.26          | 0.57    | 0.25         | 0.0077    |          |           |    |   |   |
| CRM 13 CM 2162      | 0.017 | 0.171   | 0.0025   | 0.0049   | 0.156   | 6.93    | 20.76    | 0.079   | 0.049   | 0.0133    | 0.041     | 0.034         | 0.31    | 0.0055       | ...       |          |           |    |   |   |
| CRM 13 CM 2163      | 0.101 | 1.08    | 0.0015   | 0.01     | 0.356   | 7.82    | 16.90    | 0.17    | 0.098   | 0.028     | 0.021     | 0.20          | 0.71    | 0.17         | 0.0078    |          |           |    |   |   |
| <b>Continuation</b> |       |         |          |          |         |         |          |         |         |           |           |               |         |              |           |          |           |    |   |   |
| from above          | V     | W       | B        | Ca       | As      | Pb      | Ta       | Soluble |         | Insoluble |           | Typical Alloy |         |              | Size (mm) |          |           |    |   |   |
|                     |       |         |          |          |         |         |          | Al      | Al      | O         | Type      |               |         | Ø            | H         |          |           |    |   |   |
| 13 M BS 80F         | 0.087 | 0.047   | 0.0012   | ...      | ...     | ...     | ...      | ...     | ...     | 0.0058    | AISI 303  |               |         | 35-45 x 12   | W         |          |           |    |   |   |
| 13 M BS 81V-1       | 0.072 | 0.023   | ...      | ...      | ...     | ...     | ...      | ...     | ...     | ...       | AISI 304  |               |         | 35-45 x 12   |           |          |           |    |   |   |
| 13 M BS 82E         | 0.064 | 0.041   | 0.0024   | 0.0014   | ...     | ...     | ...      | ...     | ...     | ...       | AISI 309  |               |         | 35-45 x 12   |           |          |           |    |   |   |
| 13 M BS 84J         | 0.09  | 0.054   | 0.0005   | 0.0010   | ...     | ...     | ...      | ...     | ...     | 0.0063    | AISI 316  |               |         | 35-45 x 12   |           |          |           |    |   |   |
| 13 M BS 85D         | 0.134 | 0.06    | 0.0006   | 0.0004   | 0.006   | ...     | ...      | ...     | ...     | 0.0014    | AISI 321  |               |         | 35-45 x 12   |           |          |           |    |   |   |
| 13 M BS 87F         | 0.13  | 0.050   | 0.0006   | 0.0007   | 0.004   | ...     | ...      | ...     | ...     | 0.005     | AISI 347  |               |         | 35-45 x 12   |           |          |           |    |   |   |
| 13 M BS 316A        | 0.130 | 0.10    | 0.0004   | 0.0015   | (0.003) | ...     | ...      | ...     | ...     | 0.0041    | AISI 316  |               |         | 35-45 x 12   |           |          |           |    |   |   |
| 13 M BS 316B        | 0.059 | 0.023   | 0.0005   | 0.0003   | ...     | ...     | ...      | ...     | ...     | 0.0063    | AISI 316  |               |         | 35-45 x 12   |           |          |           |    |   |   |
| 13 M BS 317L        | 0.09  | 0.018   | 0.0013   | (0.001)  | (0.003) | ...     | ...      | ...     | ...     | 0.007     | AISI 317L |               |         | 35-45 x 12   |           |          |           |    |   |   |
| 13 M BS 321A        | 0.066 | 0.06    | (0.0005) | (0.0002) | (0.006) | ...     | (0.002)  | ...     | ...     | 0.0013    | AISI 321  |               |         | 35-45 x 12   |           |          |           |    |   |   |
| 13 M BS 321C        | 0.079 | (0.03)  | (0.0005) | (0.0001) | (0.004) | ...     | ...      | ...     | ...     | (0.0011)  | AISI 321  |               |         | 35-45 x 12   |           |          |           |    |   |   |
| 13 M BS 347A        | 0.10  | (0.03)  | (0.0004) | (0.0002) | (0.003) | ...     | (<0.004) | ...     | ...     | 0.0047    | AISI 347  |               |         | 35-45 x 12   |           |          |           |    |   |   |
| 13 M BS 347B        | 0.04  | (0.005) | 0.0036   | (0.0005) | (0.003) | ...     | (<0.004) | ...     | ...     | 0.005     | AISI 347  |               |         | 35-45 x 12   |           |          |           |    |   |   |
| 13 M BS SS3951      | 0.067 | 0.04    | (0.0006) | 0.0005   | (0.003) | ...     | ...      | ...     | ...     | 0.0074    | AISI 316  |               |         | 35-45 x 12   |           |          |           |    |   |   |
| 13 M BS SS3952      | 0.045 | 0.023   | (0.0005) | 0.0014   | 0.004   | ...     | ...      | ...     | ...     | 0.005     | AISI 304L |               |         | 35-45 x 12   |           |          |           |    |   |   |
| 13 M BS 9722        | 0.076 | ...     | ...      | ...      | ...     | ...     | ...      | ...     | ...     | ...       | AISI 304  |               |         | 35-45 x 12   |           |          |           |    |   |   |
| 13 M BS 9841        | 0.070 | 0.06    | 0.0026   | (0.0002) | (0.003) | (0.001) | ...      | ...     | ...     | (0.011)   | AISI 310  |               |         | 35-45 x 12   |           |          |           |    |   |   |
| 13 M BS 9842        | 0.075 | 0.011   | 0.0025   | 0.001    | (0.002) | ...     | ...      | ...     | ...     | (0.0044)  | AISI 310  |               |         | 35-45 x 12   |           |          |           |    |   |   |
| 13 M BS 9941        | 0.062 | 0.068   | 0.0025   | (0.0003) | (0.01)  | ...     | ...      | ...     | ...     | (0.0058)  | AISI 317L |               |         | 35-45 x 12   |           |          |           |    |   |   |
| 13 M BS 9942        | 0.072 | 0.032   | 0.0014   | 0.0014   | (0.004) | ...     | ...      | ...     | ...     | (0.0023)  | AISI 317L |               |         | 35-45 x 12   |           |          |           |    |   |   |
|                     |       |         |          |          |         |         |          |         |         |           |           |               |         |              |           |          | W         | D  | H | W |
| 13 Ti 1819          | ...   | ...     | (0.0004) | ...      | ...     | ...     | ...      | ...     | ...     | ...       |           |               |         | 45 x 45 x 20 |           |          |           |    |   |   |
| 13 Ti 1820          | ...   | ...     | (0.0003) | ...      | ...     | ...     | ...      | ...     | ...     | ...       |           |               |         | 45 x 45 x 20 |           |          |           |    |   |   |
| 13 Ti 1821          | ...   | ...     | ...      | ...      | ...     | ...     | ...      | ...     | ...     | ...       |           |               |         | 45 x 45 x 20 |           |          |           |    |   |   |
| 13 Ti 1824          | 0.084 | (0.066) | ...      | ...      | ...     | ...     | ...      | ...     | ...     | ...       |           |               |         | 45 x 45 x 20 |           |          |           |    |   |   |
|                     |       |         |          |          |         |         |          |         |         |           |           |               |         |              |           |          | Ø         | H  | W |   |
| 13 JH ST21          | ...   | ...     | ...      | ...      | (0.001) | <0.001  | <0.001   | (0.001) | <0.001  | ...       |           |               |         | 35 x 18      |           |          |           |    |   |   |
| 13 JH ST22          | ...   | ...     | ...      | ...      | (0.001) | <0.001  | <0.001   | 0.092   | 0.003   | ...       |           |               |         | each         |           |          |           |    |   |   |
| 13 JH ST23          | ...   | ...     | ...      | ...      | 0.110   | 0.012   | (0.002)  | 0.029   | 0.008   | ...       |           |               |         |              |           |          |           |    |   |   |
| 13 JH ST24          | ...   | ...     | ...      | ...      | 0.056   | 0.013   | <0.001   | 0.021   | 0.002   | ...       |           |               |         | Set Only     |           |          |           |    |   |   |
| 13 JH ST25          | ...   | ...     | ...      | ...      | 0.004   | 0.067   | <0.001   | 0.002   | 0.002   | ...       |           |               |         |              |           |          |           |    |   |   |
| 13 JH ST26          | ...   | ...     | ...      | ...      | (0.001) | (0.023) | 0.40     | 0.004   | 0.002   | ...       |           |               |         |              |           |          |           |    |   |   |
| 13 JH ST27          | ...   | ...     | ...      | ...      | (0.001) | (0.009) | 0.24     | 0.016   | 0.002   | ...       |           |               |         |              |           |          |           |    |   |   |
| 13 JH ST28          | ...   | ...     | ...      | ...      | (0.001) | (0.002) | 0.060    | 0.013   | <0.001  | ...       |           |               |         |              |           |          |           |    |   |   |















# 1. Iron Base

# Special Steels

# Blocks/Discs

| 1.4.2 High Speed Steel (continued) |       |       |        |         |         |        |       |       |        |         |         |          |        |         |                       |            |            |   |
|------------------------------------|-------|-------|--------|---------|---------|--------|-------|-------|--------|---------|---------|----------|--------|---------|-----------------------|------------|------------|---|
|                                    | C     | Si    | S      | P       | Mn      | Ni     | Cr    | Mo    | Cu     | Co      | W       | V        | N      | Sn      | Others                | Typical    | Size (mm)  |   |
|                                    |       |       |        |         |         |        |       |       |        |         |         |          |        |         |                       | Alloy Type | Ø H        |   |
| CRM 14 X HS 1C                     | 0.72  | 0.23  | 0.020  | 0.018   | 0.29    | 0.28   | 4.00  | 0.36  | 0.07   | 0.25    | 17.2    | 1.04     | 0.023  | (0.035) |                       | T-1        | 40 x 15    | W |
| CRM 14 X HS 2C                     | 0.78  | 0.21  | 0.014  | 0.020   | 0.24    | 0.20   | 4.15  | 0.44  | 0.105  | 5.10    | 18.1    | 1.20     | 0.021  | (0.03)  |                       | T-4        | 40 x 15    | W |
| CRM 14 X HS 3K                     | 0.92  | 0.35  | 0.031  | 0.016   | 0.632   | 0.354  | 5.60  | 1.33  | 0.128  | 10.73   | 19.6    | 1.31     | 0.030  | (0.014) | As 0.017              | T-5/6      | 40 x 15    | C |
| 14 X HS 4B                         | 1.01  | 0.11  | 0.012  | 0.010   | 0.13    | 0.05   | 3.68  | 0.42  | 0.03   | 2.04    | 9.8     | 0.47     | ...    | ...     |                       |            | 40 x 15    | W |
| 14 X HS 5C                         | 0.59  | 0.30  | 0.022  | 0.015   | 0.29    | 0.16   | 3.4   | 3.54  | 0.13   | 8.02    | 6.0     | 1.37     | ...    | ...     |                       | M-36       | 40 x 15    | W |
| 14 X HS 6B                         | 0.70  | 0.14  | 0.032  | 0.026   | 0.17    | 0.06   | 3.94  | 5.47  | 0.08   | 0.26    | 6.63    | 1.95     | ...    | ...     |                       | M-2        | 40 x 15    | W |
| 14 X HS 7B                         | 1.33  | 0.38  | 0.028  | 0.032   | 0.32    | 0.07   | 4.19  | 5.00  | 0.10   | 0.77    | 14.28   | 1.83     | ...    | ...     |                       |            | 40 x 15    | C |
| 14 X HS 8C                         | 0.97  | 0.14  | 0.022  | 0.020   | 0.28    | 0.16   | 3.55  | 9.47  | 0.09   | 9.04    | 1.81    | 1.20     | ...    | ...     |                       | M-33       | 40 x 15    | W |
| 14 X 14944D                        | 0.62  | 0.17  | 0.011  | 0.016   | 0.23    | 0.19   | 2.87  | 0.14  | 0.10   | 0.15    | 15.5    | 1.00     | ...    | ...     |                       |            | 40 x 15    | C |
| 14 X 14945D                        | 0.67  | 0.26  | 0.041  | 0.033   | 0.72    | 0.33   | 3.97  | 0.23  | 0.12   | 0.22    | 16.84   | 0.55     | ...    | ...     |                       |            | 40 x 15    |   |
| 14 X 14946D                        | 0.85  | 0.46  | 0.048  | 0.051   | 0.53    | 1.06   | 5.06  | 0.21  | 0.25   | 0.44    | 16.9(7) | 1.03     | ...    | ...     |                       | T-1        | 40 x 15    |   |
| 14 X 14948C                        | 0.83  | 0.26  | 0.017  | 0.011   | 0.65    | 0.29   | 4.04  | 0.14  | 0.04   | 0.16    | 18.8    | 0.65     | ...    | ...     |                       |            | 40 x 15    |   |
| 14 X 14952D                        | 0.90  | 0.32  | 0.054  | 0.054   | 0.64    | 0.34   | 4.93  | 0.32  | 0.02   | 0.02    | 18.0    | 1.24     | ...    | ...     |                       |            | 40 x 15    |   |
| 14 X 14890K                        | 0.81  | 0.69  | 0.028  | (0.012) | 0.58    | 0.08   | 3.60  | 5.59  | 0.09   | 0.32    | 5.30    | 1.99     | ...    | ...     |                       |            | 40 x 15    | C |
| 14 X 14891L                        | 0.67  | 0.43  | 0.043  | 0.014   | 0.23(5) | 1.02   | 4.83  | 4.49  | 0.14   | 0.07    | 7.22    | 1.47     | ...    | ...     |                       | M-2        | 40 x 15    |   |
| 14 X 14892K                        | 0.83  | 0.23  | 0.047  | 0.054   | 0.23    | 0.23   | 3.99  | 4.99  | 0.20   | 0.16    | 6.30    | 1.76     | ...    | ...     |                       |            | 40 x 15    |   |
| 14 M BS 30C                        | 0.76  | 0.28  | 0.022  | 0.026   | 0.29    | 0.27   | 4.19  | 0.35  | 0.10   | 0.39    | 17.58   | 1.09     | 0.025  | 0.021   | As 0.03               | T-1        | 37-41 x 12 |   |
| 14 M BS 32D                        | 0.85  | 0.25  | 0.0022 | 0.027   | 0.30    | 0.053  | 4.14  | 4.92  | 0.039  | 0.01    | 6.15    | 1.82     | 0.018  | (0.005) |                       | M-2        | 37-41 x 12 |   |
| CRM 14 S 606-8                     | 0.76  | 0.28  | 0.0008 | 0.016   | 0.31    | 0.065  | 4.0   | 0.58  | 0.027  | 0.12    | 17.16   | 0.83     | 0.0290 | ...     |                       | SKH2       | 35 x 30    | W |
| CRM 14 S 607-8                     | 0.78  | 0.3   | 0.0031 | 0.026   | 0.35    | 0.052  | 3.97  | 0.54  | 0.025  | 4.59    | 17.48   | 0.84     | 0.0270 | ...     |                       | SKH3       | each       |   |
| CRM 14 S 608-8                     | 0.8   | 0.36  | 0.0028 | 0.025   | 0.33    | 0.044  | 3.99  | 0.41  | 0.017  | 9.09    | 17.03   | 0.99     | 0.0320 | ...     |                       | SKH4A      |            |   |
| CRM 14 S 609-8                     | 0.89  | 0.32  | 0.0007 | 0.027   | 0.31    | 0.12   | 3.98  | 4.85  | 0.053  | 4.63    | 6.10    | 1.87     | 0.0465 | ...     |                       | SKH55      | Set Only   |   |
| CRM 14 S 610-8                     | 1.23  | 0.28  | 0.0015 | 0.026   | 0.31    | 0.18   | 3.96  | 3.09  | 0.066  | 9.60    | 8.94    | 3.25     | 0.0348 | ...     |                       | SKH57      |            |   |
| CRM 14 S 611-8                     | 0.86  | 0.37  | 0.0013 | 0.025   | 0.30    | 0.13   | 3.97  | 4.88  | 0.046  | 0.40    | 6.27    | 1.88     | 0.0548 | ...     |                       | SKH9       |            |   |
| CRM 14 A 481/1                     | 0.68  | 0.15  | 0.022  | 0.023   | 0.25    | (0.09) | 3.40  | 0.28  | ...    | 0.31    | 14.0    | 0.56     | ...    | ...     |                       |            | 38 x 19    | W |
| CRM 14 A 482/1                     | 0.67  | 0.14  | 0.027  | 0.027   | 0.26    | (0.16) | 3.95  | 0.40  | ...    | 0.29    | 17.8    | 1.04     | ...    | ...     |                       |            | 38 x 19    |   |
| CRM 14 A 483/1                     | 0.65  | 0.16  | 0.023  | 0.023   | 0.22    | (0.08) | 2.90  | 0.18  | ...    | 2.06    | 9.28    | 0.22     | ...    | ...     |                       |            | 38 x 19    |   |
| CRM 14 A 485/1                     | 0.94  | 0.3   | 0.039  | 0.043   | 0.41    | (0.14) | 4.02  | 0.66  | ...    | 4.97    | 17.8    | 1.02     | ...    | 0.019   |                       |            | 38 x 19    |   |
| CRM 14 A 486/1                     | 0.74  | 0.27  | 0.021  | 0.029   | 0.21    | (0.06) | 4.54  | 5.20  | ...    | 0.08    | 5.80    | 1.82     | ...    | 0.014   |                       |            | 38 x 19    |   |
| CRM 14 A 487/1                     | 1.02  | 0.18  | 0.029  | 0.022   | 0.26    | (0.14) | 3.91  | 9.41  | ...    | 7.95    | 1.80    | 1.14     | ...    | (0.006) |                       |            | 38 x 19    |   |
| CRM 14 DB E290-1(D)                | 0.911 | 0.072 | 0.0160 | 0.0160  | 0.244   | 0.329  | 4.18  | 4.83  | 0.081  | 5.12    | 6.27    | 1.91     | 0.0325 | ...     |                       |            | 35 x 30    | W |
| 1.4.4 Case Hardening Steel         |       |       |        |         |         |        |       |       |        |         |         |          |        |         |                       |            |            |   |
|                                    | C     | Si    | S      | P       | Mn      | Ni     | Cr    | Mo    | Cu     | Al      | V       |          |        |         |                       | Typical    | Size (mm)  |   |
|                                    |       |       |        |         |         |        |       |       |        |         |         |          |        |         |                       | Alloy Type | Ø H        |   |
| CRM 14 S 512-6                     | 0.106 | 0.16  | 0.021  | 0.015   | 0.43    | 0.023  | 0.039 | 0.008 | 0.009  | 0.024   | ...     |          |        |         |                       | S9CK       | 35 x 30    | W |
| CRM 14 S 513-6                     | 0.151 | 0.19  | 0.0162 | 0.010   | 0.76    | 0.019  | 1.12  | 0.005 | 0.008  | 0.031   | 0.006   |          |        |         |                       | SCr415     | each       |   |
| CRM 14 S 514-6                     | 0.21  | 0.22  | 0.0153 | 0.013   | 0.78    | 0.020  | 1.02  | 0.21  | 0.009  | 0.038   | (0.004) |          |        |         |                       | SCM420     |            |   |
| CRM 14 S 515-6                     | 0.171 | 0.25  | 0.0094 | 0.009   | 0.59    | 2.24   | 0.30  | 0.011 | 0.022  | 0.029   | (0.002) |          |        |         |                       | SNC415     | Set Only   |   |
| CRM 14 S 516-6                     | 0.21  | 0.28  | 0.130  | 0.012   | 1.03    | 3.05   | 1.70  | 0.41  | 0.083  | 0.031   | 0.011   |          |        |         |                       | SNCM24     |            |   |
| CRM 14 S 517-6                     | 0.171 | 0.25  | 0.0118 | 0.013   | 1.11    | 3.00   | 1.60  | 0.52  | 0.072  | 0.029   | 0.008   |          |        |         |                       | SNCM616    |            |   |
| 1.4.5 High Manganese Steel         |       |       |        |         |         |        |       |       |        |         |         |          |        |         |                       |            |            |   |
|                                    | C     | Si    | S      | P       | Mn      | Ni     | Cr    | Mo    | Cu     | Al      | V       | Sn       | N      | Nb      | Others                | Size (mm)  |            |   |
|                                    |       |       |        |         |         |        |       |       |        |         |         |          |        |         |                       | Ø          | H          |   |
| 14 M BS 17A                        | 0.588 | 0.22  | 0.005  | 0.043   | 19.38   | 0.060  | 1.37  | 0.52  | 0.135  | 0.052   | 0.016   | 0.012    | 0.038  | 0.06    |                       | 32 x 17    | C          |   |
| 14 M BS 18A                        | 1.13  | 0.64  | 0.043  | 0.019   | 11.3    | 0.36   | 0.22  | 0.049 | 0.029  | 0.019   | 0.32    | 0.007    | 0.042  | 0.05    |                       | 32 x 17    |            |   |
| 14 M BS 19A                        | 1.57  | 1.46  | 0.009  | 0.092   | 8.76    | 1.48   | 3.75  | 1.97  | 0.51   | 0.057   | 0.10    | 0.037    | 0.039  | 0.040   |                       | 32 x 17    |            |   |
| 14 M BS 190                        | 0.022 | 0.46  | 0.001  | 0.015   | 9.72    | 6.74   | 19.57 | 0.15  | 0.072  | (0.004) | 0.11    | 0.003    | 0.255  | (0.004) | Ca, Co, B, Ti, W, O.  | 38 x 12    | W          |   |
| 14 M BS 191                        | 0.098 | 3.66  | 0.023  | 0.024   | 5.71    | 5.34   | 16.33 | 0.36  | 0.33   | (0.002) | 0.083   | (0.006)  | 0.117  | 0.024   | Co, Ca, O, Ta, Ti, W. | 38 x 12    |            |   |
| 14 M BS 193                        | 0.104 | 0.66  | 0.002  | 0.018   | 12.11   | 1.82   | 18.48 | 0.21  | 0.088  | (0.003) | 0.107   | 0.004    | 0.37   | 0.014   | B, Ca, Co, Ti.        | 38 x 12    |            |   |
| CRM 14 X MN1AF                     | 0.500 | 0.610 | 0.0069 | 0.019   | 17.95   | 0.308  | 1.587 | 0.543 | 0.055  | 0.024   | 0.015   | (0.0023) | 0.076  | 0.168   |                       | 40 x 15    | C          |   |
| CRM 14 X MN2P                      | 0.70  | 1.00  | 0.014  | 0.013   | 8.84    | 0.49   | 0.29  | 1.45  | 0.034  | (0.007) | 0.07    | 0.08     | 0.018  | ...     |                       | 40 x 15    |            |   |
| CRM 14 X MN3P                      | 1.10  | 0.88  | 0.009  | 0.07    | 11.01   | 0.23   | 0.44  | 0.18  | 0.09   | <0.005  | 0.05    | 0.024    | 0.02   | ...     |                       | 40 x 15    |            |   |
| CRM 14 X MN4W                      | 1.303 | 0.77  | 0.019  | 0.046   | 15.35   | 1.16   | 2.14  | 0.805 | 0.320  | 0.055   | 0.034   | 0.028    | 0.038  | 0.054   |                       | 40 x 15    |            |   |
| CRM 14 X MN5Q                      | 1.58  | 1.55  | 0.040  | 0.042   | 7.70    | 1.60   | 3.64  | 2.00  | 0.55   | 0.105   | 0.018   | 0.009    | 0.026  | ...     |                       | 40 x 15    |            |   |
| 14 X 15195P                        | 1.64  | 1.45  | 0.018  | 0.062   | 12.06   | 0.09   | 0.11  | 0.30  | 0.12   | 0.08    | 0.33    | 0.05     | ...    | ...     |                       | 40 x 15    | C          |   |
| 14 X 15196S                        | 1.08  | 1.64  | 0.012  | 0.037   | 10.16   | 0.25   | 0.26  | 0.22  | 0.22   | 0.13(5) | 0.21    | 0.10(5)  | ...    | ...     |                       | 40 x 15    |            |   |
| 14 X 15197Q                        | 1.25  | 1.43  | 0.041  | 0.093   | 13.7    | 0.42   | 0.25  | 0.12  | 0.32   | 0.39    | 0.11    | 0.18     | ...    | ...     |                       | 40 x 15    |            |   |
| CRM 14 A 491/2                     | 0.994 | 1.101 | 0.0112 | 0.0494  | 16.73   | 0.0745 | 1.482 | 0.608 | (0.04) | 0.110   | 0.0839  | ...      | 0.0215 | ...     |                       | 50 x 10    | C          |   |
| CRM 14 A 492/2                     | 1.165 | 0.133 | 0.0042 | 0.0468  | 9.18    | 3.833  | 1.059 | 1.295 | ...    | 0.186   | (0.01)  | ...      | ...    | ...     |                       | 50 x 10    |            |   |
| CRM 14 A 493/2                     | 0.875 | 0.782 | 0.0118 | 0.098   | 11.74   | 3.010  | 0.178 | 0.955 | ...    | 0.0375  | (0.017) | ...      | ...    | ...     |                       | 50 x 10    |            |   |
| CRM 14 A 494/2                     | 1.398 | 0.373 | 0.0032 | 0.0421  | 13.37   | 0.732  | 0.668 | 0.101 | 0.166  | 0.0022  | (0.025) | ...      | 0.0146 | ...     |                       | 50 x 10    |            |   |
| CRM 14 A 495/3                     | 0.813 | 0.595 | 0.0203 | 0.079   | 14.05   | 1.585  | 2.03  | 0.304 | ...    | 0.0093  | (0.028) | ...      | ...    | ...     |                       | 50 x 10    |            |   |
| CRM 14 MT 035A                     | 0.102 | 0.59  | 0.002  | 0.023   | 12.04   | 1.81   | 18.48 | 0.28  | 0.17   | <0.004  | 0.058   | 0.003    | 0.33   | 0.004   | Fe 65.91              | various    |            |   |
| CRM 14 MT 129A                     | 0.030 | 0.40  | <0.001 | 0.022   | 9.31    | 6.86   | 19.62 | 0.25  | 0.152  | 0.014   | 0.144   | ...      | 0.264  | 0.025   | Fe 62.62              |            |            |   |

# 1. Iron Base

# Special Steels

# Blocks/Discs

| 1.4.7 Lead Steel  |        |         |         |         |       |         |         |        |         |         |         |          |         |           |                    |                  |
|---|--------|---------|---------|---------|-------|---------|---------|--------|---------|---------|---------|----------|---------|-----------|--------------------|------------------|
|   | C      | Si      | S       | P       | Mn    | Ni      | Cr      | Mo     | Cu      | Sn      | Al      | Pb       | W       | Others    | Typical Alloy Type | Size (mm)<br>Ø H |
| 14 M BS 70B   | 0.40   | 0.27    | 0.022   | 0.009   | 0.90  | 0.25    | 1.00    | 0.205  | 0.13    | ...     | (0.024) | 0.135    | ...     | Te 0.034  | AISI 41L40         | 41 x 13          |
| 14 M BS 72B   | 0.497  | 0.26    | 0.029   | 0.029   | 0.87  | 0.17    | 0.98    | 0.19   | 0.21    | 0.014   | 0.020   | 0.174    | ...     | N 0.0081  | AISI 41L50         | 41 x 13          |
| 14 M BS 73B   | 0.020  | 0.250   | 0.030   | 0.009   | 0.83  | 0.416   | 0.512   | 0.170  | 0.141   | 0.008   | 0.022   | 0.139    | <0.002  | N 0.0113  | AISI 86L20         | 41 x 13          |
| 14 M BS 74E   | 0.079  | 0.002   | 0.308   | 0.065   | 1.04  | 0.007   | 0.020   | 0.002  | 0.006   | (0.001) | (0.001) | 0.234    | <0.002  | Te 0.045  | AISI 12L14+Te      | 41 x 13          |
| 14 M BS 74 is recommended for XRF spectrometry only; unsuitable for O.E. spectrometry due to high S and Pb. |        |         |         |         |       |         |         |        |         |         |         |          |         |           |                    |                  |
| CRM 14 MI 182A  | 0.20   | 0.25    | 0.023   | 0.028   | 0.90  | 0.50    | 0.56    | 0.18   | 0.23    | 0.012   | 0.020   | 0.14     | (0.008) | Co, Nb, N | 86L20              | 31 x 18          |
| CRM 14 MI 183A  | 0.072  | (0.01)  | 0.31    | 0.070   | 1.01  | 0.006   | 0.010   | 0.002  | 0.006   | <0.005  | (0.002) | 0.24     | <0.01   | Co, N, O  | 12L14              | 31 x 18          |
| 1.4.8 Free-machining and Resulfurised Steel   |        |         |         |         |       |         |         |        |         |         |         |          |         |           |                    |                  |
|   | C      | Si      | S       | P       | Mn    | Ni      | Cr      | Mo     | Cu      | Sn      | Co      | V        | N       | Others    | Typical Alloy Type | Size (mm)<br>Ø H |
| 14 M BS 65C   | 0.150  | 0.24    | 0.115   | 0.007   | 1.19  | 0.063   | 0.066   | 0.012  | 0.24    | 0.02    | (0.007) | 0.002    | 0.0084  |           | AISI 1117          | 41-44 x 19       |
| 14 M BS 66B   | 0.418  | 0.02    | 0.11    | 0.018   | 1.57  | 0.033   | 0.094   | 0.014  | 0.031   | 0.001   | 0.005   | 0.002    | (0.006) |           | AISI 1141          | 41-44 x 19       |
| CRM 14 X MSFM1H   | 0.032  | 0.65    | 0.34    | 0.09    | 1.58  | 0.27    | 1.75    | 0.21   | 0.20    | 0.03    | 0.25    | 0.23     | 0.007   |           |                    | 40 x 15          |
| CRM 14 X MSFM2H   | 0.269  | 0.505   | 0.193   | 0.060   | 1.83  | 0.040   | 0.060   | 0.291  | 0.0085  | (0.003) | 0.0033  | (0.0008) | (0.003) |           |                    | 40 x 15          |
| 14 X MSFM3F   | 0.55   | 0.52    | 0.087   | 0.060   | 2.10  | ...     | ...     | 0.27   | ...     | ...     | ...     | ...      | ...     |           |                    | 40 x 15          |
| CRM 14 A E058-2(D)  | 0.424  | 0.1080  | 0.1712  | 0.0098  | 1.186 | 0.199   | 0.1211  | 0.0589 | 0.261   | ...     | ...     | ...      | 0.0107  |           |                    | 38 x 19          |
| CRM 14 A E085-1(D)  | 0.067  | 0.008   | 0.336   | 0.062   | 0.977 | ...     | ...     | ...    | 0.291   | ...     | 0.019   | 0.0021   | ...     |           |                    | 38 x 19          |
| CRM 14 MI 10C   | 0.128  | 0.37    | 0.29    | 0.026   | 0.35  | 0.24    | 12.25   | 0.08   | 0.155   | 0.009   | 0.022   | 0.024    | 0.015   | Al, Nb, O | AISI 416           | 31 x 18          |
| CRM 14 MI 29C   | 0.18   | 0.28    | 0.13    | 0.011   | 1.20  | 0.075   | 0.076   | 0.016  | 0.15    | 0.008   | (0.01)  | 0.003    | 0.010   | Al, As, O | C-1117             | 31 x 18          |
| CRM 14 MI 29D   | 0.17   | 0.050   | 0.1153  | 0.018   | 1.07  | 0.042   | 0.076   | 0.016  | 0.085   | 0.0072  | (0.023) | 0.0018   | 0.0057  | Al, As    | C-1117             | 31 x 18          |
| CRM 14 MI 199A  | 0.44   | 0.16    | 0.27    | 0.008   | 1.47  | 0.10    | 0.10    | 0.031  | 0.11    | 0.007   | 0.007   | 0.003    | 0.0071  | Nb, O     | C-1144             | 31 x 18          |
| CRM 14 MI 199B  | 0.45   | 0.18    | 0.29    | 0.009   | 1.45  | 0.035   | 0.048   | 0.008  | 0.089   | 0.005   | 0.007   | 0.003    | 0.0059  | Al, As, B | C-1144             | 31 x 18          |
| CRM 14 MI 206A  | 0.068  | (0.019) | 0.26    | 0.069   | 0.90  | 0.044   | 0.041   | 0.012  | 0.098   | 0.005   | 0.009   | 0.002    | 0.0119  | Al, As, B | C-1215             | 31 x 18          |
| CRM 14 MI 253A  | 0.041  | 0.50    | 0.0089  | 0.140   | 1.50  | 9.17    | 17.90   | 0.348  | 0.223   | 0.01    | 0.088   | 0.106    | 0.0373  | Se 0.21   | AISI 303 Se        | 31 x 18          |
| 14 M BS 90F   | 0.085  | 0.58    | 0.328   | 0.023   | 0.53  | 0.3     | 13.01   | 0.14   | 0.12    | 0.005   | 0.021   | 0.076    | 0.037   |           | AISI 416           | 31-45 x 12       |
| 14 M BS 150   | 0.048  | 0.43    | 0.33    | 0.020   | 1.71  | 0.19    | 18.61   | 1.97   | 0.042   | (0.003) | 0.024   | 0.054    | 0.029   |           | 182FM              | 31-45 x 12       |
| 14 M BS 151   | 0.090  | 0.65    | 0.018   | 0.021   | 0.41  | 0.24    | 13.19   | 0.088  | 0.11    | 0.005   | 0.018   | 0.046    | 0.022   | Se 0.328  | AISI 416 Se        | 31-45 x 12       |
| 14 M BS 152   | 0.320  | 0.44    | 0.275   | 0.022   | 0.36  | 0.14    | 13.41   | 0.061  | 0.050   | 0.003   | 0.015   | 0.051    | 0.020   |           | AISI 420F          | 31-45 x 12       |
| 14 M BS 153   | 0.026  | 0.53    | 0.28    | 0.018   | 0.41  | 0.14    | 17.38   | 0.30   | 0.052   | 0.002   | 0.017   | 0.045    | 0.021   |           | AISI 430F          | 31-45 x 12       |
| 14 M BS 154   | 0.030  | 1.26    | 0.302   | 0.027   | 0.40  | 0.25    | 17.58   | 0.31   | 0.063   | (0.005) | 0.019   | 0.046    | 0.039   |           | AISI 430F mod      | 31-45 x 12       |
| 14 M BS 155   | 1.00   | 0.40    | 0.145   | 0.014   | 0.35  | 0.13    | 16.64   | 0.46   | 0.035   | (0.003) | 0.019   | 0.10     | 0.032   |           | AISI 440F          | 31-45 x 12       |
| 14 M BS 156   | 1.06   | 0.47    | 0.007   | 0.022   | 1.15  | 0.35    | 16.87   | 0.50   | 0.09    | (0.004) | 0.047   | 0.13     | 0.041   | Se 0.142  | AISI 440F Se       | 31-45 x 12       |
| 14 M BS 4142 <sub>se</sub>  | 0.428  | 0.17    | 0.031   | 0.015   | 0.85  | 0.081   | 0.84    | 0.164  | 0.13    | 0.015   | 0.012   | 0.003    | 0.0087  | Se 0.042  | AISI 4142 Se       | 31-45 x 12       |
| 14 M BS 53 <sub>Mod</sub>   | 1.01   | 0.26    | 0.012   | 0.011   | 0.36  | 0.072   | 1.37    | 0.024  | 0.07    | 0.008   | 0.007   | 0.005    | 0.0086  | Bi 0.102  | AISI E52100        | 38 x 12          |
| 14 M BS 4140A   | 0.40   | 0.21    | 0.076   | 0.021   | 0.84  | 0.15    | 0.97    | 0.16   | 0.15    | 0.011   | 0.010   | 0.004    | 0.0098  | Bi 0.105  | AISI 4140 + Bi     | 38 x 12          |
| 14 M BS 4140B   | 0.43   | 0.20    | 0.037   | 0.027   | 0.76  | 0.012   | 0.84    | 0.16   | 0.006   | (0.002) | 0.005   | 0.005    | 0.0064  | Bi 0.087  | AISI 4140 + Bi     | 38 x 12          |
| 14 M BS 4150 <sub>Mod</sub>   | 0.47   | 0.21    | 0.079   | 0.024   | 0.90  | 0.15    | 1.01    | 0.21   | 0.19    | 0.013   | 0.012   | 0.008    | 0.0087  | Bi 0.070  | AISI 4150 + Bi     | 38 x 12          |
| 14 M BS 8620A   | 0.184  | 0.21    | 0.079   | 0.008   | 0.80  | 0.44    | 0.48    | 0.16   | 0.15    | 0.009   | 0.010   | 0.004    | 0.0107  | Bi 0.073  | AISI 8620 + Bi     | 38 x 12          |
| 14 M BS 8620B   | 0.202  | 0.23    | 0.029   | 0.014   | 0.84  | 0.44    | 0.59    | 0.17   | 0.135   | 0.009   | 0.011   | 0.003    | 0.0100  | Bi 0.105  | AISI 8620 + Bi     | 38 x 12          |
| 14 MT 303   | 0.070  | 0.58    | 0.31    | 0.029   | 1.64  | 9.08    | 17.78   | 0.41   | 0.49    | 0.007   | 0.16    | 0.044    | ...     |           | AISI 303           | 38 x 19          |
| 14 MT 416   | 0.088  | 0.63    | 0.36    | 0.018   | 0.52  | 0.24    | 13.15   | 0.065  | 0.004   | 0.005   | 0.019   | 0.025    | ...     |           | AISI 416           | 38 x 19          |
| 1.4.9 Silicon Steel   |        |         |         |         |       |         |         |        |         |         |         |          |         |           |                    |                  |
|   | C      | Si      | S       | P       | Mn    | Ni      | Cr      | Cu     | Ti      | Al      | As      | Ca       | N       | Others    | Typical Alloy Type | Size (mm)<br>Ø H |
| CRM 14 HY T1  | 0.10   | 5.29    | 0.013   | 0.014   | 0.14  | 0.036   | 0.065   | <0.03  | 0.02    | ...     | ...     | ...      | ...     |           |                    | 32-35 x 19       |
| CRM 14 HY T2/1  | 0.026  | 3.24    | 0.017   | 0.009   | 0.18  | 0.11    | 0.03    | 0.09   | ...     | ...     | ...     | ...      | ...     |           |                    | 32-35 x 19       |
| CRM 14 HY T2/2  | 0.039  | 3.84    | 0.020   | 0.012   | 0.28  | 0.074   | 0.065   | 0.075  | 0.037   | ...     | ...     | ...      | ...     |           | Transformer Steel  | 32-35 x 19       |
| CRM 14 HY T3  | 0.090  | 0.66    | 0.033   | 0.058   | 0.60  | 0.11    | 0.40    | 0.10   | <0.01   | ...     | ...     | ...      | ...     |           |                    | 32-35 x 19       |
| CRM 14 HY T4  | 0.17   | 1.97    | 0.041   | 0.012   | 0.23  | 0.077   | 0.24    | 0.16   | <0.005  | ...     | ...     | ...      | ...     |           |                    | 32-35 x 19       |
| CRM 12 DB E191-1(D)   | 0.013  | 3.140   | 0.0017  | 0.011   | 0.025 | 0.018   | 0.025   | 0.0080 | 0.009   | 0.397   | 0.0031  | ...      | 0.0026  |           |                    | 35 x 30          |
| CRM 14 J E196-1(D)  | 0.0039 | 1.908   | 0.0005  | 0.0076  | 0.365 | ...     | ...     | ...    | ...     | 0.201   | ...     | 0.0005   | 0.002   |           |                    | 38 x 25          |
| 1.4.10 Special Alloys   |        |         |         |         |       |         |         |        |         |         |         |          |         |           |                    |                  |
|   | C      | Si      | S       | P       | Mn    | Ni      | Cr      | Mo     | Cu      | Co      | Al      | Ti       | Nb      | Others    | Typical Alloy Type | Size (mm)<br>Ø H |
| 14 M BS 203Mn   | 0.048  | 0.46    | 0.30    | 0.026   | 5.99  | 5.50    | 16.75   | 0.18   | 1.88    | 0.06    | (0.001) | (0.002)  | (0.004) |           |                    | 38 x 12          |
| 14 M BS 9-4-30  | 0.316  | 0.06    | <0.002  | 0.008   | 0.22  | 7.25    | 1.00    | 1.01   | 0.088   | 4.46    | 0.004   | (0.002)  | (0.007) | V 0.09    | AMS 6526           | 35 x 12          |
| CRM 14 MI 98A   | 0.019  | 0.10    | 0.002   | (0.002) | 0.24  | (29.09) | 0.12    | 0.05   | 0.05    | (17.50) | 0.04    | <0.01    | <0.01   |           | Kovar              | 31 x 18          |
| 14 X ALNICO 1A  | 0.08   | 0.31    | 0.007   | ...     | 0.26  | 17.1    | ...     | ...    | 6.1     | 15.1    | 9.03    | 0.50     | ...     | Zr 0.2    | AlNiCo             | 40 x 15          |
| 14 MT 070A  | 0.014  | 0.32    | <0.001  | 0.003   | 0.015 | 24.47   | 5.54    | 0.006  | 0.010   | 29.00   | 0.47    | 0.82     | 4.63    |           |                    | various          |
| 14 MT 098A  | 0.025  | 0.39    | <0.0005 | 0.003   | 0.037 | 37.53   | 0.099   | 0.021  | 0.026   | 14.46   | 0.050   | 1.54     | 5.06    |           |                    | various          |
| 1.4.11 High-Ni Calibration Series   |        |         |         |         |       |         |         |        |         |         |         |          |         |           |                    |                  |
|   | C      | Si      | S       | P       | Ni    | Co      | Cr      | Cu     | Al      | Fe      |         |          |         |           |                    | Size (mm)<br>Ø H |
| 14 X FeNi20   | 0.012  | 1.59    | 0.0024  | 0.006   | 19.9  | 0.98    | (0.015) | 0.06   | (0.002) | rem     |         |          |         |           |                    | 40 x 15          |
| 14 X FeNi35   | 0.056  | 0.149   | 0.093   | 0.030   | 34.7  | 0.345   | 0.08    | 0.039  | (0.001) | rem     |         |          |         |           |                    | 40 x 15          |
| 14 X FeNi40   | 0.074  | 0.068   | 1.22    | 0.014   | 40.3  | 1.02    | 0.05    | 0.063  | 2.61    | rem     |         |          |         |           |                    | 40 x 15          |
| 14 X FeNi45   | 0.0056 | 1.04    | 0.021   | 0.041   | 46.0  | 0.62    | 0.11    | 0.077  | 1.10    | rem     |         |          |         |           |                    | 40 x 15          |
| 14 X FeNi50   | 0.149  | 0.47    | 0.137   | 0.016   | 51.1  | 0.53    | 0.089   | 0.107  | 0.40    | rem     |         |          |         |           |                    | 40 x 15          |









# 2. Nickel Base

Blocks/Discs

| 2.10 Ni/Co/Cr/Al/Ti     |                | C      | Si     | Mn      | Cu      | Fe     | Cr     | Mo     | Co       | Ti     | Al     | Zr     | V        | Ni     | N        | Typical Alloy Type | Size (mm) Ø H      |               |   |
|-------------------------|----------------|--------|--------|---------|---------|--------|--------|--------|----------|--------|--------|--------|----------|--------|----------|--------------------|--------------------|---------------|---|
|                         | 210 X 11774F   | 0.09   | 0.16   | 0.04    | 0.16    | 0.23   | 10.25  | 3.41   | 13.67    | 5.30   | 5.56   | 0.08   | 0.94     | rem    | ...      |                    | 40 x 15            | c             |   |
| CRM                     | 210 X 11775G   | 0.024  | 0.36   | 0.127   | (0.008) | 1.02   | 10.42  | 3.19   | 14.83    | 5.76   | 7.0    | 0.070  | 0.47     | (56.6) | (0.003)  |                    | 45 x 20            |               |   |
|                         | 210 X 11979G   | 0.025  | 0.30   | 0.13    | 0.07    | 0.56   | 8.07   | 3.28   | 14.32    | 5.22   | 3.76   | 0.04   | 0.82     | rem    | ...      | IN100              | 40 x 15            |               |   |
|                         | 210 X 11980G   | 0.013  | 0.38   | 0.18    | 0.015   | 0.67   | 9.47   | 3.02   | 14.98    | 4.07   | 3.97   | 0.02   | 0.83     | rem    | ...      | AMS 5397           | 40 x 15            |               |   |
|                         | 210 X 11981F   | 0.09   | 0.33   | 0.21    | 0.10    | 0.93   | 11.81  | 3.66   | 14.65    | 4.83   | 5.07   | 0.11   | 0.73     | rem    | ...      |                    |                    |               |   |
|                         |                | C      | Si     | Mn      | Cu      | Fe     | Cr     | Mo     | Co       | Ti     | Al     | Zr     | V        | Ni     | B        |                    |                    |               |   |
|                         | 210 X 11982D   | 0.15   | 0.30   | 0.19    | 0.07    | 0.84   | 9.54   | 3.09   | 14.50    | 5.7    | 5.07   | 0.04   | 1.20     | rem    | 0.027    | continued          |                    |               |   |
|                         | 210 X 11999A   | 0.014  | 0.40   | 0.18    | 0.012   | 0.66   | 9.42   | 3.03   | 14.96    | 4.20   | 4.08   | 0.033  | 0.82     | rem    | ...      |                    |                    |               |   |
| CRM                     | 210 A 345      | 0.153  | ...    | ...     | ...     | ...    | 9.95   | 3.01   | 14.71    | (5)    | 5.58   | 0.044  | 1.00     | rem    | ...      | continued          |                    |               |   |
| CRM                     | 210 A 346A     | (0.15) | ...    | ...     | ...     | ...    | (10)   | (3)    | (15)     | (5)    | (5.5)  | ...    | (1)      | rem    | ...      |                    |                    |               |   |
| Continuation from above |                | ppm Ag | ppm Mg | ppm Pb  | ppm Sn  | ppm Cd | ppm Zn | ppm As | ppm Se   | ppm Bi | ppm Sb | ppm Te | ppm Ca   | ppm Ga | ppm Tl   | Typical Alloy Type | Size (mm) Ø H      |               |   |
|                         | 210 X 11982D   | <1     | 60     | 5       | 6       | <0.5   | 9      | 76     | <2       | <0.5   | 2      | <1     | ...      | ...    | ...      | IN 100             | 40 x 15            | c             |   |
|                         | 210 X 11999A   | 1.3    | 5.5    | 3.7     | 6.2     | 0.1    | 7.8    | <5     | <1       | <1     | 1      | <1     | ...      | ...    | ...      |                    | 40 x 15            |               |   |
|                         | 210 A 345      | <0.2   | 5      | 0.2     | 6       | <0.1   | <0.5   | (2)    | <0.5     | <0.2   | <2     | <0.2   | <5       | 8      | <0.2     | IN 100             | 41 x 13            | c             |   |
|                         | 210 A 346A     | 42     | 130    | 22      | 93      | 0.4    | 29     | 51     | 6        | 10     | 45     | 9      | (20)     | (50)   | (2)      |                    | 41 x 13            |               |   |
| 2.11 Ni/Cr/Al           |                | Si     | Mn     | Cu      | Fe      | Cr     | Mo     | Co     | Ti       | Al     | Nb     | Ta     | Zr       | B      | C        | Ni                 | Typical Alloy Type | Size (mm) Ø H |   |
|                         | 211 X 11221F   | 0.08   | 0.27   | 0.09    | 0.22    | 13.83  | 3.80   | 1.27   | 1.22     | 6.26   | 2.76   | 0.08   | 0.08     | ...    | ...      | rem                |                    | 40 x 15       | c |
|                         | 211 X 11222F   | 0.23   | 0.32   | 0.11    | 0.17    | 14.18  | 4.03   | 0.12   | 1.05     | 5.47   | 2.89   | 0.08   | 0.12     | ...    | ...      | rem                |                    | 40 x 15       |   |
|                         | 211 X 11224F   | 0.24   | 0.09   | 0.34    | 0.46    | 14.03  | 4.02   | 0.32   | 1.27     | 6.07   | 2.92   | 0.32   | 0.12     | ...    | ...      | rem                | IN 713             | 40 x 15       |   |
|                         | 211 X 11233E   | 0.14   | 0.20   | 0.21    | 0.39    | 12.67  | 4.10   | 0.63   | 1.32     | 6.03   | 2.61   | 0.23   | 0.13     | ...    | ...      | rem                | AMS 5377           | 40 x 15       |   |
|                         | 211 X 11236E   | 0.21   | 0.21   | 0.16    | 0.46    | 15.98  | 4.02   | 0.64   | 1.33     | 6.14   | 2.73   | 0.10   | 0.05     | ...    | ...      | rem                |                    | 40 x 15       |   |
| CRM                     | 211 A 350      | 0.110  | 0.019  | ...     | 1.50    | 13.43  | 4.29   | 0.338  | 0.87     | 5.97   | 2.17   | ...    | 0.072    | 0.013  | 0.138    | 70.8               | IN 713             | 41 x 13       |   |
| 2.12 Ni/Cu              |                | C      | Si     | S       | Mn      | Cu     | Fe     | Cr     | Pb       | Co     | Ti     | Al     | Mg       | Zr     | P        | Ni                 | Typical Alloy Type | Size (mm) Ø H |   |
|                         | 212 X 4001L    | 0.090  | 1.45   | 0.020   | 3.01    | 27.4   | 0.50   | 0.04   | 0.06     | 0.11   | 0.11   | 0.11   | 0.12     | ...    | ...      | (66.8)             |                    | 40 x 15       | c |
|                         | 212 X 4002K    | 0.046  | 0.10   | 0.071   | 1.99    | 31.5   | 0.99   | 0.023  | 0.05     | 0.09   | 0.06   | 0.055  | 0.017    | ...    | ...      | (64.8)             | Monel 400          | 40 x 15       |   |
|                         | 212 X 4003H    | 0.02   | 0.27   | 0.024   | 1.04    | 30.6   | 2.00   | 0.07   | 0.05     | 0.03   | 0.03   | 0.03   | 0.04     | ...    | ...      | 65.7               | Monel 500          | 40 x 15       |   |
|                         | 212 X 4004J    | 0.12   | 0.52   | 0.010   | 0.55    | 30.1   | 3.11   | 0.13   | 0.03     | 0.10   | 0.60   | 1.03   | 0.07     | ...    | ...      | 63.6               | Monel 505          | 40 x 15       |   |
| CRM                     | 212 X 4005D    | 0.074  | 2.44   | 0.0255  | 1.45    | 21.31  | 3.36   | 0.350  | 0.020    | 0.107  | 0.613  | 1.85   | (0.0002) | ...    | (0.0025) | 68.38              | Monel 506          | 43 x 20       |   |
|                         | 212 X 4006D    | 0.064  | 4.62   | 0.054   | 0.78    | 24.7   | 2.02   | 0.113  | 0.02     | 0.06   | 1.32   | 3.99   | 0.04     | ...    | ...      | (62.3)             |                    | 40 x 15       |   |
| CRM                     | 212 A 363/1    | 0.140  | 0.028  | (0.002) | 1.26    | 31.90  | 1.86   | (0.05) | ...      | 0.032  | (0.03) | 0.027  | ...      | ...    | ...      | 64.7               | Monel 400          | 38 x 19       | w |
|                         | 212 M BS 400C  | 0.160  | 0.18   | 0.001   | 1.05    | 31.68  | 1.61   | 0.48   | 0.0007   | 0.053  | 0.056  | 0.056  | 0.009    | ...    | 0.012    | 64.55              | Monel 400          | 38-50 x 12    |   |
|                         | 212 M BS 500D  | 0.15   | 0.07   | <0.002  | 0.69    | 29.7   | 0.73   | 0.21   | ...      | 0.033  | 0.45   | 2.98   | 0.01     | ...    | 0.009    | (64.9)             | Monel 500          | 38-50 x 12    |   |
|                         | 212 M BS 400-1 | 0.109  | 0.16   | 0.008   | 1.07    | 30.97  | 1.27   | 0.033  | 0.002    | 0.37   | 0.007  | 0.004  | 0.048    | ...    | 0.022    | 66.0               |                    | 38-50 x 12    |   |
|                         | 212 M BS 400-2 | 0.170  | 0.17   | 0.008   | 1.17    | 30.75  | 1.42   | 0.091  | 0.46     | 0.0011 | 0.006  | 0.033  | ...      | 0.027  | 65.9     |                    |                    | 38-50 x 12    |   |
|                         | 212 M BS 400-3 | 0.153  | 0.063  | 0.006   | 0.85    | 31.25  | 1.6    | 0.21   | (0.0015) | 0.46   | 0.004  | 0.001  | 0.012    | ...    | 0.026    | 65.4               |                    | 38-50 x 12    |   |
|                         | 212 M BS 405   | 0.13   | 0.04   | 0.041   | 1.03    | 31.80  | 1.34   | 0.006  | ...      | 0.025  | 0.003  | 0.1    | 0.026    | ...    | 0.010    | 65.49              |                    | 38-50 x 12    |   |
| CRM                     | 212 MI 51B     | 0.16   | 0.105  | 0.002   | 1.01    | 31.70  | 1.60   | 0.32   | ...      | 0.029  | 0.05   | 0.004  | 0.015    | <0.01  | 0.011    | 64.9               | Monel 400          | 31 x 18       | w |
| CRM                     | 212 MI 52B     | 0.154  | 0.09   | 0.0010  | 0.77    | 30.22  | 0.77   | 0.047  | 0.0002   | 0.004  | 0.50   | 3.02   | 0.012    | 0.039  | 0.009    | 64.3               | Monel 500          | 31 x 18       |   |
| CRM                     | 212 MI 202A    | 0.13   | 0.046  | 0.032   | 1.03    | 32.3   | 1.31   | 0.008  | ...      | 0.020  | 0.005  | 0.080  | 0.024    | 0.010  | 0.011    | 64.8               | Monel R405         | 31 x 18       |   |
|                         |                | C      | Si     | S       | P       | Mn     | Cu     | Fe     | Mg       | Pb     |        |        |          |        |          |                    | Typical Alloy Type | Size (mm) Ø H |   |
|                         | 212 X NA2G     | 0.07   | 2.50   | 0.023   | 0.019   | 1.06   | 29.6   | 1.53   | 0.008    | 0.02   |        |        |          |        |          |                    | Monel H            | 40 x 15       | c |
|                         | 212 X NA3G     | 0.37   | 3.66   | 0.008   | 0.022   | 0.52   | 29.2   | 1.42   | 0.74     | 0.05   |        |        |          |        |          |                    |                    | 40 x 15       |   |
| 2.14 Ni/Cu/Sn           |                | C      | Si     | S       | P       | Mn     | Cu     | Fe     | Mg       | Sn     | Zn     | Ni     |          |        |          |                    |                    | Size (mm) Ø H |   |
|                         | 214 N N50.02   | 0.22   | 0.02   | 0.30    | 2.0     | 1.1    | 28.2   | 3.9    | 0.006    | 14.0   | 0.39   | rem    |          |        |          |                    |                    | 50 x 10       |   |
|                         | 214 N N50.03   | 0.10   | 0.02   | 0.16    | 0.9     | 0.80   | 33.2   | 2.3    | 0.02     | 11.0   | 0.36   | rem    |          |        |          |                    |                    | 50 x 10       |   |
|                         | 214 N N50.05   | 0.02   | 0.03   | 0.19    | 0.05    | 2.0    | 42.0   | <0.01  | 0.06     | 10.1   | <0.01  | rem    |          |        |          |                    |                    | 50 x 10       |   |

# 2. Nickel Base

Blocks/Discs

| 2.15 Ni/Co/Cr/Fe/Mo         |               | C      | Si     | S       | P       | Mn      | Cu       | Fe      | Cr      | Mo      | Co     | V         | W                  | Ni                 | N          | Others     | Typical Alloy Type | Size (mm) |         |   |
|-----------------------------|---------------|--------|--------|---------|---------|---------|----------|---------|---------|---------|--------|-----------|--------------------|--------------------|------------|------------|--------------------|-----------|---------|---|
|                             |               |        |        |         |         |         |          |         |         |         |        |           |                    |                    |            |            | Ø                  | H         |         |   |
| CRM                         | 215 X HB1M    | 0.068  | 0.246  | 0.049   | 0.005   | 1.25    | 0.035    | 7.46    | 2.04    | 33.9    | 1.12   | 0.63      | ...                | rem                | 0.031      | Al, Ti, Sn | BS 3146            | 43 x 20   | c       |   |
| CRM                         | 215 X HB2F    | 0.045  | 0.48   | 0.039   | 0.011   | 0.925   | (0.004)  | 2.43    | 1.63    | 32.1    | 0.51   | 0.52      | ...                | 61.2               | 0.006      |            | ANC 15             | 43 x 20   |         |   |
|                             | 215 X HB3F    | 0.10   | 1.26   | 0.020   | 0.004   | 1.09    | ...      | 4.98    | 0.675   | 29.1    | 0.83   | 0.51      | ...                | rem                | ...        |            | AMS 5396           | 40 x 15   |         |   |
|                             | 215 X HB4E    | 0.138  | 1.38   | (0.008) | (0.026) | 0.89    | ...      | 6.07    | 0.70    | 26.6    | 1.76   | 0.34      | ...                | rem                | ...        |            | ASTM A494          | 40 x 15   |         |   |
|                             | 215 X HB5J    | 0.147  | 1.30   | 0.002   | 0.053   | 0.44    | 0.05     | 3.05    | 0.03    | 26.0    | 2.47   | 0.14      | ...                | rem                | 0.008      | Al, Ti     | Hastelloy B        | 43 x 20   |         |   |
| CRM                         | 215 X HC1K    | 0.031  | 0.58   | 0.006   | 0.003   | 1.18    | 0.057    | 4.31    | 15.2    | 19.5    | 2.44   | 0.144     | 3.22               | 53.2               | 0.121      | Ti         | BS 3146            | 43 x 20   | c       |   |
|                             | 215 X HC2H    | 0.066  | 1.02   | 0.003   | 0.012   | 0.97    | 0.023    | 3.62    | 15.7    | 18.9    | 1.7    | 0.38      | 3.91               | rem                | 0.18       | Al, Ti     | ANC 16             | 43 x 20   |         |   |
| CRM                         | 215 X HC3J    | 0.105  | 1.06   | 0.027   | 0.025   | 0.79    | 0.157    | 5.38    | 17.2    | 18.0    | 0.97   | 0.40      | 4.31               | 51.3               | 0.146      | Al, B, Ti  | AMS 5388           | 43 x 20   |         |   |
| CRM                         | 215 X HC4H    | 0.245  | 1.86   | 0.032   | 0.035   | 0.56    | 0.025    | 8.15    | 20.85   | 17.35   | 0.495  | 0.745     | 5.78               | 43.8               | ...        | Al, Ti, B  | A 494              | 43 x 20   |         |   |
| CRM                         | 215 X HC5R    | 0.243  | 1.35   | 0.033   | 0.053   | 0.322   | 0.265    | 6.81    | 18.81   | 14.37   | 0.093  | 0.53      | 4.87               | 50.09              | 0.162      | Al, Ti, Mg | Hastelloy C        | 43 x 20   |         |   |
|                             | 215 M BS H1B  | 0.006  | 0.049  | 0.0005  | 0.003   | 0.81    | (0.01)   | 1.00    | <0.01   | 26.52   | <0.02  | <0.01     | ...                | (71.4)             | ...        |            |                    |           |         |   |
|                             | 215 M BS H3B  | 0.078  | 0.63   | 0.0005  | 0.013   | 0.11    | 0.27     | 19.92   | 22.23   | 8.84    | 1.96   | 0.06      | 0.49               | 44.9               | ...        | continued  |                    |           |         |   |
|                             | 215 M BS H6A  | 0.005  | (0.03) | <0.002  | 0.010   | 0.31    | 0.070    | 4.34    | 21.37   | 13.37   | 1.11   | 0.17      | 3.09               | rem                | ...        |            |                    |           |         |   |
| CRM                         | 215 MI 55B    | 0.004  | 0.021  | 0.0010  | 0.005   | 0.323   | 0.013    | 1.12    | 8.25    | 24.62   | 0.036  | 0.005     | 0.12               | 65.4               | ...        |            |                    |           |         |   |
| CRM                         | 215 MI 65B    | 0.0054 | 0.030  | 0.0005  | 0.006   | 0.29    | 0.054    | 3.63    | 21.32   | 13.02   | 0.59   | 0.155     | 2.87               | 57.3               | ...        |            |                    |           |         |   |
| CRM                         | 215 MI 66B    | 0.0044 | 0.028  | 0.0003  | 0.008   | 0.47    | 0.086    | 5.80    | 15.86   | 16.06   | 0.90   | 0.16      | 3.42               | 56.65              | ...        | continued  |                    |           |         |   |
| CRM                         | 215 MI 67B    | 0.008  | 0.24   | 0.0010  | 0.012   | 1.12    | 1.74     | 14.26   | 28.54   | 4.98    | 3.69   | 0.054     | 3.10               | 41.1               | ...        |            |                    |           |         |   |
| CRM                         | 215 MI 69B    | 0.074  | 0.38   | 0.0004  | 0.013   | 0.68    | 0.11     | 17.84   | 21.90   | 8.78    | 1.58   | 0.10      | 0.78               | 47.37              | ...        |            |                    |           |         |   |
| Continuation from above     |               | Nb     | Al     | Ti      | Ta      | Zr      | B        | Sn      | Mg      | N       | O      |           |                    | Typical Alloy Type | Size (mm)  |            |                    |           |         |   |
|                             | 215 M BS H1B  | <0.005 | 0.12   | 0.11    | (0.005) | ...     | 0.003    | ...     | ...     | ...     | ...    |           |                    | Hastelloy B-2      | 38-41 x 12 | w          |                    |           |         |   |
|                             | 215 M BS H3B  | 0.28   | 0.14   | 0.020   | (0.005) | ...     | 0.0052   | ...     | ...     | ...     | ...    |           |                    | Hastelloy X        | 38-41 x 12 |            |                    |           |         |   |
|                             | 215 M BS H6A  | 0.029  | 0.24   | 0.007   | ...     | ...     | 0.0012   | 0.003   | ...     | ...     | ...    |           |                    | Hastelloy C-22     | 38-41 x 12 |            |                    |           |         |   |
|                             | 215 MI 55B    | 0.08   | 0.09   | 0.002   | (0.08)  | (0.005) | 0.002    | <0.001  | 0.011   | 0.016   | 0.0009 |           |                    | Haynes 242         | 31 x 18    | w          |                    |           |         |   |
|                             | 215 MI 65B    | 0.029  | 0.283  | 0.005   | (0.06)  | <0.001  | (0.002)  | (0.001) | 0.009   | 0.046   | 0.0013 |           |                    | Hastelloy C22      | 31 x 18    |            |                    |           |         |   |
|                             | 215 MI 66B    | 0.019  | 0.40   | 0.006   | ...     | 0.02    | 0.0020   | ...     | 0.004   | 0.0108  | 0.0010 |           |                    | Hastelloy C276     | 31 x 18    |            |                    |           |         |   |
|                             | 215 MI 67B    | 0.73   | 0.26   | 0.005   | (0.03)  | (0.002) | (0.001)  | (0.002) | 0.007   | 0.060   | 0.0014 |           |                    | Hastelloy G30      | 31 x 18    |            |                    |           |         |   |
|                             | 215 MI 69B    | 0.11   | 0.20   | 0.011   | ...     | 0.005   | (0.0007) | ...     | 0.006   | 0.0155  | 0.0011 |           |                    | Hastelloy X        | 31 x 18    |            |                    |           |         |   |
| 2.19 Various Nickel Alloys  |               | C      | Si     | S       | P       | Mn      | Cu       | Fe      | Cr      | Mo      | Co     | Ti        | Al                 | Ni                 | Nb         | Y          | Size (mm)          |           |         |   |
|                             |               |        |        |         |         |         |          |         |         |         |        |           |                    |                    |            |            | Ø                  | H         |         |   |
|                             | 219 X NY1A    | ...    | 1.10   | ...     | ...     | ...     | ...      | ...     | 29.2    | ...     | ...    | 1.12      | 9.9                | rem                | ...        | 0.24       |                    |           | 40 x 15 | c |
|                             | 219 X NY2A    | ...    | 1.64   | ...     | ...     | ...     | ...      | ...     | 20.8    | ...     | ...    | 0.6       | 13.1               | rem                | ...        | 0.69       |                    |           | 40 x 15 |   |
| CRM                         | 219 X 20500A  | 0.025  | 1.48   | 0.004   | 0.002   | 0.22    | 0.002    | 1.26    | 51.2    | 0.002   | 0.002  | ...       | ...                | 45.7               | ...        | ...        |                    |           | 43 x 20 | c |
|                             | 219 M BS 197A | 0.050  | 0.96   | <0.001  | 0.021   | 1.56    | 0.12     | 18.07   | 25.11   | 2.99    | 3.06   | 0.017     | 0.18               | ...                | 0.20       | ...        |                    |           |         |   |
|                             | 219 M BS 725  | 0.010  | 0.02   | 0.002   | 0.004   | 0.08    | 0.014    | 8.0     | 20.72   | 7.97    | 0.02   | 1.52      | 0.13               | 58.0               | 3.52       | ...        | continued          |           |         |   |
|                             | 219 M BS 750B | 0.052  | 0.14   | <0.001  | 0.006   | 0.09    | 0.05     | 7.23    | 15.7    | 0.21    | 0.35   | 2.58      | 0.72               | 71.92              | 1.06       | ...        |                    |           |         |   |
|                             | 219 M BS 925  | 0.011  | 0.11   | 0.0020  | 0.016   | 0.50    | 1.74     | 26.92   | 20.82   | 3.0     | 0.34   | 2.2       | 0.17               | 43.53              | 0.23       | ...        |                    |           |         |   |
|                             | 219 X 1837A   | 0.004  | 0.053  | 0.001   | 0.002   | 0.003   | ...      | 0.1     | 9.98    | 3.0     | 10.04  | 5.28      | 5.63               | rem                | <0.01      | ...        | continued          |           |         |   |
|                             | 219 X 1867B   | 0.12   | 0.15   | 0.024   | 0.014   | 0.195   | 0.04     | (1.78)  | 7.2     | 6.0     | 10.7   | 2.5       | 7.9                | rem                | 0.1        | ...        |                    |           |         |   |
| CRM                         | 219 MI 203A   | 0.005  | 0.41   | 0.0009  | 0.006   | 0.023   | 0.050    | 40.6    | 0.72    | 0.090   | 12.88  | 1.58      | 0.066              | 38.44              | 5.00       | ...        | continued          |           |         |   |
| CRM                         | 219 MI 207A   | 0.007  | 0.053  | 0.0027  | 0.002   | 0.015   | 0.017    | 0.64    | 19.98   | 9.62    | 33.46  | 0.91      | 0.040              | 35.19              | 0.043      | ...        |                    |           |         |   |
| CRM                         | 219 MT 133A   | 0.014  | 0.145  | <0.001  | 0.003   | 0.51    | 4.41     | 13.75   | 0.037   | 4.17    | 0.003  | ...       | ...                | 76.99              | ...        | ...        |                    |           | 32 X 19 |   |
| Continuation from above     |               | V      | Ta     | W       | Zr      | Mg      | B        | Re      | Hf      | N       |        |           | Typical Alloy Type | Size (mm)          |            |            |                    |           |         |   |
|                             | 219 M BS 197A | 0.051  | ...    | 2.79    | ...     | (0.003) | 0.0019   | ...     | ...     | (0.052) |        |           | RA 333             | 38 x 12            | w          |            |                    |           |         |   |
|                             | 219 M BS 725  | (0.01) | ...    | ...     | ...     | (0.002) | ...      | ...     | ...     | 0.0051  |        |           | Inconel 725        | 38 x 12            |            |            |                    |           |         |   |
|                             | 219 M BS 750B | 0.04   | (0.01) | (0.05)  | (0.01)  | ...     | 0.003    | ...     | ...     | (0.002) |        |           | Nickel 750         | 38 x 12            |            |            |                    |           |         |   |
|                             | 219 M BS 925  | 0.03   | ...    | 0.47    | ...     | ...     | 0.002    | ...     | ...     | 0.0042  |        |           | Inconel 925        | 38 x 12            |            |            |                    |           |         |   |
|                             | 219 X 1837A   | ...    | <0.01  | 0.012   | 0.027   | ...     | 0.11     | ...     | ...     | ...     |        |           | High B Alloy       | 40 x 15            | c          |            |                    |           |         |   |
|                             | 219 X 1867B   | ...    | 3.4    | 0.63    | 0.45    | ...     | ...      | 0.31    | (0.008) | ...     |        |           | B1900-type         | 40 x 15            |            |            |                    |           |         |   |
|                             | 219 MI 203A   | <0.01  | ...    | (0.02)  | <0.01   | <0.002  | ...      | ...     | ...     | 0.001   |        |           | Inconel 909        | 31 x 18            | w          |            |                    |           |         |   |
|                             | 219 MI 207A   | 0.011  | 0.007  | 0.028   | 0.003   | ...     | 0.011    | ...     | ...     | 0.0031  |        |           | MP35N              | 31 x 18            |            |            |                    |           |         |   |
| 2.21 Ni/B Hardfacing Alloys |               | C      | Si     | S       | Mn      | Cr      | Mo       | Cu      | B       | Fe      | Ni     | Size (mm) |                    |                    |            |            |                    |           |         |   |
|                             |               |        |        |         |         |         |          |         |         |         |        | Ø         | H                  |                    |            |            |                    |           |         |   |
|                             | 221 X HF1A    | 0.144  | 4.61   | 0.006   | 0.130   | 13.1    | 0.018    | 0.029   | 2.12    | 0.33    | rem    |           |                    | 40 x 15            | c          |            |                    |           |         |   |
|                             | 221 X HF2A    | 0.91   | 2.29   | 0.0095  | 0.32    | 9.5     | 0.16     | 0.70    | 2.83    | 0.33    | rem    |           |                    | 40 x 15            |            |            |                    |           |         |   |
|                             | 221 X HF3A    | 1.24   | 3.34   | 0.004   | 0.036   | 10.6    | 0.06     | 0.095   | 1.80    | 1.21    | rem    |           |                    | 40 x 15            |            |            |                    |           |         |   |
|                             | 221 X HF4A    | 0.54   | 5.97   | 0.014   | 0.109   | 14.7    | 0.09     | 0.044   | 1.26    | 6.58    | rem    |           |                    | 40 x 15            |            |            |                    |           |         |   |









# 3. Copper Base

## Bronzes

### Blocks/Discs

| 3.2.3 Aluminium Bronze |                | Sn      | Pb     | Zn    | Fe    | Ni    | Al    | Si    | As      | Mn     | P       | Mg      | Cr                          | Cu      | Size (mm)          |           |   |
|------------------------|----------------|---------|--------|-------|-------|-------|-------|-------|---------|--------|---------|---------|-----------------------------|---------|--------------------|-----------|---|
|                        |                |         |        |       |       |       |       |       |         |        |         |         |                             |         | Ø                  | H         |   |
| CRM                    | 32 X ALB 1M    | 0.023   | 0.223  | 0.032 | 3.04  | 6.03  | 10.09 | 0.13  | <0.001  | 0.088  | 0.017   | 0.084   | 0.012                       | 80.2    | 43 x 20            | c         |   |
| CRM                    | 32 X ALB 2H    | 0.08    | 0.09   | 0.229 | 4.60  | 4.64  | 9.52  | 0.302 | 0.0114  | 0.393  | 0.027   | 0.0104  | 0.0261                      | 80.0    | 43 x 20            | c         |   |
| CRM                    | 32 X ALB 3Q    | 0.10    | 0.11   | 0.325 | 4.15  | 3.72  | 11.56 | 0.135 | 0.0060  | 0.374  | 0.025   | 0.088   | 0.0089                      | 79.4    | 43 x 20            | c         |   |
| CRM                    | 32 X ALB 4G    | 0.093   | 0.149  | 0.305 | 4.68  | 7.02  | 7.96  | 0.335 | 0.010   | 1.20   | 0.028   | 0.297   | 0.0275                      | (77.91) | 43 x 20            | c         |   |
| CRM                    | 32 X ALB 5H    | 0.10    | 0.20   | 0.28  | 2.45  | 4.10  | 7.50  | 0.08  | 0.008   | 1.05   | 0.030   | 0.008   | 0.006                       | (84.2)  | 43 x 20            | c         |   |
| CRM                    | 32 X ALB 6H    | 0.126   | 0.060  | 0.19  | 3.06  | 5.62  | 8.42  | 0.30  | (0.021) | 1.41   | 0.036   | 0.0026  | (0.004)                     | 80.7    | 43 x 20            | c         |   |
| CRM                    | 32 X ALB 7B    | 0.351   | 0.029  | 0.513 | 4.97  | 4.87  | 3.97  | 0.41  | 0.048   | 0.575  | 0.051   | 0.013   | 0.094                       | 83.98   | 43 x 20            | c         |   |
| CRM                    | 32 X ALB 8D*   | 0.50    | 0.005  | 0.75  | 5.7   | 6.5   | 7.2   | 0.6   | 0.15    | 1.5    | 0.15    | 0.05    | 0.05                        | bal     | 42 x 18            | cc        |   |
| CRM                    | 32 X ALB 9A    | 0.032   | 0.285  | 0.040 | 3.79  | 0.773 | 12.79 | 0.160 | (0.001) | 0.069  | 0.019   | 0.0023  | 0.013                       | 81.3    | 43 x 20            | c         |   |
| * Target values        |                |         |        |       |       |       |       |       |         |        |         |         |                             |         |                    |           |   |
|                        |                | Sn      | Pb     | Zn    | Fe    | Ni    | Al    | Si    | Mn      | Mg     | Cd      | Cu      |                             |         | Size (mm)          |           |   |
|                        |                |         |        |       |       |       |       |       |         |        |         |         |                             |         | Ø                  | H         |   |
|                        | 32 T CA10      | 0.16    | 0.16   | 0.067 | 4.55  | 3.39  | 10.10 | 0.46  | 0.333   | 0.007  | ...     | 80.70   |                             |         | 60 x 6             | cc        |   |
|                        | 32 T CA11      | 0.25    | 0.1    | 0.2   | 1.3   | 2.0   | 10    | 0.25  | 0.8     | 0.07   | ...     | 85      | CA11 values are approximate |         | 60 x 6             |           |   |
|                        | 32 T CA12      | 0.036   | 0.047  | 0.45  | 2.77  | 1.385 | 8.0   | 0.058 | 3.09    | ...    | ...     | 84.1    |                             |         | 60 x 6             |           |   |
|                        | 32 T CA13      | (0.01)  | 0.0230 | 0.65  | 3.82  | 0.50  | 11.20 | 0.11  | 1.22    | ...    | ...     | 82.45   |                             |         | 60 x 6             |           |   |
|                        | 32 T CA20      | 0.19    | 0.18   | 0.41  | 0.79  | 1.18  | 8.00  | 0.17  | 1.85    | ...    | 0.05    | 87.15   |                             |         | 60 x 6             |           |   |
|                        | 32 T CA21      | 0.07    | 0.05   | 0.100 | 3.45  | 3.09  | 10.82 | 0.07  | 0.30    | ...    | 0.0095  | 81.9    |                             |         | 60 x 6             |           |   |
|                        | 32 T CA22      | 0.30    | 0.0243 | 0.605 | 2.51  | 4.54  | 10.45 | 0.32  | 0.745   | ...    | ...     | 80.50   |                             |         | 60 x 6             |           |   |
|                        | 32 T CA25      | 0.177   | 0.03   | 0.252 | 6.10  | 5.74  | 7.97  | 0.084 | 0.51    | ...    | ...     | 79.12   |                             |         | 60 x 6             |           |   |
|                        | 32 T CA26      | 0.005   | 0.058  | 0.038 | 4.36  | 4.87  | 9.10  | 0.035 | 0.188   | ...    | 0.034   | 81.25   |                             |         | 60 x 6             |           |   |
|                        | 32 T CA27      | 0.054   | 0.11   | 0.428 | 2.81  | 3.88  | 10.25 | 0.127 | 1.195   | ...    | 0.012   | 81.10   |                             |         | 60 x 6             |           |   |
|                        | 32 T CA30      | 0.099   | 0.142  | 0.066 | 5.2   | 3.10  | 7.55  | 0.15  | 2.05    | ...    | ...     | 81.6    |                             |         | 60 x 6             |           |   |
|                        | 32 T CA31      | 0.063   | 0.020  | 0.145 | 3.18  | 7.51  | 9.15  | 0.064 | 3.27    | 0.02   | ...     | 76.5    |                             |         | 60 x 6             |           |   |
|                        | 32 T CA35      | 0.30    | 0.10   | 0.56  | 6.1   | 3.80  | 11.4  | 0.25  | 1.6     | ...    | ...     | 75.6    |                             |         | 60 x 6             |           |   |
|                        | 32 T CA36      | 0.2     | 0.02   | 0.25  | 3.0   | 6.5   | 12.6  | 0.1   | 0.12    | 0.1    | ...     | 78      | CA36 values are approximate |         | 60 x 6             |           |   |
|                        | 32 T 3298-A    | 0.04    | 0.04   | 0.635 | 6.05  | 6.90  | 10.60 | 0.065 | 1.60    | ...    | ...     | 74.15   |                             |         | 60 x 6             | cc        |   |
|                        | 32 T 3018-F    | 0.06    | 0.02   | 0.06  | 4.45  | 4.50  | 7.25  | 0.085 | 1.57    | ...    | ...     | 81.90   |                             |         | 60 x 6             |           |   |
|                        | 32 T 4149-G    | 0.34    | 0.15   | 0.37  | 2.00  | 1.96  | 9.84  | 0.18  | 0.21    | ...    | ...     | 84.95   |                             |         | 60 x 6             |           |   |
|                        | 32 T 4065-P    | 0.18    | 0.03   | 0.03  | 3.40  | 3.18  | 11.85 | 0.034 | 0.075   | ...    | ...     | 81.20   |                             |         | 60 x 6             |           |   |
|                        | 32 T 3610-Q    | 0.25    | 0.23   | 0.51  | 3.98  | 5.40  | 7.10  | 0.065 | 0.045   | ...    | 0.090   | 82.32   |                             |         | 60 x 6             |           |   |
|                        | 32 T 2151-R    | <0.01   | <0.005 | <0.01 | 4.48  | 0.56  | 9.43  | 0.015 | 0.73    | ...    | ...     | 84.75   |                             |         | 60 x 6             |           |   |
|                        | 32 T 2152-S    | ...     | <0.005 | <0.01 | 3.99  | 0.68  | 9.78  | 0.015 | 0.42    | ...    | ...     | 85.05   |                             |         | 60 x 6             |           |   |
|                        | 32 T 2154-V    | <0.01   | <0.005 | 0.01  | 3.05  | 0.41  | 11.25 | 0.015 | 0.12    | ...    | ...     | 85.00   |                             |         | 60 x 6             |           |   |
|                        | 32 T 2158-W    | 0.01    | <0.005 | 0.01  | 2.53  | 0.10  | 11.95 | 0.015 | 0.26    | ...    | ...     | 85.00   |                             |         | 60 x 6             |           |   |
|                        | 32 T 3297-Y    | 0.10    | 0.11   | 0.27  | 1.88  | ...   | 10.00 | 0.15  | 0.03    | ...    | ...     | 87.45   |                             |         | 60 x 6             |           |   |
|                        | 32 T 3301-Z    | 0.03    | 0.032  | 0.06  | 4.00  | 0.125 | 8.10  | 0.06  | 0.26    | ...    | ...     | 87.30   |                             |         | 60 x 6             |           |   |
|                        | 32 T 2504-E    | 0.51    | 0.59   | 0.55  | 3.55  | 6.4   | 8.1   | 0.075 | 0.65    | ...    | ...     | 79.5    |                             |         | 60 x 6             |           |   |
|                        | 32 T 3011-G    | 0.125   | 0.10   | 0.25  | 1.98  | 2.00  | 10.35 | 0.16  | 0.165   | ...    | ...     | 84.80   |                             |         | 60 x 6             |           |   |
|                        | 32 T 2805-X    | 0.34    | 0.105  | 0.26  | 0.79  | 1.04  | 6.95  | 0.03  | 6.42    | ...    | ...     | 84.05   |                             |         | 60 x 6             |           |   |
|                        |                | Sn      | Pb     | Zn    | Fe    | Ni    | Al    | Si    | As      | Mn     | P       | Cr      | C                           | Cu      | Typical Alloy Type | Size (mm) |   |
|                        |                |         |        |       |       |       |       |       |         |        |         |         |                             |         |                    | Ø         | H |
|                        | 32 A 51.11-4   | 0.027   | 0.33   | 0.111 | 0.060 | 0.012 | 5.27  | 0.159 | <0.001  | <0.001 | 0.035   | 0.013   | ...                         | 93.95   |                    | 50 x 12   |   |
|                        | 32 A 51.12-4   | 0.196   | 0.219  | 0.45  | 2.87  | 0.112 | 6.36  | 0.005 | 0.111   | 1.33   | <0.001  | 0.013   | ...                         | 88.29   |                    | 50 x 12   |   |
|                        | 32 A 51.13-4   | 0.270   | 0.104  | 0.335 | 1.81  | 0.057 | 7.30  | 0.174 | 0.215   | 0.898  | 0.022   | 0.013   | ...                         | 88.79   |                    | 50 x 12   |   |
|                        | 32 A 51.14-4   | 0.113   | 0.003  | 0.656 | 0.72  | 0.219 | 8.42  | 0.286 | 0.44    | 0.55   | 0.012   | 0.013   | ...                         | 88.57   |                    | 50 x 12   |   |
| CRM                    | 32 MI 80B      | 0.018   | 0.009  | 0.078 | 3.31  | 4.69  | 10.19 | 0.030 | (0.004) | 0.54   | 0.009   | 0.012   | (0.01)                      | 81.2    | CDA 630            | 31 x 18   |   |
| CRM                    | 32 MI 93B      | 0.009   | 0.012  | 0.17  | 3.87  | 0.088 | 10.33 | 0.024 | <0.01   | 0.024  | (0.002) | (0.007) | 0.007                       | 85.4    | CDA 954            | 31 x 18   |   |
| CRM                    | 32 MI 94A      | <0.01   | 0.009  | 0.09  | 4.04  | 4.37  | 10.63 | <0.01 | (0.01)  | 0.16   | <0.01   | ...     | (0.014)                     | (80.68) | CDA 955            | 31 x 18   |   |
| CRM                    | 32 MI 94B      | (0.003) | 0.004  | 0.14  | 3.99  | 4.31  | 10.80 | 0.028 | <0.01   | 0.071  | 0.011   | 0.017   | (0.006)                     | 80.6    | CDA 955            | 31 x 18   |   |
| CRM                    | 32 MI 204A     | 0.005   | 0.004  | 0.22  | 3.87  | 1.95  | 10.55 | 0.034 | (0.01)  | 0.052  | 0.007   | 0.008   | 0.006                       | 83.3    | CDA 954 mod        | 31 x 18   |   |
|                        | 32 M BS 954A   | 0.07    | 0.047  | 0.10  | 3.90  | 1.38  | 10.20 | 0.07  | (0.005) | 0.27   | 0.012   | ...     | (0.005)                     | 83.9    | CDA 954            | 38 x 12   |   |
|                        | 32 M BS 955B   | 0.025   | 0.046  | 0.10  | 3.91  | 4.25  | 10.08 | 0.085 | <0.002  | 0.32   | 0.019   | ...     | 0.005                       | 81.1    | CDA 955            | 38 x 12   |   |
|                        | 32 M BS 955mod | 0.096   | 0.035  | 1.05  | 5.46  | 6.38  | 10.37 | 0.054 | <0.003  | 1.61   | <0.002  | ...     | ...                         | (74.9)  |                    | 40 x 17   |   |
|                        | 32 M BS 623A   | 0.002   | 0.001  | 0.008 | 2.19  | 0.146 | 9.12  | 0.014 | (0.006) | 0.273  | <0.002  | ...     | (0.002)                     | 88.13   | CDA 623            | 38 x 12   |   |
|                        | 32 M BS 630A   | 0.019   | 0.0069 | 0.17  | 3.73  | 4.81  | 10.05 | 0.037 | 0.002   | 0.11   | <0.01   | ...     | 0.005                       | 81.0    | CDA 630            | 38 x 12   |   |
|                        | 32 M BS 642A   | 0.018   | 0.001  | 0.011 | 0.17  | 0.025 | 6.70  | 1.80  | <0.002  | 0.005  | 0.001   | ...     | 0.001                       | 91.0    | CDA 642            | 38 x 12   |   |

# 3. Copper Base

## Bronzes

## Blocks/Discs

| 3.2.4 Bismuth Bronze |       |         |         |         |         |         |         |         |         |         |         |          |         |         | Size (mm)          |          |           |    |
|----------------------|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|---------|---------|--------------------|----------|-----------|----|
|                      | Sn    | Pb      | Zn      | Fe      | Ni      | As      | P       | Sb      | Co      | Se      | Bi      | Cd       | B       | Cu      | Ø                  | H        |           |    |
| CRM 32 X SEB 1B      | 3.83  | 0.564   | 11.57   | 0.059   | 0.118   | 0.051   | 0.025   | 0.354   | 0.0108  | 0.895   | 5.77    | ...      | ...     | (76.7)  | 42 x 18            | cc       |           |    |
| CRM 32 X SEB 2C      | 9.34  | 0.424   | 3.73    | 0.078   | 0.028   | 0.0094  | 0.013   | 0.0120  | 0.0121  | 0.026   | 4.36    | ...      | ...     | (81.8)  | 40 x 15            |          |           |    |
| CRM 32 X SEB 3C      | 2.07  | 0.109   | 0.85    | 0.082   | 1.52    | 0.0161  | 0.040   | 0.054   | 0.025   | 1.42    | (5.4)   | 0.0016   | 0.0021  | (88.4)  | 42 x 18            |          |           |    |
| CRM 32 X SEB 4C      | 9.26  | 0.011   | 8.60    | 0.366   | 0.0091  | 0.0012  | (0.006) | 0.0056  | 0.48    | 0.105   | 2.65    | 0.0004   | 0.0021  | 78.6    | 42 x 18            |          |           |    |
| CRM 32 X SEB 5B      | 5.28  | 0.0149  | 6.64    | 0.360   | 0.308   | 0.0121  | 0.183   | 0.0344  | 0.0048  | 0.512   | 1.17    | 0.0067   | 0.0028  | 85.5    | 42 x 18            |          |           |    |
| CRM 32 X SEB 6B *    | 6.74  | 0.083   | 5.21    | 0.42    | 0.86    | 0.082   | 0.034   | 0.085   | 0.202   | 0.32    | 0.60    | ...      | ...     | 85.2    | 40 x 15            |          |           |    |
| * Target values      |       |         |         |         |         |         |         |         |         |         |         |          |         |         |                    |          |           |    |
| 3.2.5 Si/Mn Bronze   |       |         |         |         |         |         |         |         |         |         |         |          |         |         | Size (mm)          |          |           |    |
|                      | Sn    | Pb      | Zn      | Fe      | Ni      | Mn      | Si      | P       | Cu      |         |         |          |         |         |                    |          | Ø         | H  |
| CRM 32 PN BE1        | 0.014 | 0.028   | 0.52    | 0.047   | 0.012   | 1.69    | 2.34    | 0.051   | rem     |         |         |          |         |         |                    |          | 40 x 25   | w  |
| CRM 32 PN BE2        | 0.041 | 0.023   | 0.027   | 0.078   | 0.29    | 1.35    | 2.82    | 0.024   | rem     |         |         |          |         |         |                    |          | each      |    |
| CRM 32 PN BE3        | 0.13  | 0.012   | 0.19    | 0.10    | 0.10    | 1.10    | 3.26    | 0.039   | rem     |         |         |          |         |         |                    |          |           |    |
| CRM 32 PN BE4        | 0.11  | 0.0061  | 0.13    | 0.19    | 0.048   | 0.51    | 3.91    | 0.0070  | rem     |         |         |          |         |         |                    |          | Set only  |    |
| CRM 32 PN BE5        | 0.30  | 0.0052  | 0.36    | 0.23    | 0.20    | 1.20    | 2.08    | 0.013   | rem     |         |         |          |         |         |                    |          |           |    |
| 3.2.9 Bronzes        |       |         |         |         |         |         |         |         |         |         |         |          |         |         | Typical Alloy Type |          | Size (mm) |    |
|                      | Sn    | Pb      | Zn      | Fe      | Ni      | Al      | Si      | As      | Mn      | Sb      | P       | S        | Cr      | Cd      | Cu                 |          | Ø         | H  |
| CRM 32 X SN1D        | 11.75 | 5.17    | 0.804   | 0.0034  | 2.17    | <0.002  | <0.001  | ...     | 0.0018  | 0.006   | 0.0025  | 0.0064   | ...     | ...     | 79.93              |          | 42 x 18   | cc |
| CRM 32 X SN2H        | 13.54 | 1.97    | 1.28    | 0.0332  | 0.104   | 0.0004  | 0.0028  | ...     | 0.0043  | 0.100   | 0.082   | 0.0326   | ...     | ...     | 82.80              |          | 42 x 18   |    |
| CRM 32 X SN3E        | 16.51 | 0.270   | 0.43    | 0.0782  | 0.513   | 0.0004  | (0.002) | ...     | 0.0026  | 0.260   | 0.297   | 0.096    | ...     | ...     | 81.32              |          | 42 x 18   |    |
| CRM 32 DB 377        | 5.92  | 0.00449 | 0.01006 | 0.01042 | 0.01074 | 0.00451 | (0.013) | <0.001  | 0.00921 | 0.00130 | <0.001  | ...      | 0.00669 | <0.0001 | 94.04              |          | 40 x 30   |    |
| CRM 32 DB 378        | 5.74  | 0.00042 | ...     | 0.0182  | 0.00183 | <0.0001 | <0.001  | 0.00995 | ...     | 0.00861 | 0.00602 | 0.00091  | 0.0311  | 0.01007 | 94.13              |          | 40 x 30   |    |
| 32 M BS 903B         | 7.9   | 0.10    | 4.39    | 0.049   | 0.50    | (0.001) | 0.002   | 0.003   | 0.0004  | 0.003   | 0.073   | 0.006    | ...     | ...     | 86.7               | CDA 903  | 41 x 12   |    |
| 32 M BS 905A-1       | 10.25 | 0.030   | 2.27    | 0.015   | 0.018   | <0.003  | <0.004  | (0.001) | <0.0003 | 0.004   | 0.055   | ...      | ...     | ...     | 87.3               | CDA 905  | 41 x 12   |    |
| 32 M BS 922B-3       | 5.8   | 1.33    | 3.83    | 0.008   | 0.61    | (0.001) | (0.001) | 0.01    | (0.002) | 0.002   | 0.026   | ...      | ...     | ...     | 88.4               | CDA 922  | 41 x 12   |    |
| 32 T B1              | 15.0  | 0.2     | 1.0     | 0.05    | 0.05    | 0.15    | 0.05    | ...     | ...     | 0.4     | 0.02    | 0.02     | ...     | ...     | 83.05              |          | 60 x 6    | cc |
| 32 T B2              | 13.5  | 0.02    | 0.11    | 0.05    | <0.01   | <0.01   | 0.2     | ...     | ...     | <0.01   | 0.17    | 0.05     | ...     | ...     | 85.9               |          | 60 x 6    |    |
| 32 T B3              | 12.8  | 1.6     | 2.2     | 0.02    | 1.5     | 0.10    | 0.07    | ...     | 0.2     | 0.20    | 0.45    | 0.04     | ...     | ...     | 80.2               |          | 60 x 6    |    |
| 32 T B4              | 10.8  | 2.5     | 1.2     | <0.05   | 0.6     | ...     | <0.05   | ...     | ...     | 0.1     | 0.5     | 0.02     | ...     | ...     | 84.0               |          | 60 x 6    |    |
| 32 T B5              | 9.9   | 0.5     | 0.4     | 0.18    | 2.3     | 0.04    | 0.05    | ...     | 0.08    | 0.5     | 0.04    | 0.07     | ...     | ...     | 86.0               |          | 60 x 6    |    |
| 32 T B10             | 6.60  | 4.03    | 2.55    | 0.17    | 0.97    | 0.17    | <0.001  | 0.009   | <0.001  | 1.09    | 0.015   | 0.05     | ...     | ...     | 83.90              |          | 60 x 6    | cc |
| 32 T B11             | 8.04  | 1.93    | 2.05    | 0.168   | 2.0     | ...     | 0.13    | ...     | ...     | 0.70    | 0.056   | 0.09     | ...     | ...     | 84.85              |          | 60 x 6    |    |
| 32 T B12             | 9.6   | 0.2     | 0.6     | 0.2     | 2.6     | 0.1     | 0.05    | 0.1     | 0.25    | 0.1     | 0.5     | 0.01     | ...     | ...     | 85.7               |          | 60 x 6    |    |
| 32 T B13             | 10.05 | 0.99    | 1.09    | (0.25)  | 0.5     | 0.016   | 0.085   | 0.065   | 0.046   | 0.243   | 0.215   | 0.07     | ...     | ...     | 86.35              |          | 60 x 6    |    |
| 32 T B14             | 11.0  | 0.5     | 0.15    | 0.1     | 0.302   | ...     | 0.07    | 0.039   | <0.02   | 0.072   | 0.7     | 0.021    | ...     | ...     | 87.0               |          | 60 x 6    |    |
| 32 T B20.1           | 6.35  | 5.1     | 3.77    | 0.165   | 0.51    | 0.04    | 0.055   | ...     | ...     | 0.520   | 0.072   | 0.115    | ...     | ...     | 83.35              |          | 60 x 6    |    |
| 32 T B21             | 5.13  | 3.79    | 6.22    | 0.285   | 1.21    | 0.13    | ...     | ...     | ...     | 0.18    | (0.004) | 0.047    | ...     | ...     | 83.0               |          | 60 x 6    |    |
| 32 T B22.1           | 3.5   | 6.0     | 4.0     | <0.10   | 2.5     | ...     | <0.1    | ...     | ...     | 0.05    | ...     | 0.03     | ...     | ...     | 83.0               |          | 60 x 6    |    |
| 32 T B23.1           | 7.18  | 7.20    | 1.46    | (0.040) | 0.086   | 0.020   | 0.025   | ...     | ...     | 0.384   | 0.070   | 0.019    | ...     | ...     | 83.45              |          | 60 x 6    |    |
| 32 T B30             | 9.80  | 10.00   | 1.05    | 0.115   | 0.97    | 0.063   | 0.066   | ...     | 0.150   | 0.22    | 0.063   | 0.048    | ...     | ...     | 77.45              |          | 60 x 6    |    |
| 32 T B31             | 7.65  | 11.79   | 0.79    | (0.015) | 0.489   | (0.031) | (0.047) | ...     | ...     | 0.475   | ...     | 0.028    | ...     | ...     | 78.65              |          | 60 x 6    |    |
| 32 T B32             | 5.96  | 16.10   | 1.21    | 0.11    | 1.49    | 0.085   | 0.075   | 0.0056  | ...     | 0.13    | 0.041   | 0.027    | ...     | ...     | 74.65              |          | 60 x 6    |    |
| CRM 32 PN WL1        | 0.22  | 0.013   | 3.53    | 0.072   | 0.44    | 0.082   | 0.057   | 0.0010  | 0.0041  | ...     | 0.012   | 0.020    | ...     | 0.0017  | 95.54              |          | 40 x 25   |    |
| CRM 32 PN WL2        | 0.32  | 0.011   | 1.56    | 0.13    | 0.32    | 0.057   | 0.046   | 0.0078  | 0.0038  | 0.0050  | 0.016   | 0.0070   | ...     | 0.0023  | 97.49              |          | each      |    |
| CRM 32 PN WL3        | 0.37  | 0.00083 | 2.21    | 0.20    | 0.22    | 0.0034  | 0.0037  | 0.020   | 0.38    | 0.0085  | 0.021   | 0.0088   | ...     | 0.010   | 96.51              |          |           |    |
| CRM 32 PN WL4        | 0.55  | 0.0066  | 2.97    | 0.012   | 0.019   | ...     | 0.0019  | 0.0034  | ...     | ...     | ...     | 0.0050   | ...     | 0.0068  | 96.41              |          | Set only  |    |
| CRM 32 PN WL5        | 0.73  | 0.0030  | 1.61    | 0.0025  | 0.0014  | 0.0014  | 0.0009  | 0.0011  | 0.00073 | 0.0006  | ...     | 0.0019   | ...     | 0.0038  | 97.62              |          |           |    |
| CRM 32 PN WL6        | 0.80  | 0.016   | 2.48    | 0.31    | 0.091   | 0.10    | 0.13    | 0.024   | 0.14    | 0.011   | 0.032   | 0.017    | ...     | 0.025   | 95.76              |          |           |    |
| CRM 32 PN BL1        | 2.58  | 0.25    | 0.68    | 0.38    | 0.25    | 0.11    | 0.059   | 0.058   | 0.062   | 0.053   | 0.49    | (0.0081) | ...     | 0.060   | rem                |          | 40 x 27   |    |
| CRM 32 PN BL2        | 4.04  | 0.14    | 0.40    | 0.21    | 0.37    | 0.15    | 0.031   | 0.039   | 0.055   | 0.039   | 0.29    | (0.0063) | ...     | 0.040   | rem                |          | each      |    |
| CRM 32 PN BL3        | 6.12  | 0.065   | 0.15    | 0.10    | 0.13    | 0.019   | 0.015   | 0.025   | 0.026   | 0.021   | 0.084   | ...      | ...     | 0.022   | rem                |          |           |    |
| CRM 32 PN BL4        | 8.38  | 0.013   | 0.017   | 0.014   | 0.015   | ...     | 0.011   | 0.0089  | 0.0092  | 0.0095  | 0.010   | (0.022)  | ...     | 0.0092  | rem                |          | Set only  |    |
| CRM 32 PN BL5        | 11.05 | 0.0069  | 0.0078  | 0.0061  | 0.0074  | 0.00052 | ...     | 0.00057 | 0.0011  | 0.0039  | 0.0042  | (0.031)  | ...     | 0.0015  | rem                |          |           |    |
|                      |       |         |         |         |         |         |         |         |         |         |         |          |         |         | Size (mm)          |          |           |    |
|                      | Sn    | Pb      | Zn      | Fe      | Ni      | As      | Sb      | P       | Bi      | Ag      |         |          |         |         |                    | Ø        | H         |    |
| CRM 32 PN CM1        | 0.61  | 0.012   | 0.021   | 0.019   | 0.0086  | 0.0098  | 0.012   | 0.0088  | 0.010   | 0.010   |         |          |         |         |                    | 40 x 30  | w         |    |
| CRM 32 PN CM2        | 0.84  | 0.0067  | 0.0061  | 0.0064  | 0.0055  | 0.0068  | 0.0068  | 0.0058  | 0.0072  | 0.0061  |         |          |         |         |                    | each     |           |    |
| CRM 32 PN CM3        | 1.06  | 0.0038  | 0.0060  | 0.012   | 0.0031  | 0.0036  | 0.0040  | 0.0041  | 0.0033  | 0.0029  |         |          |         |         |                    |          |           |    |
| CRM 32 PN CM4        | 1.30  | 0.0023  | 0.0020  | 0.0042  | 0.0011  | 0.0011  | 0.0019  | 0.0009  | 0.00093 | 0.0011  |         |          |         |         |                    | Set only |           |    |
| CRM 32 PN CM5        | 1.14  | 0.019   | 0.013   | 0.0094  | 0.014   | (0.015) | 0.018   | 0.015   | 0.014   | ...     |         |          |         |         |                    |          |           |    |
| Cu Binaries          |       |         |         |         |         |         |         |         |         |         |         |          |         |         | Size (mm)          |          |           |    |
|                      | Sn    |         |         |         |         |         |         |         |         |         |         |          |         |         |                    | Ø        | H         |    |
| 32 X 14953C          | 1.37  |         |         |         |         |         |         |         |         |         |         |          |         |         |                    | 40 x 15  | c         |    |
| 32 X 14954B          | 3.15  |         |         |         |         |         |         |         |         |         |         |          |         |         |                    | 40 x 15  |           |    |
| 32 X 14955B          | 5.25  |         |         |         |         |         |         |         |         |         |         |          |         |         |                    | 40 x 15  |           |    |
| 32 X 14956B          | 7.35  |         |         |         |         |         |         |         |         |         |         |          |         |         |                    | 40 x 15  |           |    |
| 32 X 14957B          | 9.30  |         |         |         |         |         |         |         |         |         |         |          |         |         |                    | 40 x 15  |           |    |

# 3. Copper Base

Blocks/Discs

| 3.3 Gun Metal                    |                 | Sn      | Pb      | Zn      | Fe     | Ni      | Al      | Si       | As       | Mn       | Bi      | Sb      | P        | Cr       | Ag     | S      | Cu      | Typical Alloy Type | Size (mm) |              |    |
|----------------------------------|-----------------|---------|---------|---------|--------|---------|---------|----------|----------|----------|---------|---------|----------|----------|--------|--------|---------|--------------------|-----------|--------------|----|
|                                  |                 |         |         |         |        |         |         |          |          |          |         |         |          |          |        |        |         |                    | Ø         | H            |    |
| CRM                              | 33 X GM 4W      | 2.50    | 5.20    | 7.17    | 0.051  | 2.05    | <0.002  | <0.005   | 0.021    | (0.0019) | 0.041   | 0.042   | <0.005   | <0.001   | 0.0062 | 0.33   | 82.6    |                    | 40 x 15   | cc           |    |
| CRM                              | 33 X GM 5J      | 4.89    | 4.20    | 6.8     | 0.32   | 1.82    | 0.033   | 0.079    | 0.026    | 0.019    | 0.074   | 0.058   | 0.054    | <0.001   | 0.011  | 0.108  | 81.2    |                    | 40 x 15   |              |    |
| CRM                              | 33 X GM 6H      | 7.31    | 3.11    | 2.99    | 0.131  | 1.069   | 0.136   | 0.124    | 0.175    | 0.0912   | 0.037   | 0.258   | 0.0566   | 0.0019   | 0.0114 | 0.070  | 84.46   |                    | 42 x 18   |              |    |
| CRM                              | 33 X GM 7G      | 10.35   | 1.17    | 2.93    | 0.008  | 0.550   | 0.144   | 0.090    | 0.136    | 0.396    | 0.119   | 0.163   | 0.044    | (0.04)   | 0.074  | 0.015  | 83.8    |                    | 40 x 15   |              |    |
| CRM                              | 33 X GM 8E      | 4.03    | 6.78    | 6.21    | 0.298  | 0.115   | 0.0067  | (0.0010) | (0.0051) | 0.0010   | 0.0138  | <0.002  | 0.0213   | <0.001   | 0.105  | 0.0055 | 82.3    |                    | 42 x 18   |              |    |
| CRM                              | 33 X GM 24A     | 3.85    | 3.35    | 3.67    | 0.0083 | 0.0087  | ...     | 0.0028   | 0.0010   | <0.0005  | 0.0009  | 0.0012  | 0.190    | (0.0013) | 0.0046 | 0.003  | 88.88   |                    | 44 x 17   | w            |    |
| CRM                              | 33 X GM 29A     | 6.12    | 0.050   | 4.23    | 0.0102 | 0.0289  | ...     | 0.0027   | 0.0017   | (0.0005) | 0.0019  | 0.0015  | 0.138    | (0.0004) | 0.0026 | 0.0024 | 89.36   |                    | 33 x 19   |              |    |
| CRM                              | 33 X RB 1A      | 2.137   | 5.02    | 7.95    | 0.928  | 0.0539  | 0.0048  | 0.063    | 0.0030   | 0.0167   | 0.0029  | 0.432   | 0.020    | 0.0013   | 0.0174 | 0.0044 | 83.24   |                    | 42 x 18   | cc           |    |
| CRM                              | 33 X RB 2A      | 3.19    | 3.85    | 9.14    | 0.493  | 0.255   | 0.0352  | 0.0116   | 0.0211   | 0.0028   | 0.101   | 0.019   | 0.0208   | 0.0017   | 0.0029 | 0.078  | 82.67   |                    | 42 x 18   |              |    |
|                                  | 33 M BS 836A-1  | 4.59    | 5.32    | 4.52    | 0.023  | 0.46    | (0.001) | 0.003    | 0.008    | (0.002)  | ...     | 0.068   | 0.08     | ...      | 0.023  | 0.042  | 84.64   | CDA 836            | 41 x 12   | c            |    |
|                                  | 33 M BS 544A    | 4.42    | 4.16    | 3.42    | 0.092  | 0.16    | ...     | <0.002   | 0.011    | <0.002   | ...     | 0.040   | 0.021    | ...      | ...    | 0.038  | 88.4    | CDA 544            | 41 x 12   |              |    |
|                                  | 33 M BS 932E    | 7.33    | 7.3     | 2.86    | 0.029  | 0.16    | <0.001  | <0.005   | 0.048    | 0.0001   | ...     | 0.145   | 0.022    | ...      | ...    | 0.053  | 82.15   | CDA 932            | 38 x 12   |              |    |
| 3.4 Nickel Silver                |                 | Sn      | Pb      | Zn      | Fe     | Ni      | Si      | Mn       | P        | S        | Mg      | Co      | C        | Cr       | Ag     | As     | Sb      | Bi                 | Cu        | Size (mm)    |    |
|                                  |                 |         |         |         |        |         |         |          |          |          |         |         |          |          |        |        |         |                    | Ø         | H            |    |
| CRM                              | 34 X NS 1E      | 0.004   | (0.01)  | 32.8    | 0.014  | 8.23    | <0.01   | 0.060    | <0.002   | (0.002)  | 0.007   | ...     | ...      | ...      | ...    | ...    | ...     | ...                | 58.8      | 40 x 15      | cc |
| CRM                              | 34 X NS 2E      | 0.009   | 0.057   | 26.0    | 0.065  | 13.12   | 0.06    | 0.145    | 0.005    | 0.018    | <0.0005 | ...     | ...      | ...      | ...    | ...    | ...     | ...                | 60.6      | 40 x 15      |    |
| CRM                              | 34 X NS 3E      | 0.031   | 0.155   | 17.99   | 0.201  | 14.86   | 0.018   | 0.129    | 0.013    | 0.063    | 0.0011  | 0.102   | 0.014    | 0.0022   | 0.111  | ...    | ...     | ...                | 66.30     | 40 x 15      |    |
| CRM                              | 34 X NS 4D      | 0.007   | 0.53    | 17.6    | 0.35   | 17.18   | 0.06    | 0.189    | 0.018    | 0.023    | 0.043   | ...     | ...      | ...      | ...    | ...    | ...     | ...                | 63.8      | 40 x 15      |    |
| CRM                              | 34 X NS 5E      | 0.124   | 1.13    | 24.2    | 0.56   | 19.4    | 0.051   | 0.096    | 0.044    | 0.017    | 0.0015  | ...     | ...      | ...      | ...    | ...    | ...     | ...                | 54.3      | 40 x 15      |    |
| CRM                              | 34 PN WH1       | ...     | ...     | rem     | 0.0052 | 5.70    | 0.010   | 0.56     | 0.0029   | (0.0055) | ...     | 0.0061  | (0.0046) | ...      | ...    | ...    | ...     | ...                | 68.16     | 40 x 25      | w  |
| CRM                              | 34 PN WH2       | ...     | ...     | rem     | 0.038  | 6.34    | 0.038   | 0.36     | 0.0072   | (0.0071) | ...     | 0.017   | (0.0058) | ...      | ...    | ...    | ...     | ...                | 69.14     | each         |    |
| CRM                              | 34 PN WH3       | ...     | ...     | rem     | 0.11   | 3.44    | 0.072   | 0.25     | 0.013    | (0.011)  | ...     | 0.031   | (0.0070) | ...      | ...    | ...    | ...     | ...                | 70.18     |              |    |
| CRM                              | 34 PN WH4       | ...     | ...     | rem     | 0.13   | 4.14    | 0.12    | 0.11     | 0.015    | (0.017)  | ...     | 0.048   | (0.0075) | ...      | ...    | ...    | ...     | ...                | 71.15     | Set only     |    |
| CRM                              | 34 PN WH5       | ...     | ...     | rem     | 0.22   | 4.89    | 0.17    | 0.011    | 0.017    | (0.021)  | ...     | 0.028   | (0.0087) | ...      | ...    | ...    | ...     | ...                | 72.28     |              |    |
|                                  | 34 CG 02111     | ...     | 0.0072  | 20.76   | 0.85   | 14.77   | 0.033   | 0.068    | ...      | ...      | 0.0071  | ...     | ...      | ...      | ...    | 0.013  | 0.0118  | 0.0070             | (rem)     | 35 x 45 x 30 |    |
|                                  | 34 CG 02112     | ...     | 0.0098  | 21.20   | 0.64   | 14.96   | 0.43    | 0.15     | ...      | ...      | 0.018   | ...     | ...      | ...      | ...    | 0.0070 | 0.0063  | 0.0040             | (rem)     | each         |    |
|                                  | 34 CG 02113     | ...     | 0.021   | 20.82   | 0.45   | 14.85   | 0.140   | 0.205    | ...      | ...      | 0.029   | ...     | ...      | ...      | ...    | 0.034  | 0.0021  | 0.0021             | (rem)     |              |    |
|                                  | 34 CG 02114     | ...     | 0.030   | 21.08   | 0.231  | 14.86   | 0.0281  | 0.505    | ...      | ...      | 0.058   | ...     | ...      | ...      | ...    | 0.0041 | 0.0036  | 0.0014             | (rem)     | set only     |    |
|                                  | 34 CG 02115     | ...     | 0.049   | 21.17   | 0.112  | 14.91   | 0.089   | 0.82     | ...      | ...      | 0.101   | ...     | ...      | ...      | ...    | 0.055  | 0.0015  | 0.00074            | (rem)     |              |    |
| 3.5 Phosphorus Deoxidised Copper |                 | P       | Sn      | Pb      | Zn     | Fe      | Ni      | Al       | Si       | As       | Mn      | Bi      | Sb       | Co       | Ag     | Te     | S       | Se                 | Cu        | Size (mm)    |    |
|                                  |                 |         |         |         |        |         |         |          |          |          |         |         |          |          |        |        |         |                    | Ø         | H            |    |
|                                  | 35 A C09.01-4   | 0.151   | <0.001  | <0.0005 | 0.0008 | 0.0019  | <0.0005 | <0.0005  | <0.001   | <0.002   | <0.0005 | <0.0005 | <0.0005  | <0.0005  | 0.011  | <0.001 | ...     | ...                | 99.82     | 50 x 12      | cc |
|                                  | 35 A C09.02-4   | 0.078   | <0.001  | <0.001  | <0.001 | 0.0042  | <0.0005 | <0.0005  | <0.002   | <0.002   | <0.0005 | <0.0005 | <0.0005  | <0.0005  | 0.0055 | <0.001 | ...     | ...                | 99.90     | 50 x 12      |    |
|                                  | 35 A C09.03-4   | 0.056   | <0.001  | <0.0005 | <0.001 | <0.0033 | <0.0005 | <0.0005  | <0.001   | <0.001   | <0.0005 | <0.0005 | <0.0005  | <0.0005  | 0.012  | <0.001 | ...     | ...                | 99.92     | 50 x 12      |    |
|                                  | 35 A C09.04-4   | 0.0174  | <0.001  | <0.001  | <0.001 | <0.0047 | <0.0005 | <0.0005  | <0.002   | <0.001   | <0.0005 | <0.0005 | <0.0005  | <0.0005  | 0.0033 | <0.001 | ...     | ...                | 99.96     | 50 x 12      |    |
|                                  | 35 X CUP 8A     | 8.9     | 0.18    | 0.006   | 0.017  | ...     | 0.019   | <0.002   | <0.005   | <0.002   | <0.002  | <0.005  | (0.003)  | ...      | ...    | ...    | 0.015   | ...                | 90.7      | 40 x 15      | cc |
| CRM                              | 35 PN CO2       | 11.60   | 0.35    | 0.070   | 0.15   | 0.096   | 0.013   | ...      | ...      | 0.0050   | ...     | 0.0049  | 0.065    | ...      | ...    | 0.0055 | ...     | 0.0045             | ...       | 40 x 25      | w  |
| CRM                              | 35 PN CO3       | 8.56    | 0.037   | 0.10    | 0.24   | 0.11    | 0.10    | ...      | ...      | 0.011    | ...     | 0.015   | 0.14     | ...      | ...    | 0.0080 | ...     | 0.0073             | ...       | each         |    |
| CRM                              | 35 PN CO4       | 5.54    | 0.13    | 0.29    | 0.029  | 0.29    | 0.25    | ...      | ...      | 0.016    | ...     | 0.0086  | 0.092    | ...      | ...    | 0.012  | ...     | 0.010              | ...       |              |    |
| CRM                              | 35 PN CO5       | 9.45    | 0.55    | 0.044   | 0.061  | 0.11    | 0.0082  | ...      | ...      | 0.0023   | ...     | 0.00095 | 0.034    | ...      | ...    | 0.0023 | ...     | 0.0015             | ...       | Set only     |    |
| 3.6.1 Cupro-Nickel               |                 | Sn      | Pb      | Fe      | Ni     | Co      | Si      | Mn       | Mg       | S        | P       | Bi      | B        | C        | Cr     | Ti     | Nb      | Zn                 | Cu        | Size (mm)    |    |
|                                  |                 |         |         |         |        |         |         |          |          |          |         |         |          |          |        |        |         |                    | Ø         | H            |    |
| CRM                              | 36 X CN1M       | 0.006   | 0.008   | 2.41    | 9.31   | 0.131   | 0.058   | 2.27     | ...      | 0.010    | 0.008   | ...     | (0.0008) | 0.008    | 0.118  | ...    | (0.019) | 0.331              | 85.3      | 40 x 15      | cc |
|                                  | 36 X CN2H       | 0.06    | 0.036   | 1.45    | 15.1   | 0.11    | 0.44    | 1.41     | 0.005    | 0.043    | ...     | ...     | ...      | ...      | ...    | ...    | ...     | ...                | rem       | 40 x 15      | c  |
| CRM                              | 36 X CN3L       | 0.063   | 0.053   | 1.07    | 19.95  | 0.072   | 0.490   | 0.920    | 0.012    | 0.029    | 0.032   | ...     | 0.0064   | 0.035    | 0.050  | ...    | 0.15    | 0.80               | 76.3      | 40 x 15      | cc |
|                                  | 36 X CN4J       | <0.005  | 0.02    | 0.52    | 25.8   | 0.04    | 0.75    | 0.43     | 0.005    | 0.001    | ...     | ...     | ...      | ...      | ...    | ...    | ...     | ...                | (72.4)    | 40 x 15      | c  |
| CRM                              | 36 X CN5N       | 0.015   | 0.027   | 0.791   | 32.26  | 0.018   | 0.80    | 0.090    | 0.014    | 0.041    | ...     | ...     | 0.0091   | 0.0253   | 0.118  | ...    | 0.441   | 0.232              | 65.1      | 40 x 15      | cc |
| CRM                              | 36 X CN6G *     | ...     | 0.009   | 0.73    | 35.3   | 0.031   | 0.24    | 0.43     | ...      | 0.005    | 0.012   | 0.027   | 0.056    | 0.024    | 1.15   | 0.002  | ...     | ...                | 61.9      | 40 x 15      | cc |
|                                  | 36 X CN7E       | ...     | 0.040   | 1.01    | 32.1   | 0.060   | 0.36    | 0.75     | ...      | 0.046    | 0.021   | 0.009   | 0.006    | 0.029    | 1.40   | <0.005 | ...     | ...                | 64.2      | 40 x 15      | cc |
| CRM                              | 36 X CN8G       | 0.03    | 0.067   | 0.34    | 31.7   | 0.114   | 0.37    | 1.17     | ...      | 0.10     | 0.02    | 0.11    | 0.009    | 0.013    | 1.33   | 0.029  | 0.43    | 0.21               | (64.0)    | 40 x 15      | cc |
|                                  | 36 X CN9G       | (0.003) | 0.04    | 1.25    | 28.00  | 0.018   | 0.61    | 1.156    | ...      | 0.009    | 0.034   | 0.019   | ...      | 0.011    | 2.11   | 0.77   | 1.21    | 0.014              | 64.2      | 40 x 15      | cc |
| CRM                              | 36 X CN10A      | (0.009) | 0.004   | 4.28    | 29.3   | 0.081   | 1.02    | 0.262    | 0.0026   | 0.055    | (0.020) | 0.014   | 0.0029   | 0.064    | 1.59   | 0.03   | 0.89    | 0.026              | 61.01     | 40 x 15      | cc |
|                                  | * Target values |         |         |         |        |         |         |          |          |          |         |         |          |          |        |        |         |                    |           |              |    |
| CRM                              | 36 MI 85B       | 0.014   | 0.005   | 0.53    | 29.60  | 0.034   | <0.01   | 0.53     | ...      | 0.010    | 0.007   | ...     | ...      | 0.011    | ...    | ...    | ...     | ...                | ...       | 31 x 18      |    |
|                                  | 36 DB 367       | 0.0105  | 0.0298  | 1.443   | 9.72   | ...     | ...     | 0.723    | 0.0347   | 0.0162   | 0.0124  | ...     | ...      | ...      | ...    | ...    | ...     | 0.0715             | 87.88     | 40 x 30      |    |
|                                  | 36 A 62-12-4    | 0.111   | 0.053   | 0.45    | 7.94   | 0.081   | 0.109   | 1.59     | 0.002    | 0.034    | ...     | ...     | ...      | ...      | ...    | ...    | ...     | 0.180              | 89.42     | 50 x 12      |    |
|                                  | 36 M BS 706     | 0.006   | 0.006   | 1.56    | 10.9   | ...     | <0.002  | 0.61     | ...      | 0.009    | 0.009   | ...     | ...      | (0.004)  | ...    | ...    | ...     | 0.054              | 87.00     | 38 x 12      |    |
|                                  | 36 M BS 715A    | 0.008   | (0.007) | 0.61    | 30.22  | ...     | 0.10    | 0.82     | ...      | 0.001    | 0.006   | ...     | ...      | 0.03     | ...    | ...    | ...     | 0.10               | 68.0      | 38 x 12      |    |
|                                  | Al Cd Sb        |         |         |         |        |         |         |          |          |          |         |         |          |          |        |        |         |                    |           |              |    |
| CRM                              | 36 PN NB1       | 0.0038  | 0.011   | 0.11    | 23.77  | 0.010   | 0.093   | 0.029    | 0.017    | 0.0019   | 0.025   | 0.011   | ...      | 0.040    | 0.071  | 0.016  | 0.0025  | 0.052              | 75.71     | 40 x 25      | w  |
| CRM                              | 36 PN NB2       | 0.014   | 0.014   | 0.085   | 24.38  | 0.023   | 0.13    | 0.46     | 0.0059   | 0.0084   | 0.030   | 0.0082  | ...      | 0.019    | 0.043  | 0.005  |         |                    |           |              |    |

# 3. Copper Base

Blocks/Discs

| 3.6.2 Cu/Al |       |       |       |      |       |       |       |       |       |  |  |  |  | Size (mm) |    |
|-------------|-------|-------|-------|------|-------|-------|-------|-------|-------|--|--|--|--|-----------|----|
|             | Sn    | Pb    | Zn    | Fe   | Ni    | Al    | Si    | Mn    | Cu    |  |  |  |  | Ø         | H  |
| 36 T 2794-H | 0.105 | <0.01 | <0.01 | 0.82 | 0.69  | 8.0   | 0.048 | <0.01 | 90.3  |  |  |  |  | 60 x 6    | cc |
| 36 T 3299-J | 0.106 | 0.110 | 0.19  | 0.38 | 0.21  | 10.10 | 0.136 | 1.12  | 87.60 |  |  |  |  | 60 x 6    |    |
| 36 T 3296-L | 0.06  | 0.30  | 0.62  | 0.07 | 0.41  | 9.40  | 0.20  | 0.37  | 88.55 |  |  |  |  | 60 x 6    |    |
| 36 T 3300-M | 0.205 | 0.205 | 0.085 | 0.45 | 0.205 | 8.73  | 0.415 | 0.165 | 89.5  |  |  |  |  | 60 x 6    |    |
| 36 T CA3    | 0.20  | 0.15  | 0.30  | 0.80 | 0.80  | 10.9  | ...   | 0.06  | 86.5  |  |  |  |  | 60 x 6    | cc |

| 3.6.3 Cu/Mg     |       |       |       |        |        |          |         |  |  |  |  |  |  | Size (mm)  |    |
|-----------------|-------|-------|-------|--------|--------|----------|---------|--|--|--|--|--|--|------------|----|
|                 | Mg    | P     | Ag    | S      | Al     | Co       | Cr      |  |  |  |  |  |  | Ø          | H  |
| CRM 36 X CMG10A | 0.379 | 0.027 | 0.076 | 0.0024 | 0.024  | 0.042    | 0.038   |  |  |  |  |  |  | 36-38 x 16 | cc |
| CRM 36 X CMG11A | 0.771 | 0.079 | 0.151 | 0.0019 | 0.043  | (0.0001) | <0.0005 |  |  |  |  |  |  | 36-38 x 16 |    |
| CRM 36 X CMG12A | 1.16  | 0.09  | 0.192 | 0.0020 | 0.0076 | 0.089    | 0.074   |  |  |  |  |  |  | 36-38 x 16 |    |

| 3.6.4 Cu/Be/Co |         |         |         |        |        |        |        |         |        |       |         |        |       | Typical Alloy Type | Size (mm) |    |
|----------------|---------|---------|---------|--------|--------|--------|--------|---------|--------|-------|---------|--------|-------|--------------------|-----------|----|
|                | Sn      | Pb      | Zn      | Fe     | Ni     | Al     | Si     | Mn      | Cr     | Be    | Co      | Ag     | Cu    |                    | Ø         | H  |
| CRM 36 X CBC2E | 0.009   | 0.0099  | 0.0103  | 0.0208 | 0.0472 | 0.0231 | 0.0205 | 0.0015  | 0.0044 | 0.450 | 2.47    | 0.0020 | 96.96 | C17500             | 40 x 17   |    |
| CRM 36 X CBC5A | 0.01    | 0.009   | 0.038   | 0.028  | 1.69   | 0.021  | 0.036  | (0.001) | 0.006  | 0.32  | 0.14    | ...    | 97.6  | C17510             | 40 x 15   |    |
| 36 T 4583      | 0.25    | 0.084   | 0.094   | (0.15) | 2.02   | 0.029  | 0.08   | 0.064   | ...    | 0.84  | (0.002) | ...    | 96.35 |                    | 60 x 6    | cc |
| 36 T 4584      | 0.022   | (0.002) | 0.022   | 0.120  | 0.015  | 0.033  | 0.166  | (0.002) | ...    | 2.53  | 0.04    | ...    | 97.05 |                    | 60 x 6    |    |
| 36 T 4594      | (0.002) | (0.003) | (0.004) | (0.10) | 0.055  | 0.030  | 0.116  | ...     | 0.067  | 0.142 | 3.00    | 0.978  | 95.50 |                    | 60 x 6    |    |
| 36 T 4640      | 0.053   | 0.056   | 0.055   | 0.125  | 1.07   | 0.099  | 0.166  | 0.063   | (0.1)  | 0.69  | 1.36    | 0.495  | 95.67 |                    | 60 x 6    |    |
| 36 T 4763      | 0.042   | 0.043   | 0.058   | 0.031  | 0.105  | 0.048  | 0.125  | ...     | ...    | 0.79  | 2.13    | 1.53   | 95.10 |                    | 60 x 6    |    |
| 36 T 4766      | 0.100   | 0.053   | 0.070   | 0.160  | 0.203  | 0.027  | 0.110  | 0.008   | (0.2)  | 1.58  | 0.64    | ...    | 96.83 |                    | 60 x 6    |    |
| 36 T 4868      | 0.022   | 0.023   | 0.056   | 0.204  | 0.038  | 0.044  | 0.211  | 0.019   | ...    | 2.92  | 0.246   | ...    | 96.15 |                    | 60 x 6    |    |
| 36 T 4872      | 0.044   | 0.019   | 0.119   | 0.104  | 0.103  | 0.059  | 0.16   | 0.008   | (0.04) | 1.93  | 0.400   | ...    | 97.00 |                    | 60 x 6    |    |
| 36 T 4873      | (0.007) | (0.003) | (0.003) | 0.078  | 0.049  | 0.094  | 0.088  | (0.002) | 0.105  | 0.17  | 0.98    | ...    | 98.40 |                    | 60 x 6    |    |
| 36 M BS172Be-1 | 0.033   | (0.002) | 0.007   | 0.052  | 0.039  | (0.02) | 0.055  | 0.001   | 0.003  | 1.89  | 0.206   | ...    | 97.68 | CDA 172            | 38 x 12   |    |

| 3.6.5 Cu/Cr    |        |        |        |        |        |       |        |        |        |        |        |       |        |        |        |       | Size (mm) |   |
|----------------|--------|--------|--------|--------|--------|-------|--------|--------|--------|--------|--------|-------|--------|--------|--------|-------|-----------|---|
|                | Sn     | Fe     | Ni     | Si     | Mn     | Cr    | Zr     | Pb     | Zn     | Al     | S      | Mg    | Co     | Cd     | Ag     | Cu    | Ø         | H |
| 36 X CCR1C     | <0.005 | 0.015  | <0.005 | 0.01   | <0.001 | 0.855 | 0.11   | 0.002  | 0.003  | 0.014  | 0.002  | 0.001 | ...    | ...    | ...    | ...   | 45 x 20   | w |
| CRM 36 X CCZ A | 0.0045 | 0.033  | 0.0084 | 0.0031 | 0.0008 | 0.667 | 0.049  | 0.0023 | 0.0076 | 0.0003 | 0.001  | ...   | 0.0012 | 0.0027 | 0.0019 | 99.22 | 50 x 17   |   |
| CRM 36 X 274A  | 0.014  | 0.0779 | 2.54   | 0.594  | 0.0148 | 0.531 | <0.005 | 0.0021 | 0.0395 | 0.0013 | 0.0035 | ...   | 0.0028 | ...    | ...    | 96.23 | 46 x 17   |   |

| 3.6.6 Cu/Ag    |      |       |       |       |       |       |       |       |       |       |        |         |          |          |          | Typical Alloy Type | Size (mm) |  |
|----------------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|---------|----------|----------|----------|--------------------|-----------|--|
|                | Ag   | Sn    | Pb    | Zn    | Fe    | Ni    | Al    | Si    | Mn    | Zr    | S      | P       | N        | O        |          | Ø                  | H         |  |
| CRM 36 MI 159A | 3.48 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01  | <0.01   | (0.0003) | (0.0006) | NARLOY-A | 31 x 18            |           |  |
| CRM 36 MI 160A | 3.03 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | 0.4   | <0.003 | (0.004) | (0.0002) | (0.003)  | NARLOY-Z | 31 x 18            |           |  |

| 3.6.7 Cu/Cd     |      |        |          |          | Size (mm) |   |
|-----------------|------|--------|----------|----------|-----------|---|
|                 | Cd   | Sn     | Zn       | Ag       | Ø         | H |
| CRM 36 X CCD 1A | 1.01 | <0.001 | (0.0017) | (0.0014) | 30 x 15   | w |
| CRM 36 X CCD 2A | 1.18 | 0.200  | (0.0019) | (0.0012) | 30 x 15   |   |
| CRM 36 X CCD 3A | 1.10 | 0.473  | (0.0018) | (0.0011) | 30 x 15   |   |

| 3.6.8 Cu/Mn   |        |        |       |       |      |       |        |        |        |        |        | Size (mm) |   |
|---------------|--------|--------|-------|-------|------|-------|--------|--------|--------|--------|--------|-----------|---|
|               | Sn     | Pb     | Zn    | Fe    | Mn   | Ni    | Si     | As     | P      | Sb     | Ag     | Ø         | H |
| CRM 36 PN CK1 | 0.13   | 0.0021 | 0.24  | 0.029 | 1.06 | 0.44  | 0.049  | 0.013  | 0.0011 | 0.0049 | 0.012  | 40 x 30   | w |
| CRM 36 PN CK2 | ...    | 0.0062 | 0.14  | 0.11  | 1.51 | 0.38  | 0.091  | 0.010  | 0.0022 | 0.0015 | 0.0094 | each      |   |
| CRM 36 PN CK3 | 0.075  | 0.0098 | 0.095 | 0.17  | 1.78 | 0.27  | 0.033  | 0.0095 | 0.0043 | 0.0026 | 0.0066 | set only  |   |
| CRM 36 PN CK4 | 0.042  | 0.017  | 0.065 | 0.26  | 1.91 | 0.13  | 0.0025 | 0.0055 | 0.0056 | 0.0041 | 0.0041 |           |   |
| CRM 36 PN CK5 | 0.0048 | ...    | 0.033 | 0.29  | 2.30 | 0.011 | 0.011  | 0.0015 | ...    | 0.0051 | ...    |           |   |
| CRM 36 PN CK6 | 0.025  | ...    | 0.034 | 0.40  | 2.64 | 0.073 | 0.21   | 0.0039 | 0.013  | 0.0052 | 0.0012 |           |   |

| 3.7.1 Various Copper Alloys |        |         |       |       |        |        |      |       |        |        |       |        |        |          |       | Size (mm) |    |
|-----------------------------|--------|---------|-------|-------|--------|--------|------|-------|--------|--------|-------|--------|--------|----------|-------|-----------|----|
|                             | Sn     | Pb      | Zn    | Fe    | Ni     | Al     | Si   | Mn    | P      | S      | C     | Cr     | Co     | Zr       | Cu    | Ø         | H  |
| CRM 37 X 218A               | 0.015  | 0.0025  | 0.027 | 0.070 | 2.51   | 0.0022 | 0.58 | 0.084 | 0.0014 | 0.007  | 0.002 | 0.030  | 0.0013 | ...      | 96.50 | 38 x 17   | w  |
| CRM 37 X 226A               | 0.0032 | (0.001) | 2.82  | 1.52  | 0.0024 | 0.0023 | 3.54 | 0.58  | 0.0023 | 0.0005 | 0.006 | 0.0024 | ...    | (0.0003) | 91.58 | 57 x 17   |    |
| 37 T UN 3S                  | 0.215  | 0.20    | 1.62  | 0.30  | 3.45   | 0.11   | 1.24 | 0.073 | ...    | ...    | ...   | ...    | ...    | ...      | 92.65 | 60 x 6    | cc |
| 37 X HK7                    | 2.30   | 5.32    | 0.38  | 1.72  | 30.7   | ...    | ...  | ...   | ...    | ...    | ...   | ...    | ...    | ...      | 59.3  | 40 x 11   | cc |
| 37 X HK8                    | 10.4   | 21.0    | 0.17  | 0.23  | 5.01   | ...    | ...  | ...   | ...    | ...    | ...   | ...    | ...    | ...      | 63.2  | 40 x 10   |    |

These two alloys are for XRF use only

# 3. Copper Base

Blocks/Discs

| 3.8 Residuals in Pure Copper - Wire  |        | All elements ppm |       |       |      |         |      |      |       |       |        |         |        |        |        |      |     | Size (mm) |     |
|--|--------|------------------|-------|-------|------|---------|------|------|-------|-------|--------|---------|--------|--------|--------|------|-----|-----------|-----|
|  | Pb     | Zn               | Fe    | Ni    | As   | Bi      | Sb   | Co   | Ag    | Cd    | Te     | Mn      | Sn     | Cr     | Se     | S    | O   | Ø         | H   |
| CRM 38 X C1A   | 0.4    | 1.5              | 2     | 0.8   | <1.0 | 0.2     | <1.0 | <1.0 | 7.8   | <0.1  | 0.4    | <1.0    | 0.7    | <1.0   | 0.7    | ...  | ... |           |     |
| CRM 38 X C1B   | 0.8    | 0.45             | 1.2   | 1.0   | 0.8  | 0.1     | 0.6  | 0.03 | 13    | <0.01 | 0.3    | 1.2     | <0.3   | 0.06   | ...    | ...  | ... | 3 X       | 400 |
| CRM 38 X C1C   | (0.05) | <0.1             | 1.7   | 0.27  | 0.19 | 0.10    | 0.10 | ...  | 11    | <0.01 | (0.21) | (0.005) | (0.01) | <0.005 | (0.25) | 2.0  | 266 |           |     |
| CRM 38 X C2A   | 2.7    | 3.6              | 9.1   | 1.4   | 3.8  | 1.5     | 2.6  | 2.6  | 12    | 2.5   | 1.6    | 3.1     | 1.1    | 1.0    | ...    | ...  | ... |           |     |
| CRM 38 X C4  | 23.0   | 22.0             | 19.0  | 29.0  | 19.0 | 5.0     | 9.0  | 3.0  | 21.0  | 8.0   | 8.0    | 2.7     | 21.0   | 3.0    | ...    | ...  | ... |           |     |
| CRM 38 X C6  | 111.0  | 40.0             | 107.0 | 166.0 | 98.0 | 22.0    | 45.0 | 33.0 | 104.0 | 32.0  | 30.0   | 0.3     | 120.0  | 1.0    | ...    | ...  | ... |           |     |
| These reference materials are in wire form, intended for globule arc work. |        |                  |       |       |      |         |      |      |       |       |        |         |        |        |        |      |     |           |     |
| CRM 38 PN CF1  | 33.0   | 57.0             | 42.0  | 29.0  | 6.7  | 12.5    | 24.0 | ...  | 45.0  | ...   | ...    | ...     | 21.0   | ...    | ...    | ...  | ... | 6 x       | 100 |
| CRM 38 PN CF2  | 0.6    | 2.2              | 2.8   | 0.7   | 1.1  | ...     | 1.4  | ...  | 9.0   | ...   | ...    | ...     | ...    | ...    | ...    | ...  | ... |           |     |
| CRM 38 PN CF3  | 8.9    | 3.4              | 20.0  | 6.4   | 1.8  | ...     | 2.2  | ...  | 3.2   | ...   | ...    | ...     | 3.2    | ...    | ...    | ...  | ... |           |     |
| CRM 38 PN CF4  | 1.1    | 31.0             | 3.7   | 7.8   | 43.0 | 1.2     | 11.0 | ...  | 18.0  | ...   | ...    | ...     | 1.0    | ...    | ...    | ...  | ... |           |     |
| CRM 38 PN CF5  | 3.2    | 4.7              | 98.0  | 3.0   | 2.3  | 0.25    | 1.9  | ...  | 12.0  | ...   | ...    | ...     | 1.3    | ...    | ...    | ...  | ... |           |     |
| CRM 38 PN CF6  | 1.8    | ...              | 1.0   | (0.4) | 0.32 | (0.012) | 0.2  | ...  | 12.0  | ...   | ...    | ...     | (0.06) | ...    | ...    | ...  | ... |           |     |
| CRM 38 A SSC-1   | 65.3   | 33.3             | 39.2  | 17.6  | 1.16 | 1.1     | 2.64 | ...  | 18.8  | ...   | 4.57   | ...     | 54.9   | ...    | 7.28   | 19.6 | 216 | 8 x       | 300 |

| 3.9 Residuals in Pure Copper - Discs |       | All elements ppm |       |       |      |       |       |      |       |       |       |      |       |         |  |
|--------------------------------------|-------|------------------|-------|-------|------|-------|-------|------|-------|-------|-------|------|-------|---------|--|
|                                      | Sn    | Pb               | Zn    | Fe    | Ni   | As    | Bi    | Sb   | Co    | Ag    | Cd    | Si   | Mn    | Al      |  |
| CRM 39 X 17866AD                     | 2100  | 240              | 340   | 101   | 548  | 400   | 63    | 58   | 229   | 61    | 327   | (7)  | 1.6   | <10     |  |
| CRM 39 X 17867AA                     | 450   | 290              | 440   | 270   | 440  | 430   | 290   | 46   | 720   | 62    | 550   | 1150 | 221   | 390     |  |
| CRM 39 X 17868AD                     | 350   | 380              | 390   | 470   | 330  | 294   | 430   | 330  | 480   | 250   | 330   | 1000 | 580   | 1390    |  |
| CRM 39 X 17869AC                     | 150   | 500              | 100   | 180   | 150  | 130   | 450   | 380  | 125   | 430   | 85    | 80   | 15    | 8       |  |
| CRM 39 X 17870AE                     | 170   | 590              | 130   | 440   | 70   | 43    | 750   | 470  | 120   | 460   | 97    | (20) | 200   | <10     |  |
| CRM 39 X 17871A                      | ...   | 92               | (8)   | (20)  | 270  | 290   | 690   | 170  | 8     | 250   | 31    | ...  | 10    | <5      |  |
| 39 M BS 110A                         | 20    | 30               | (10)  | 30    | 20   | (10)  | ...   | 4    | ...   | ...   | ...   | 10   | <3    | 20      |  |
| 39 FO Cu166                          | 1.2   | 1.3              | 1.2   | (9.5) | 2.3  | 1.8   | 1.1   | 1.3  | 1.0   | 10.8  | 0.93  | 3.2  | 1.3   | 1.5     |  |
| 39 FO Cu167                          | 1.3   | 1.6              | 1.0   | 2     | 1.5  | 1.6   | 1.6   | 1.9  | 0.8   | 11.9  | 0.4   | 1.4  | 1.5   | 1.5     |  |
| 39 FO Cu168                          | 4     | 4.2              | 3.2   | 5.3   | 6.2  | 4.8   | 3.5   | 4.6  | 4     | 14    | 3.8   | 5.8  | 3.0   | 3.1     |  |
| 39 FO Cu169                          | 4     | 4.0              | 2.9   | 5.1   | 4.9  | 3.5   | 3.6   | 3.8  | 2.9   | 13    | 2.3   | 4.1  | 3.0   | 3.7     |  |
| 39 FO Cu170                          | 10    | 11               | 8.4   | 12    | 13.5 | 11.1  | 11    | 9.3  | 9.5   | 14    | 5.8   | 12.4 | 10    | 8.4     |  |
| 39 FO Cu171                          | 100   | 93               | <0.1  | 99    | 2.4  | 100   | 0.11  | 33.5 | <0.02 | 33    | <0.05 | <1   | 0.2   | 25      |  |
| 39 FO Cu172                          | <0.1  | 32               | 32    | 33    | 32   | 4.7   | 97    | 94   | <0.02 | 104   | <0.05 | 96   | <0.2  | <0.2    |  |
| 39 FO Cu173                          | 30    | 1.6              | 0.4   | 3.7   | 3.0  | 3.5   | 28    | 0.85 | 30    | 18    | <0.05 | 4    | 0.3   | 91      |  |
| 39 FO Cu174                          | 0.08  | 1.1              | 60    | 1     | 99   | 29    | 0.1   | 0.54 | 0.05  | 11    | 77    | 31.4 | 100   | 1.2     |  |
| 39 FO Cu175                          | 0.30  | 0.91             | 1.3   | 0.8   | 2.5  | 2.4   | 0.1   | 0.70 | 99    | 16    | 15    | 1    | 1.3   | 3.1     |  |
| 39 FO Cu176                          | 0.22  | 0.32             | 0.17  | 1.3   | 0.5  | 1.0   | 0.2   | 1.39 | <0.02 | 21    | 0.01  | <1   | <0.2  | <0.3    |  |
| 39 FO Cu182                          | <0.05 | 0.05             | 1.14  | 2.7   | 0.35 | 0.28  | <0.02 | 0.25 | 0.02  | 10.9  | <0.01 | <1   | 0.11  | 0.5     |  |
| CRM 39 DB 366                        | 111   | 10.8             | 15.6  | 23.4  | 3.2  | 1.11  | <0.3  | 0.99 | ...   | 7.9   | 0.27  | ...  | ...   | ...     |  |
| CRM 39 DB 376                        | 247.3 | 236              | 217.3 | 234.6 | 209  | 199.9 | 200   | 202  | 207.9 | 163.0 | 186.1 | ...  | 205.9 | (181.5) |  |

| Continuation from above | All elements ppm |      |       |       |     |      |     |      |      |        |     |       |       |     |       | % Cu |    | Size (mm) |  |
|-------------------------|------------------|------|-------|-------|-----|------|-----|------|------|--------|-----|-------|-------|-----|-------|------|----|-----------|--|
|                         | Mg               | S    | P     | Cr    | Au  | Se   | Be  | Te   | B    | Zr     | In  | Li    | Ti    | C   | Ø     | H    |    |           |  |
| 39 X 17866AD            | 2                | 510  | 160   | 15    | ... | 30   | (1) | 53   | ...  | ...    | ... | ...   | (2)   | ... | 40 x  | 17   |    |           |  |
| 39 X 17867AA            | 49               | 580  | 170   | 2560  | 85  | 115  | 3   | 210  | (10) | (10)   | ... | ...   | ...   | ... | 40 x  | 17   |    |           |  |
| 39 X 17868AD            | 470              | 176  | 410   | 2000  | 220 | 40   | 13  | 320  | 30   | (50)   | ... | ...   | ...   | ... | 40 x  | 17   |    |           |  |
| 39 X 17869AC            | 4                | 130  | 150.0 | 4     | 90  | 80   | 1   | 350  | ...  | ...    | ... | ...   | (10)  | ... | 40 x  | 17   |    |           |  |
| 39 X 17870AE            | 4                | 194  | 490   | (20)  | 730 | 76   | <1  | 160  | (3)  | ...    | 23  | ...   | ...   | ... | 40 x  | 17   |    |           |  |
| 39 X 17871A             | (2)              | 80   | <5    | (3)   | 48  | 280  | (4) | 110  | ...  | <5     | ... | ...   | ...   | ... | 40 x  | 17   |    |           |  |
| 39 M BS 110A            | ...              | 8    | 10    | ...   | ... | ...  | ... | ...  | ...  | ...    | ... | ...   | ...   | 18  | 99.97 | 38 x | 12 |           |  |
| 39 FO Cu166             | 1                | 2    | 1.1   | 1.3   | ... | 1.2  | ... | 1.3  | 1.2  | 0.8    | ... | 2.4   | 1.1   | ... | 40 x  | 25   |    |           |  |
| 39 FO Cu167             | 1.9              | 12   | 1.5   | 1.5   | ... | 9.7  | ... | 7.2  | 2.6  | 0.7    | ... | (6.4) | <0.5  | ... | 40 x  | 25   |    |           |  |
| 39 FO Cu168             | 3.7              | 3.5  | 3.4   | 3.4   | ... | 4    | ... | 3.2  | 3.7  | 2.3    | ... | 7.8   | 4     | ... | 40 x  | 25   |    |           |  |
| 39 FO Cu169             | 3.1              | 3.5  | 3.1   | 4.5   | ... | 2.9  | ... | 3.6  | 3.1  | 2.1    | ... | (9)   | 1     | ... | 40 x  | 25   |    |           |  |
| 39 FO Cu170             | 7.9              | 12   | 11    | 9.6   | ... | 7.9  | ... | (10) | 5.2  | 8      | ... | 8     | <0.5  | ... | 40 x  | 25   |    |           |  |
| 39 FO Cu171             | 0.4              | 6    | <0.5  | 100   | ... | <0.5 | ... | 33   | ...  | 23     | ... | ...   | ...   | ... | 40 x  | 25   |    |           |  |
| 39 FO Cu172             | 0.2              | 7    | <0.5  | 0.7   | ... | <0.5 | ... | <0.1 | ...  | <0.05  | ... | ...   | 78    | ... | 40 x  | 25   |    |           |  |
| 39 FO Cu173             | 100              | 3.8  | 89    | 29    | ... | <0.5 | ... | 0.1  | ...  | 0.10   | ... | 69    | ...   | ... | 40 x  | 25   |    |           |  |
| 39 FO Cu174             | 0.8              | 35   | 0.35  | 0.48  | ... | 38   | ... | 0.2  | ...  | (80)   | ... | ...   | 20    | ... | 40 x  | 25   |    |           |  |
| 39 FO Cu175             | 26               | 89   | 31.5  | 0.25  | ... | 90   | ... | 85   | 30   | 0.12   | ... | 125   | 2.5   | ... | 40 x  | 25   |    |           |  |
| 39 FO Cu176             | 1.0              | 10.5 | <0.5  | 0.08  | ... | <0.5 | ... | 0.12 | ...  | 4.3    | ... | ...   | ...   | ... | 40 x  | 25   |    |           |  |
| 39 FO Cu182             | 0.2              | 2    | <0.1  | 0.19  | ... | 0.16 | ... | 0.05 | ...  | (0.03) | ... | <0.1  | ...   | ... | 40 x  | 25   |    |           |  |
| 39 DB 366               | ...              | 8.7  | 263   | ...   | ... | <1.1 | ... | <0.3 | ...  | ...    | ... | ...   | ...   | ... | 40 x  | 30   |    |           |  |
| 39 DB 376               | 124              | 133  | 203   | (400) | ... | 210  | ... | 215  | ...  | 42.2   | ... | ...   | (4.5) | ... | 40 x  | 30   |    |           |  |

# 3. Copper Base

Blocks/Discs

| 3.9 Residuals in Pure Copper - Discs (continued) |            | All elements ppm |       |        |         |       |       |       |       |        |       |         |       |     |     |           |
|--|------------|------------------|-------|--------|---------|-------|-------|-------|-------|--------|-------|---------|-------|-----|-----|-----------|
|  |            | Ag               | As    | Bi     | Cd      | Cr    | Fe    | Mn    | Ni    | Pb     | Sb    | Si      | Sn    | Al  | Be  |           |
| CRM  | 39 F 074A  | 12.8             | 0.78  | (0.10) | <0.02   | <0.1  | 1.14  | 1.27  | 1.04  | 0.97   | 0.58  | ...     | <0.07 | ... | ... | continued |
| CRM  | 39 F 075A  | 12.2             | 3.74  | 1.44   | 2.57    | 0.89  | 9.0   | 3.23  | 1.45  | 3.27   | 2.56  | ...     | 1.09  | ... | ... |           |
|  | 39 DK 4700 | 465              | 100   | 66     | 50      | 14    | 93    | 2     | 21    | 656    | 11    | 156     | 1     | <1  | <1  |           |
|  | 39 DK 4701 | 394              | 16    | 27     | 95      | 22    | 35    | 36    | 120   | 6      | 186   | 53      | 568   | 17  | <1  |           |
|  | 39 DK 4702 | 201              | 24    | <1     | 10      | 5     | 319   | 3     | 194   | 514    | 137   | 102     | 28    | <1  | <1  |           |
|  | 39 DK 4703 | 293              | 41    | 49     | <1      | 69    | 686   | 7     | 106   | 418    | 3     | 10      | 36    | <1  | <1  |           |
|  | 39 DK 4705 | 66               | 103   | 10     | <1      | 58    | 8     | 66    | 563   | 191    | 95    | 41      | 91    | <1  | <1  |           |
|  | 39 DK 4707 | 51               | 204   | <1     | 1       | 36    | 199   | 1     | 79    | 52     | 29    | 2       | 270   | <1  | 72  | continued |
|  | 39 DK 4708 | 39               | 385   | 88     | 44      | 19    | 85    | 12    | 376   | 22     | 3     | 34      | 347   | 38  | <1  |           |
|  | 39 DK 4709 | 22               | 291   | 2      | 17      | 39    | 60    | 107   | 30    | 11     | 11    | 13      | 440   | 16  | 46  |           |
|  | 39 DK 4711 | 98               | 79    | 7      | 138     | 279   | 49    | 205   | 93    | 3      | 41    | 478     | 4     | 341 | 178 |           |
|  | 39 DK 3563 | 9                | <5    | <5     | <5      | <5    | 7     | <5    | <5    | <5     | <5    | <5      | <5    | <5  | <5  |           |
|  | 39 DK 4875 | 586              | 495   | 82     | 411     | 385   | 510   | 287   | 600   | 607    | 222   | 255     | 590   | 324 | 140 |           |
| CRM  | 39 PN CP1  | 12               | 0.4   | 1.0    | 0.6     | 0.3   | 10    | 1.3   | 3.4   | 1.7    | 11    | ...     | 5.6   | ... | ... |           |
| CRM  | 39 PN CP2  | 36               | 140   | ...    | 72      | 0.5   | 8.1   | 5.9   | 20    | 120    | 160   | (4)     | 4.8   | ... | ... |           |
| CRM  | 39 PN CP3  | 60               | 63    | 47     | 35      | 45    | 15    | 30    | 13    | 81     | 120   | (8)     | 17    | ... | ... | continued |
| CRM  | 39 PN CP4  | 110              | 14    | 13     | 11      | 86    | 44    | 55    | 3.4   | 28     | 48    | (3)     | 40    | ... | ... |           |
| CRM  | 39 PN CP5  | 31               | 65    | 9.4    | 2.5     | 48    | 77    | 49    | 39    | 13     | 27    | (82)    | 2.1   | ... | ... |           |
| CRM  | 39 PN CP6  | 20               | 0.85  | ...    | ...     | 0.3   | 6.4   | 0.6   | 2.7   | 2.7    | 0.4   | ...     | 0.7   | ... | ... |           |
| CRM  | 39 PN CS1  | 53.05            | 2.27  | 1.08   | 0.99    | 0.33  | 18.39 | 28.98 | 46.79 | 60.48  | 3.03  | (3.0)   | 52.93 | ... | ... |           |
| CRM  | 39 PN CS2  | 45.62            | 7.85  | 6.23   | 7.37    | 35.83 | 30.54 | 35.28 | 26.65 | 38.64  | 7.51  | (9.38)  | 33.65 | ... | ... |           |
| CRM  | 39 PN CS3  | 38.90            | 13.83 | 12.17  | 13.40   | 10.93 | 28.27 | 12.58 | 11.11 | 13.26  | 12.97 | (22.2)  | 13.34 | ... | ... | continued |
| CRM  | 39 PN CS4  | 237              | 42.18 | 39.64  | 35.48   | 6.96  | 82.0  | 8.32  | 7.15  | 7.58   | 36.76 | (46.48) | 6.21  | ... | ... |           |
| CRM  | 39 PN CS5  | 320              | 70.5  | 59.7   | 66.1    | 1.03  | 90.9  | 4.25  | 4.39  | 4.99   | 63.9  | (54.8)  | 0.85  | ... | ... |           |
| CRM  | 39 PN CS6  | 8.48             | 0.22  | <0.2   | (0.059) | 0.24  | 20.83 | 0.71  | 0.80  | (0.36) | 1.02  | ...     | 10.6  | ... | ... | continued |
| CRM  | 39 PN CS7  | 13.70            | 0.81  | <0.9   | (0.019) | 19.72 | 4.90  | 2.15  | 4.37  | 0.86   | 0.93  | <1      | 0.49  | ... | ... |           |

| Continuation from above |            | All elements ppm |     |        |       |       |       |     |        |         |          | Size (mm) |  |
|-------------------------|------------|------------------|-----|--------|-------|-------|-------|-----|--------|---------|----------|-----------|--|
|                         |            | Co               | Mg  | P      | S     | Se    | Zn    | Zr  | Te     | B       | Ø        | H         |  |
|                         | 39 F 074A  | <0.05            | ... | ...    | ...   | 0.37  | 0.46  | ... | (0.21) | ...     | 40       | 30        |  |
|                         | 39 F 075A  | 2.50             | ... | ...    | ...   | 1.26  | 3.47  | ... | 1.52   | ...     | 40       | 30        |  |
|                         | 39 DK 4700 | 202              | 26  | <1     | 22    | 126   | 75    | <1  | 53     | 87      | 40       | 35-40     |  |
|                         | 39 DK 4701 | 19               | <1  | 463    | 47    | 14    | 65    | <1  | 9      | <1      | 40       | 35-40     |  |
|                         | 39 DK 4702 | 40               | <1  | 163    | 210   | 23    | 5     | <1  | 2      | <1      | 40       | 35-40     |  |
|                         | 39 DK 4703 | 66               | <1  | 156    | 94    | 49    | 150   | <1  | 25     | <1      | 40       | 35-40     |  |
|                         | 39 DK 4705 | 211              | 15  | 9      | 38    | 187   | 139   | <1  | 160    | <1      | 40       | 35-40     |  |
|                         | 39 DK 4707 | 542              | 93  | 446    | 28    | 93    | 415   | <1  | 113    | <1      | 40       | 35-40     |  |
|                         | 39 DK 4708 | 636              | <1  | 22     | 17    | 9     | 18    | <1  | 45     | <1      | 40       | 35-40     |  |
|                         | 39 DK 4709 | 312              | 64  | 593    | 14    | <1    | 2     | 135 | 76     | <1      | 40       | 35-40     |  |
|                         | 39 DK 4711 | 11               | 239 | 23     | 26    | <1    | 8     | 181 | 110    | 14      | 40       | 35-40     |  |
|                         | 39 DK 3563 | <5               | <5  | <5     | 8     | <5    | <5    | <5  | <5     | ...     | 40       | 35-40     |  |
|                         | 39 DK 4875 | 451              | 270 | 506    | 68    | 172   | 331   | 123 | 290    | <2      | 40       | 35-40     |  |
|                         | 39 PN CP1  | 0.2              | ... | 2.0    | 6.3   | <1    | 1.9   | ... | 3.0    | ...     | 40       | 23        |  |
|                         | 39 PN CP2  | 39               | ... | 11     | 35    | 77    | 92    | ... | 12     | ...     | each     |           |  |
|                         | 39 PN CP3  | 20               | ... | 44     | 60    | 43    | 33    | ... | 46     | ...     |          |           |  |
|                         | 39 PN CP4  | 4.2              | ... | 130    | 94    | 10    | 17    | ... | 75     | ...     | Set only |           |  |
|                         | 39 PN CP5  | 34               | ... | 110    | 21    | 35    | 38    | ... | 7.8    | ...     |          |           |  |
|                         | 39 PN CP6  | <1               | ... | 1.7    | 7.5   | <1    | 1.4   | ... | ...    | ...     |          |           |  |
|                         | 39 PN CS1  | 0.6              | ... | 57.66  | 65.91 | 61.53 | 24.13 | ... | 2.11   | (1.1)   | 40       | 25        |  |
|                         | 39 PN CS2  | 3.6              | ... | 33.75  | 44.88 | 38.99 | 8.91  | ... | 5.62   | (2.83)  | each     |           |  |
|                         | 39 PN CS3  | 7.4              | ... | 12.11  | 18.79 | 15.41 | 31.30 | ... | 10.56  | (4.19)  |          |           |  |
|                         | 39 PN CS4  | 24.3             | ... | 6.3    | 41.3  | 6.68  | 44.02 | ... | 32.86  | (21.73) | Set only |           |  |
|                         | 39 PN CS5  | 37.5             | ... | 2.04   | 12.00 | 0.94  | 100.6 | ... | 49.8   | (35.2)  |          |           |  |
|                         | 39 PN CS6  | (0.19)           | ... | (1.47) | 5.39  | <1    | 1.43  | ... | <0.05  | <0.5    | 40       | 25        |  |
|                         | 39 PN CS7  | 0.093            | ... | (2.4)  | 7.02  | <1    | 1.24  | ... | <0.05  | <0.5    | 40       | 25        |  |



# 4. Zinc Base

Blocks/Discs

| 4.1 Residuals in Pure Zinc |         |         |         |         |         |         |          |        |         |          |          |        |          |          |            | Typical | Size (mm)  |
|----------------------------|---------|---------|---------|---------|---------|---------|----------|--------|---------|----------|----------|--------|----------|----------|------------|---------|------------|
|                            | Pb      | Mg      | Al      | Cd      | Fe      | Sn      | Cu       | Ni     | Mn      | In       | Tl       | Bi     | Sb       | Ti       | Alloy Type | Ø       | H          |
| CRM 41 X Z1M               | 0.0018  | 0.00025 | ...     | 0.00005 | 0.0005  | <0.0002 | 0.0005   | 0.0001 | 0.00017 | <0.0005  | ...      | ...    | ...      | ...      |            | 50 x 20 | c          |
| CRM 41 X Z2L               | 0.0036  | 0.0064  | 0.017   | 0.0017  | 0.0028  | 0.0017  | 0.016    | 0.0014 | 0.0017  | (0.0002) | (0.0023) | ...    | (0.0011) | (0.0005) |            | 50 x 20 |            |
| CRM 41 X Z3K               | 0.0052  | 0.0009  | 0.0081  | 0.0044  | 0.002   | 0.0039  | 0.0019   | 0.0031 | 0.0007  | 0.0007   | (0.0025) | ...    | 0.0037   | 0.0012   | BS 3436    | 50 x 20 |            |
| CRM 41 X Z4K               | 0.0091  | 0.0019  | 0.0096  | 0.0066  | 0.003   | 0.0070  | 0.0047   | 0.0069 | 0.0012  | 0.0015   | (0.0037) | ...    | 0.005    | <0.0005  |            | 50 x 20 |            |
| CRM 41 X Z5M               | 0.0280  | 0.0105  | 0.041   | 0.032   | 0.011   | 0.031   | 0.031    | 0.0005 | 0.014   | 0.0055   | 0.0005   | ...    | 0.009    | 0.0005   |            | 50 x 20 |            |
| CRM 41 X Z6A               | 0.031   | <0.0005 | 0.0096  | 0.0093  | (0.002) | 0.0038  | 0.0088   | 0.0002 | 0.0002  | 0.0228   | 0.0004   | 0.0122 | ...      | ...      |            | 50 x 20 |            |
| CRM 41 PN ZE1              | 0.018   | ...     | 0.012   | 0.0019  | 0.020   | 0.0018  | 0.011    | ...    | ...     | ...      | ...      | ...    | ...      | ...      |            | 40 x 25 |            |
| CRM 41 PN ZE2              | 0.0078  | ...     | 0.0035  | 0.0031  | 0.0052  | 0.0074  | ...      | ...    | ...     | ...      | ...      | ...    | ...      | ...      |            | each    |            |
| CRM 41 PN ZE3              | 0.0052  | ...     | 0.025   | 0.0050  | ...     | 0.015   | 0.0032   | ...    | ...     | ...      | ...      | ...    | ...      | ...      |            |         |            |
| CRM 41 PN ZE4              | 0.0012  | ...     | ...     | 0.00023 | ...     | 0.0017  | 0.013    | ...    | ...     | ...      | ...      | ...    | ...      | ...      |            |         | Set only   |
| CRM 41 PN ZE5              | 0.0004  | ...     | 0.0011  | 0.0060  | 0.011   | 0.00045 | 0.0049   | ...    | ...     | ...      | ...      | ...    | ...      | ...      |            |         |            |
| CRM 41 F 321               | 0.00047 | ...     | <0.0001 | ...     | ...     | <0.0005 | ...      | ...    | ...     | <0.00002 | 0.00008  | ...    | ...      | ...      |            | 80 x 20 |            |
| CRM 41 F 322 R             | 0.00150 | ...     | ...     | 0.00151 | 0.00191 | 0.00056 | 0.000589 | ...    | ...     | ...      | 0.00053  | ...    | ...      | ...      |            | 60 x 30 |            |
| CRM 41 F 323 R             | 0.00486 | ...     | ...     | 0.00065 | 0.00113 | 0.00187 | 0.00189  | ...    | ...     | ...      | 0.00108  | ...    | ...      | ...      |            | 60 x 30 |            |
| CRM 41 F 324 R             | 0.00261 | ...     | ...     | 0.00486 | 0.00585 | 0.00098 | 0.000987 | ...    | ...     | ...      | 0.00199  | ...    | ...      | ...      |            | 60 x 30 |            |
| CRM 41 F 325 R             | 0.0142  | ...     | ...     | 0.00947 | 0.00561 | 0.00461 | 0.00475  | ...    | ...     | ...      | 0.00368  | ...    | ...      | ...      |            | 60 x 30 |            |
| CRM 41 F 326               | 0.0307  | ...     | ...     | 0.0203  | 0.0265  | ...     | 0.0105   | ...    | ...     | ...      | ...      | ...    | ...      | ...      |            | 80 x 20 |            |
| CRM 41 F 327               | 0.0409  | ...     | <0.0001 | 0.0301  | 0.0144  | ...     | ...      | ...    | ...     | ...      | ...      | ...    | ...      | ...      |            | 80 x 20 |            |
| 41 CM 4320-1               | 0.00044 | ...     | ...     | 0.00045 | 0.00043 | 0.00022 | 0.000058 | ...    | ...     | ...      | ...      | ...    | ...      | ...      |            | 28 x 20 |            |
| 41 CM 4320-2               | 0.0015  | ...     | ...     | 0.0011  | 0.0013  | 0.00042 | 0.00018  | ...    | ...     | ...      | ...      | ...    | ...      | ...      |            | each    |            |
| 41 CM 4320-3               | 0.0030  | ...     | ...     | 0.0031  | 0.0033  | 0.00071 | 0.00047  | ...    | ...     | ...      | ...      | ...    | ...      | ...      |            |         | set only   |
| 41 CM 4320-4               | 0.0082  | ...     | ...     | 0.0079  | 0.0065  | 0.0012  | 0.00099  | ...    | ...     | ...      | ...      | ...    | ...      | ...      |            |         |            |
| 41 CM 4320-5               | 0.021   | ...     | ...     | 0.020   | 0.011   | 0.0019  | 0.0020   | ...    | ...     | ...      | ...      | ...    | ...      | ...      |            |         |            |
| 41 A 194e                  | 0.002   | ...     | ...     | ...     | 0.001   | <0.001  | <0.0005  | ...    | ...     | ...      | ...      | ...    | ...      | ...      | Zn 99.99   |         | 300g block |

| 4.1.1 Zinc with Impurities |         |          |        |        |          |        |        |          |          |         |          |        |         |        |        | Size (mm) |              |   |   |
|----------------------------|---------|----------|--------|--------|----------|--------|--------|----------|----------|---------|----------|--------|---------|--------|--------|-----------|--------------|---|---|
|                            | Pb      | Mg       | Al     | Cd     | Fe       | Sn     | Cu     | Mn       | Ni       | Sb      | Bi       | In     | Tl      | Ag     | As     | Ø         | H            |   |   |
| CRM 41 X 0336Zn1K          | 0.95    | 0.0049   | 0.014  | 0.0056 | 0.0124   | 0.0053 | 0.0070 | 0.0035   | ...      | ...     | ...      | ...    | ...     | ...    | ...    | 50 x 20   | c            |   |   |
| CRM 41 X 0336Zn2K          | 0.46    | 0.033    | 0.99   | 0.171  | 0.12     | 0.040  | 0.196  | 0.014    | 0.005    | ...     | ...      | ...    | ...     | ...    | ...    | 50 x 20   |              |   |   |
| CRM 41 X 0336Zn3J          | 0.019   | 0.134    | 0.43   | 0.341  | 0.27     | 0.111  | 0.36   | 0.0058   | ...      | ...     | ...      | ...    | ...     | ...    | ...    | 50 x 20   |              |   |   |
| CRM 41 X 0336Zn4B          | 2.87    | 0.179    | 1.39   | 0.638  | (0.018)  | 2.38   | 0.874  | 0.038    | 0.0074   | 0.048   | 0.027    | 0.0035 | (0.004) | 0.0023 | 0.0005 | 50 x 20   |              |   |   |
| CRM 41 X 0336Zn5A          | 0.91    | <0.0005  | 0.035  | 0.056  | 0.016    | 0.21   | 0.023  | (0.0001) | (0.0005) | 0.008   | (0.001)  | ...    | ...     | ...    | ...    | 50 x 20   |              |   |   |
| CRM 41 X 0336Zn6A          | 1.82    | 0.0008   | 0.105  | 0.0140 | 0.08     | 0.0023 | 0.0203 | 0.0010   | 0.0018   | 0.234   | 0.123    | 0.0123 | 0.0132  | 0.0055 | 0.0020 | 50 x 20   |              |   |   |
|                            | Pb      | Mg       | Al     | Cd     | Fe       | Sn     | Cu     | Mn       | Ni       | Ti      | Cr       | Ce     | La      | Sb     | Bi     | Si        | Size (mm)    |   |   |
|                            |         |          |        |        |          |        |        |          |          |         |          |        |         |        |        |           | Ø            | H |   |
| CRM 41 X 4380Zn1C          | 0.068   | 0.0011   | 0.055  | 0.376  | 0.01     | 0.049  | 0.175  | 0.0015   | 0.0029   | (0.001) | 0.002    | ...    | ...     | 0.002  | 0.0017 | 0.006     | 50 x 20      | c |   |
| 41 X 4380Zn2B              | 0.26    | 0.015    | 0.030  | 0.29   | 0.23     | 0.0015 | 0.030  | ...      | ...      | ...     | ...      | ...    | ...     | ...    | ...    | ...       | 40 x 15      |   |   |
| 41 X 4380Zn3B              | 0.21    | 0.052    | 0.17   | 0.18   | (0.05)   | 0.087  | 0.092  | ...      | ...      | 0.18    | 0.004    | 0.037  | (0.023) | ...    | ...    | ...       | 40 x 15      |   |   |
| CRM 41 X 4380Zn4C          | 0.325   | 0.126    | 0.144  | 0.094  | 0.056    | 0.038  | 0.0022 | 0.0007   | 0.0040   | 0.005   | (0.0003) | ...    | ...     | 0.017  | 0.011  | (0.002)   | 50 x 20      |   |   |
| CRM 41 X 4380Zn5C          | 0.15    | 0.0018   | 0.022  | 0.064  | 0.012    | 0.009  | 0.072  | 0.036    | 0.0014   | 0.33    | 0.0075   | ...    | ...     | 0.0052 | 0.031  | <0.0005   | 50 x 20      |   |   |
| CRM 41 X 4380Zn6C          | 0.42    | 0.0045   | 0.0048 | 0.047  | 0.017    | 0.110  | 0.020  | 0.025    | 0.0005   | 0.062   | 0.0020   | ...    | ...     | 0.034  | 0.0010 | <0.0005   | 50 x 20      |   |   |
| CRM 41 X 4380Zn7C          | 1.25    | 0.0028   | 0.137  | 0.015  | (0.0044) | 0.0047 | 0.012  | ...      | 0.012    | 0.009   | 0.0045   | ...    | ...     | 0.090  | ...    | ...       | 50 x 20      |   |   |
| CRM 41 X 4380Zn8C          | 0.73    | 0.007    | 0.225  | 0.0079 | 0.003    | 0.011  | 0.020  | 0.0015   | 0.024    | 0.012   | 0.0019   | ...    | ...     | 0.016  | 0.011  | (0.005)   | 50 x 20      |   |   |
|                            |         |          |        |        |          |        |        |          |          |         |          |        |         |        |        |           | W            | D | H |
| CRM 41 B 631               | (0.001) | (<0.001) | 0.50   | 0.0002 | 0.005    | 0.0001 | 0.0013 | 0.00015  | <0.0005  | ...     | 0.0001   | ...    | ...     | ...    | ...    | (0.002)   | 44 x 44 x 19 |   | c |

| 4.1.2 Galvanizing Alloys |        |        |          |        |        |          |        |        |        |        |        |        |          |     |            | Size (mm) |   |
|--------------------------|--------|--------|----------|--------|--------|----------|--------|--------|--------|--------|--------|--------|----------|-----|------------|-----------|---|
|                          | Pb     | Al     | Cd       | Fe     | Sn     | Cu       | Ni     | Bi     | Sb     | As     | Cr     | Mn     | Co       |     | Ø          | H         |   |
| CRM 41 X GLV1A           | 0.056  | 0.115  | 0.0093   | 0.059  | 0.010  | 0.0028   | 0.0141 | 0.0025 | <0.001 | <0.001 | ...    | ...    | ...      | ... | 50 x 20    | c         |   |
| CRM 41 X GLV2A           | 0.214  | 0.068  | 0.0025   | 0.048  | 0.003  | 0.0052   | 0.0070 | 0.017  | 0.006  | <0.001 | ...    | ...    | ...      | ... | 50 x 20    |           |   |
| CRM 41 X GLV3A           | 0.0080 | 0.31   | 0.021    | 0.012  | 0.006  | 0.0188   | 0.0301 | 0.0011 | 0.048  | ...    | ...    | ...    | ...      | ... | 50 x 20    |           |   |
| CRM 41 X GLV4A           | 0.0038 | 0.201  | (0.0001) | 0.017  | <0.005 | 0.0009   | 0.049  | 0.0051 | 0.025  | <0.002 | ...    | ...    | ...      | ... | 50 x 20    |           |   |
| CRM 41 X GLV5A           | 0.0187 | 0.014  | 0.0138   | 0.076  | 0.020  | 0.0116   | 0.0030 | 0.0105 | 0.162  | 0.0041 | ...    | ...    | ...      | ... | 50 x 20    |           |   |
| CRM 41 X GLV6A           | 0.120  | 0.474  | 0.0053   | 0.0047 | 0.0152 | 0.039    | 0.0008 | 0.0248 | 0.0112 | 0.0014 | 0.0029 | 0.0013 | 0.0047   | ... | 50 x 20    |           |   |
| CRM 41 X GLV7A           | 0.082  | 0.399  | 0.00056  | 0.0031 | ...    | 0.023    | 0.0060 | 0.0108 | 0.0031 | 0.0016 | 0.0010 | 0.0025 | (0.0001) | ... | 50 x 20    |           |   |
| CRM 41 X CGL F           | 0.046  | 0.28   | (0.0015) | ...    | <0.001 | (0.0005) | ...    | ...    | ...    | ...    | ...    | ...    | ...      | ... | 42-48 x 20 |           | c |
| CRM 41 B 1736            | 0.0029 | 0.3076 | ...      | ...    | ...    | ...      | ...    | ...    | ...    | ...    | ...    | ...    | ...      | ... | 51 X 13    |           | c |
| CRM 41 B 1737            | 0.0029 | 0.6302 | ...      | ...    | ...    | ...      | ...    | ...    | ...    | ...    | ...    | ...    | ...      | ... | 51 X 13    |           |   |
| CRM 41 B 1738            | 0.0101 | 0.1014 | ...      | ...    | ...    | ...      | ...    | ...    | ...    | ...    | ...    | ...    | ...      | ... | 51 X 13    |           |   |
| CRM 41 B 1739            | 0.0302 | 0.2049 | ...      | ...    | ...    | ...      | ...    | ...    | ...    | ...    | ...    | ...    | ...      | ... | 51 X 13    |           |   |
| CRM 41 B 1740            | 0.0691 | 0.4177 | ...      | ...    | ...    | ...      | ...    | ...    | ...    | ...    | ...    | ...    | ...      | ... | 51 X 13    |           |   |
| CRM 41 B 1741            | 0.1571 | 0.5242 | ...      | ...    | ...    | ...      | ...    | ...    | ...    | ...    | ...    | ...    | ...      | ... | 51 X 13    |           |   |
| CRM 41 B 1742            | 0.0081 | 0.7917 | ...      | ...    | ...    | ...      | ...    | ...    | ...    | ...    | ...    | ...    | ...      | ... | 51 X 13    |           |   |

| 4.1.3 Binaries |       |          |          |          |          |          |          |          |  | Size (mm) |   |
|----------------|-------|----------|----------|----------|----------|----------|----------|----------|--|-----------|---|
|                | Mn    | Ni       | Pb       | Mg       | Al       | Cd       | Fe       | Cu       |  | Ø         | H |
| 41 X ZMn1A     | 1.058 | (0.0009) | (0.0026) | (0.0001) | (0.0001) | (0.0002) | (0.0025) | (0.0005) |  | 50 x 20   | c |

| 4.1.4 Specialty Alloys |        |        |       |        |       |          |      |        |        |       | Typical | Size (mm)  |         |   |
|------------------------|--------|--------|-------|--------|-------|----------|------|--------|--------|-------|---------|------------|---------|---|
|                        | Pb     | Mg     | Al    | Cd     | Fe    | Sn       | Cu   | Ni     | Mn     | Ti    | Cr      | Alloy Type | Ø       | H |
| CRM 41 X 2951Zn1A      | 0.0042 | 0.0029 | 0.029 | 0.0005 | 0.011 | (0.0007) | 0.79 | 0.0038 | 0.0013 | 0.278 | 0.083   |            | 50 x 20 | c |
| CRM 41 X 2951Zn2A      | 0.0040 | 0.0123 | 0.032 | 0.0037 | 0.019 | (0.0015) | 1.37 | 0.0027 | 0.0011 | 0.209 | 0.142   | ILZRO16    | 50 x 20 |   |
| CRM 41 X 2951Zn3A      | 0.0065 | 0.0164 | 0.078 | 0.0062 | 0.029 | (0.006)  | 1.89 | 0.0010 | 0.0018 | 0.133 | 0.184   |            | 50 x 20 |   |

# 4. Zinc Base

Blocks/Discs

| 4.2 Zn/Al   |              | Pb       | Mg      | Al     | Cd      | Fe       | Sn       | Cu      | Ni       | Mn       | Cr       | Si      | Sb                 | Ce                 | La               | Typical Alloy Type | Size (mm)<br>Ø H |   |
|---|--------------|----------|---------|--------|---------|----------|----------|---------|----------|----------|----------|---------|--------------------|--------------------|------------------|--------------------|------------------|---|
| CRM   | 42 X Z1H     | 0.0022   | 0.0041  | 4.61   | 0.0005  | 0.0024   | 0.0006   | 0.0019  | 0.0017   | 0.0007   | <0.0005  | 0.0046  | (0.0009)           | 0.0027             | 0.0026           | BS 1004 A          | 50 x 20          | c |
| CRM   | 42 X Z2H     | 0.0052   | 0.0147  | 4.04   | 0.0010  | 0.0040   | 0.0021   | 0.0186  | 0.0051   | 0.012    | 0.0018   | 0.0089  | 0.0026             | 0.0049             | 0.0044           | ASTM 13            | 50 x 20          |   |
| CRM   | 42 X Z3H     | 0.0060   | 0.0288  | 3.72   | 0.0048  | (0.047)  | 0.0030   | 0.159   | 0.0102   | 0.0252   | 0.002    | 0.015   | 0.003              | (0.0003)           | (0.0003)         | ASTM AG40A         | 50 x 20          |   |
| CRM   | 42 X Z4H     | 0.0113   | 0.058   | 3.55   | 0.0076  | 0.012    | 0.0060   | 0.063   | 0.0177   | 0.0077   | ...      | ...     | (0.0029)           | 0.020              | 0.02             |                    | 50 x 20          |   |
| CRM   | 42 X Z5J     | 0.0048   | 0.073   | 4.22   | 0.0021  | 0.029    | 0.0022   | 0.098   | 0.0185   | 0.0068   | 0.0018   | ...     | (0.0055)           | 0.0109             | 0.009            |                    | 50 x 20          |   |
| CRM   | 42 X Z6A     | 0.0090   | 0.180   | 3.60   | 0.0041  | 0.005    | 0.006    | 0.240   | 0.0003   | 0.016    | 0.0036   | 0.010   | 0.0155             | ...                | ...              |                    | 50 x 20          |   |
| CRM   | 42 X Z7A     | 0.0097   | 0.0095  | 4.39   | 0.030   | 0.027    | 0.012    | 0.0249  | 0.0067   | 0.0045   | ...      | 0.006   | ...                | 0.053              | 0.047            | GALFAN             | 50 x 20          | c |
| CRM   | 42 X Z8A     | 0.0025   | 0.0033  | 7.03   | 0.0003  | 0.013    | (0.0023) | 0.0215  | 0.0019   | 0.0014   | ...      | 0.013   | ...                | 0.0081             | 0.0079           |                    | 50 x 20          |   |
| CRM   | 42 X Z9A     | 0.0021   | 0.0464  | 5.58   | 0.0054  | 0.032    | ...      | 0.0070  | (0.0003) | 0.0006   | ...      | (0.004) | ...                | 0.0047             | 0.0044           |                    | 50 x 20          |   |
| <b>W D H</b>  |              |          |         |        |         |          |          |         |          |          |          |         |                    |                    |                  |                    |                  |   |
| CRM   | 42 B 625     | 0.0014   | 0.070   | 3.06   | 0.0007  | 0.036    | 0.0006   | 0.034   | 0.0184   | 0.031    | 0.0128   | 0.017   | ...                | ...                | ...              | ASTM AG40A         | 44 x 44 x 19     | c |
| CRM   | 42 B 626     | 0.0022   | 0.020   | 3.56   | 0.0016  | 0.103    | 0.0012   | 0.056   | 0.047    | 0.048    | 0.0395   | 0.042   | ...                | ...                | ...              | ASTM AG40A         | 44 x 44 x 19     |   |
| CRM   | 42 B 627     | 0.0082   | 0.030   | 3.88   | 0.0051  | 0.023    | 0.0042   | 0.132   | 0.0029   | 0.014    | 0.0038   | 0.021   | ...                | ...                | ...              | ASTM AG40A         | 44 x 44 x 19     |   |
| CRM   | 42 B 628     | 0.0045   | 0.0094  | 4.59   | 0.0040  | 0.066    | 0.0017   | 0.611   | 0.030    | 0.0091   | 0.0087   | 0.008   | ...                | ...                | ...              | ASTM AC41A         | 44 x 44 x 19     |   |
| CRM   | 42 B 629     | 0.0135   | 0.094   | 5.15   | 0.0155  | 0.017    | 0.012    | 1.50    | 0.0075   | 0.0017   | 0.0008   | 0.078   | ...                | ...                | ...              | ASTM AC41A         | 44 x 44 x 19     |   |
| CRM   | 42 B 630     | 0.0083   | 0.030   | 4.30   | 0.0048  | 0.023    | 0.0040   | 0.976   | 0.0027   | 0.0106   | 0.0031   | 0.022   | ...                | ...                | ...              | ASTM AC41A         | 44 x 44 x 19     |   |
|   |              | ppm Pb   | ppm Mg  | % Al   | ppm Cd  | ppm In   | ppm Sn   | ppm Cu  | ppm Ni   | ppm Ti   |          |         | Typical Alloy Type | Size (mm)<br>Ø H   |                  |                    |                  |   |
| CRM   | 42 F 351     | 4.5      | 131     | 4.355  | (0.21)  | <0.2     | <1       | 12.13   | (1.9)    | 0.74     |          |         |                    | 80 x 20            | c                |                    |                  |   |
| CRM   | 42 F 352     | (6.4)    | 282     | 4.150  | 2.88    | 3.02     | 3.0      | 31.26   | 6.74     | 3.2      |          |         |                    | 80 x 20            |                  |                    |                  |   |
| CRM   | 42 F 353     | 24.4     | 452.5   | 3.950  | 10.44   | 2.55     | 5.6      | 100     | ...      | 3.95     |          |         | Zamak 3            | 80 x 20            |                  |                    |                  |   |
| CRM   | 42 F 354     | 30.8     | 602     | 3.727  | 29.7    | 9.8      | 14.1     | 312.3   | 83.1     | 11.01    |          |         |                    | 80 x 20            |                  |                    |                  |   |
| CRM   | 42 F 355     | 56.9     | 786     | 3.443  | 58.1    | 24.6     | 29.1     | 1035    | 268      | 23.25    |          |         |                    | 80 x 20            |                  |                    |                  |   |
| <b>4.3 Zn/Al/Cu</b>   |              | Pb       | Mg      | Al     | Cd      | Fe       | Sn       | Cu      | Ni       | Mn       | Si       | Cr      | Ti                 | Sb                 | Bi               | Typical Alloy Type | Size (mm)<br>Ø H |   |
| CRM   | 43 X Z1J     | 0.0017   | 0.0145  | 4.50   | 0.00037 | 0.0058   | (0.0007) | 0.501   | 0.0010   | 0.0005   | (0.0037) | 0.0009  | 0.0014             | 0.0016             | 0.0031           | BS 1004 B          | 50 x 20          | c |
| CRM   | 43 X Z2K     | 0.0066   | 0.0739  | 3.80   | 0.0068  | 0.020    | 0.0036   | 1.04    | 0.0124   | 0.0059   | 0.009    | 0.0021  | ...                | 0.008              | 0.0019           | ASTM 11            | 50 x 20          |   |
| CRM   | 43 X Z3L     | 0.0132   | 0.0143  | 3.64   | 0.0132  | 0.061    | 0.0125   | 1.58    | 0.0061   | 0.0125   | 0.005    | 0.0045  | ...                | (0.0030)           | 0.018            | ASTM AG41A         | 50 x 20          |   |
| CRM   | 43 X Z4B     | (0.0024) | 0.043   | 4.76   | 0.0025  | (0.064)  | (0.0023) | 3.21    | 0.0286   | 0.088    | (0.0065) | 0.0063  | 0.0017             | 0.0043             | 0.012            | ZL2                | 50 x 20          |   |
| CRM   | 43 X Z5A     | 0.0045   | 0.041   | 3.05   | 0.0111  | 0.023    | 0.0032   | 6.05    | 0.0021   | 0.0030   | 0.003    | 0.0010  | 0.0009             | ...                | ...              | ACuZinc5           | 50 x 20          |   |
| CRM   | 43 X Z6A     | 0.0016   | 0.0256  | 4.02   | 0.0016  | 0.019    | 0.0053   | 2.72    | 0.029    | 0.0006   | 0.012    | 0.0006  | 0.0013             | 0.0045             | 0.0049           |                    | 50 x 20          |   |
| CRM   | 43 X Z11E    | 0.0305   | 0.053   | 11.61  | 0.0224  | 0.0091   | 0.0206   | 0.515   | 0.0014   | 0.0089   | 0.020    | 0.0010  | 0.013              | 0.0091             | 0.0035           |                    | 50 x 20          | c |
| CRM   | 43 X Z12D    | 0.0133   | 0.027   | 10.05  | 0.0114  | 0.047    | 0.0089   | 0.796   | 0.0035   | 0.0059   | (0.008)  | 0.0023  | 0.0054             | 0.0039             | (0.002)          | ASTM B669          | 50 x 20          |   |
| CRM   | 43 X Z13D    | 0.0125   | 0.0204  | 9.55   | 0.0100  | 0.05     | 0.0111   | 0.981   | 0.0109   | 0.0070   | (0.0048) | ...     | ...                | 0.009              | ...              | ZA8                | 50 x 20          |   |
| CRM   | 43 X Z14D    | 0.0082   | 0.0026  | 8.24   | 0.0067  | 0.015    | 0.0053   | 1.23    | 0.0052   | 0.0033   | 0.010    | 0.0046  | 0.0012             | 0.011              | 0.010            | ZA12               | 50 x 20          |   |
| CRM   | 43 X Z15C    | 0.0054   | 0.0024  | 7.36   | 0.0030  | 0.009    | 0.004    | 1.53    | 0.0019   | 0.0020   | (0.011)  | 0.0025  | 0.0020             | 0.005              | 0.005            |                    | 50 x 20          |   |
| CRM   | 43 X Z21C    | 0.012    | 0.047   | 23.5   | 0.027   | 0.12     | 0.0140   | 1.81    | 0.043    | 0.0104   | 0.022    | 0.0087  | 0.013              | ...                | ...              | ASTM B669          | 50 x 20          | c |
| CRM   | 43 X Z22C    | 0.0060   | 0.022   | 27.4   | 0.0050  | (0.36)   | 0.0061   | 2.32    | 0.027    | 0.0096   | 0.038    | 0.019   | 0.0065             | ...                | ...              | ZA27               | 50 x 20          |   |
| CRM   | 43 X Z23C    | 0.0028   | 0.0133  | 31.4   | 0.0024  | (0.24)   | (0.002)  | 2.74    | 0.0115   | 0.0124   | 0.061    | 0.036   | 0.0026             | ...                | ...              |                    | 50 x 20          |   |
| CRM   | 43 A NZA-1   | 0.0030   | 0.020   | 28.70  | 0.00098 | 0.046    | 0.0069   | 1.51    | ...      | ...      | ...      | ...     | ...                | ...                | ...              |                    | 50 x 12          |   |
| CRM   | 43 A NZA-2   | 0.0076   | 0.029   | 23.81  | 0.0047  | 0.021    | 0.0045   | 3.00    | ...      | ...      | ...      | ...     | ...                | ...                | ...              |                    | 50 x 12          |   |
| CRM   | 43 A NZA-3   | 0.0045   | 0.0049  | 25.99  | 0.0064  | 0.066    | 0.0034   | 2.00    | ...      | ...      | ...      | ...     | ...                | ...                | ...              |                    | 50 x 12          |   |
| CRM   | 43 A NZA-4   | 0.0101   | 0.0106  | 26.65  | 0.0029  | 0.027    | 0.0087   | 2.45    | ...      | ...      | ...      | ...     | ...                | ...                | ...              |                    | 50 x 12          |   |
| CRM   | 43 A NZA-5   | 0.0012   | 0.021   | 10.85  | 0.0095  | (0.016)  | 0.0017   | 1.04    | ...      | ...      | ...      | ...     | ...                | ...                | ...              |                    | 50 x 12          |   |
| CRM   | 43 A NZA-6   | 0.0809   | 0.00037 | 7.54   | 0.0147  | (0.0105) | 0.0051   | 3.17    | ...      | ...      | ...      | ...     | ...                | ...                | ...              |                    | 50 x 12          |   |
| CRM   | 43 A NZA-7   | 0.0136   | 0.052   | 13.17  | 0.00020 | (0.016)  | 0.0116   | 0.212   | ...      | ...      | ...      | ...     | ...                | ...                | ...              |                    | 50 x 12          |   |
|   |              | ppm Pb   | ppm Mg  | % Al   | ppm Cd  | ppm Fe   | ppm Sn   | % Cu    | ppm Ni   | ppm In   | ppm Ti   |         |                    | Typical Alloy Type | Size (mm)<br>Ø H |                    |                  |   |
| CRM   | 43 F 356     | 9.87     | 132.3   | 4.434  | 0.73    | 31.5     | (0.32)   | 0.394   | 3.43     | <0.2     | 0.79     |         |                    |                    | 80 x 20          | c                  |                  |   |
| CRM   | 43 F 357     | 13.8     | 273     | 4.227  | 2.83    | 25.7     | 3.51     | 0.5849  | 9.82     | 3.3      | 2.76     |         |                    |                    | 80 x 20          |                    |                  |   |
| CRM   | 43 F 358     | 22.5     | 403     | 3.946  | 10.22   | 40.5     | 7.87     | 0.793   | 26.98    | 7.04     | 6.09     |         |                    | Zamak 5            | 80 x 20          |                    |                  |   |
| CRM   | 43 F 359     | 36.2     | 557     | 3.711  | 29.8    | 119.7    | 16.93    | 0.989   | 92.6     | 15.5     | 13.34    |         |                    |                    | 80 x 20          |                    |                  |   |
| CRM   | 43 F 360     | 73.9     | 705     | 3.427  | 59.5    | ...      | 33.3     | 1.234   | 267      | 29.8     | 25.9     |         |                    |                    | 80 x 20          |                    |                  |   |
| CRM   | 43 F 361     | 5.31     | ...     | 4.068  | (0.8)   | 10.34    | 46.3     | 0.798   | ...      | <0.2     | 37.4     |         |                    |                    | 80 x 20          |                    |                  |   |
| <b>4.4 High-Alloy Zinc</b>  |              | Al       | Sb      | Mg     | Cu      | Pb       | Cd       | Bi      | Sn       | Fe       | Zn       | Ni      | Ag                 | Size (mm)<br>Ø H   |                  |                    |                  |   |
|   | 44 X Z1A     | 8.0      | 10.6    | 0.001  | 0.028   | 0.019    | 0.027    | 0.024   | 0.024    | 0.007    | rem      | ...     | ...                | 40 x 15            | c                |                    |                  |   |
|   | 44 X Z2A     | 12.6     | 9.5     | 0.035  | 0.003   | 0.053    | 0.005    | 0.030   | 0.018    | 0.007    | rem      | ...     | ...                | 40 x 15            |                  |                    |                  |   |
|   | 44 X Z3A     | 17.8     | 8.1     | 0.005  | 0.011   | 0.020    | 0.012    | 0.013   | 0.019    | 0.009    | rem      | ...     | ...                | 40 x 15            |                  |                    |                  |   |
|   | 44 X Z4A     | 20.3     | 6.7     | 0.008  | 0.007   | 0.032    | 0.011    | 0.016   | 0.018    | 0.011    | rem      | ...     | ...                | 40 x 15            |                  |                    |                  |   |
|   | 44 X Z5A     | 20.4     | 5.2     | <0.001 | 0.001   | 0.010    | 0.001    | 0.004   | 0.003    | 0.010    | rem      | ...     | ...                | 40 x 15            |                  |                    |                  |   |
| Note: the above series has some Sb segregation, and must therefore be used with caution |              |          |         |        |         |          |          |         |          |          |          |         |                    | 40 x 15            |                  |                    |                  |   |
|   | 44 X ZnCd30A | ...      | 1.03    | ...    | 0.05    | 0.09     | 31.0     | 0.05    | 0.05     | 0.002    | rem      | 0.001   | 0.05               | 40 x 15            | c                |                    |                  |   |
| <b>4.5 Zn/Al 'Galvalume'</b>  |              | Zn       | Si      | Fe     | Cu      | Sn       | Pb       | Mg      | Ti       | Ca       | Li       | Al      | Size (mm)<br>Ø H   |                    |                  |                    |                  |   |
|   | 45 X ZnAl1A  | 24.5     | 2.72    | 0.28   | 0.065   | 0.020    | 0.020    | 0.013   | 0.022    | (0.018)  | (0.0022) | (72.6)  | 60 x 6             | cc                 |                  |                    |                  |   |
|   | 45 X ZnAl2A  | 36.1     | 2.58    | 0.20   | 0.048   | 0.008    | 0.010    | 0.007   | 0.025    | (0.009)  | (0.0034) | (60.9)  | 60 x 6             |                    |                  |                    |                  |   |
|   | 45 X ZnAl3A  | 45.8     | 1.00    | 0.127  | 0.021   | 0.003    | 0.0046   | 0.003   | 0.0087   | (0.006)  | (0.0006) | (53.0)  | 60 x 6             |                    |                  |                    |                  |   |
|   | 45 X ZnAl4A  | 54.65    | 0.67    | 0.095  | 0.013   | 0.0023   | 0.003    | <0.0005 | 0.0038   | (0.0023) | (0.0002) | (44.5)  | 60 x 6             |                    |                  |                    |                  |   |
|   | 45 X ZnAl5A  | 40.8     | 1.88    | 0.050  | 0.0035  | (0.0024) | 0.004    | 0.030   | 0.003    | (0.009)  | (0.005)  | (57.0)  | 60 x 6             |                    |                  |                    |                  |   |





# 5. Aluminium Base

Blocks/Discs

| 5.1 High Purity         |              | All Elements ppm |          |         |        |          |          |         |          |         |         |         |         |         |         |          |          |                |           |
|-------------------------|--------------|------------------|----------|---------|--------|----------|----------|---------|----------|---------|---------|---------|---------|---------|---------|----------|----------|----------------|-----------|
|                         |              | Ag               | As       | B       | Ba     | Be       | Bi       | Ca      | Cd       | Ce      | Co      | Cr      | Cu      | Fe      | Ga      | Hg       | In       | La             |           |
|                         | 51 S HP1000  | <0.5             | ...      | <0.05   | <0.01  | <0.01    | <0.1     | 0.1     | <0.1     | ...     | <0.1    | 0.3     | 0.2     | 0.2     | <0.1    | ...      | <0.1     | ...            |           |
|                         | 51 S HP2000  | <1               | ...      | <1      | <1     | 4.4      | (<1)     | 2.6     | <1       | ...     | <1      | 4.5     | 5.3     | 6.6     | 4.9     | ...      | <1       | ...            |           |
|                         | 51 S HP3000  | 5.1              | ...      | 5.4     | 0.7    | <1       | 8.1      | <1      | 4.9      | ...     | 4.9     | <1      | 6.6     | 6.2     | <1      | ...      | 4.8      | ...            | continued |
|                         | 51 S HP4000  | <1               | ...      | <1      | <1     | 27.0     | <1       | 25.0    | <1       | ...     | <1      | 29.0    | 31.0    | 39.0    | 28.0    | ...      | <1       | ...            |           |
|                         | 51 S HP5000  | 30               | ...      | 33      | 6.6    | <1       | 48       | 1       | 30       | ...     | 29      | <1      | 42.0    | 37.0    | (1.0)   | ...      | 28       | ...            |           |
|                         | 51 ZA 113/03 | ...              | ...      | 100     | ...    | <1       | 5        | 1       | <2       | ...     | 5       | <1      | 2       | 40      | <1      | ...      | ...      | ...            |           |
|                         | 51 ZA 114/02 | ...              | ...      | 210     | ...    | <1       | 10       | 1       | 33       | ...     | 9       | 5       | 12      | 55      | 3       | ...      | ...      | ...            |           |
|                         | 51 ZA 115/02 | 10               | ...      | 6       | <1     | <1       | 15       | <1      | 22       | ...     | 31      | 27      | 41      | 67      | 21      | ...      | 20       | ...            | continued |
|                         | 51 ZA 116/03 | 20               | 13       | 3       | <1     | 4        | 16       | <1      | 10       | 7       | 20      | 52      | 71      | 115     | 23      | 41       | 21       | 13             |           |
|                         | 51 ZA 117/01 | ...              | ...      | 18      | 1      | 4        | 19       | 3.5     | 7        | 22      | 16      | 12      | 23      | 153     | 12      | ...      | ...      | 12             |           |
|                         | 51 ZA 122/04 | 145              | 53       | 0.4     | (53)   | (8)      | 152      | (10)    | 53       | 100     | 150     | 180     | 170     | 590     | 250     | 96       | 154      | 130            | continued |
| Continuation from above |              | All Elements ppm |          |         |        |          |          |         |          |         |         |         |         |         |         |          |          | Size (mm)      |           |
|                         |              | Li               | Mg       | Mn      | Na     | Ni       | P        | Pb      | Sb       | Si      | Sn      | Sr      | Ti      | V       | Zn      | Zr       |          |                |           |
|                         | 51 S HP1000  | <0.1             | 0.2      | 0.04    | <0.5   | <0.1     | <0.2     | 0.1     | <0.5     | 0.6     | <0.1    | <0.01   | 0.5     | 0.05    | 0.5     | <0.01    |          |                |           |
|                         | 51 S HP2000  | <1               | 2.7      | 5.4     | 8.8    | 5.0      | <2       | <1      | <2       | 5.4     | <1      | <1      | 5.3     | 5.2     | 5.0     | 5.2      |          |                |           |
|                         | 51 S HP3000  | 1.0              | <1       | <1      | <1     | <1       | 0.6      | 9.0     | 4.2      | 5.1     | 4.5     | 1.8     | <1      | <1      | <2      | <1       |          |                |           |
|                         | 51 S HP4000  | <1               | 26.0     | 31.0    | 13.0   | 29.0     | <2       | <1      | <2       | 36      | <1      | <1      | 31.0    | 31.0    | 32.0    | 30.0     |          |                |           |
|                         | 51 S HP5000  | <1               | <2       | <1      | 0.9    | <1       | 2.2      | 54      | 25       | 35      | 27      | 2.4     | <1      | <1      | <5      | <1       |          |                |           |
|                         | 51 ZA 113/03 | <0.5             | 4        | <1      | <1     | <1       | 7        | 7       | 7        | 12      | 5       | ...     | <1      | 6       | 2       | 6        |          |                | cc        |
|                         | 51 ZA 114/02 | <0.5             | 15       | 27      | <1     | 5        | 11       | 14      | 12       | 33      | 10      | ...     | 5       | 12      | 13      | 11       |          |                |           |
|                         | 51 ZA 115/02 | 1                | 40       | 33      | <1     | 32       | 10       | 10      | 11       | 70      | 10      | <1      | 6       | 10      | 34      | 25       |          |                |           |
|                         | 51 ZA 116/03 | 0.7              | 37       | 52      | <1     | 50       | 20       | 15      | 32       | 117     | 22      | <1      | 17      | 23      | 56      | 15       |          |                |           |
|                         | 51 ZA 117/01 | (2)              | 19       | 12      | (7)    | 12       | 15       | 20      | 17       | 148     | 20      | 2       | 0       | 24      | 12      | 26       |          |                |           |
|                         | 51 ZA 122/04 | (8)              | 200      | 160     | (47)   | 175      | 70       | 81      | 99       | 380     | 100     | <1      | 180     | 175     | 185     | 150      |          |                | cc        |
| 5.1.1 Residuals in Al   |              |                  |          |         |        |          |          |         |          |         |         |         |         |         |         |          |          | Size (mm)      |           |
|                         |              | Cu               | Mg       | Si      | Fe     | Mn       | Ni       | Zn      | Pb       | Sn      | Ti      | Cr      | Ga      | V       | Zr      | Be       | Others   |                |           |
| CRM                     | 51 X G00H1D  | 0.0132           | 0.054    | 0.143   | 0.835  | 0.0074   | 0.230    | 0.249   | 0.0021   | 0.097   | 0.0135  | 0.0062  | ...     | 0.0080  | 0.0008  | ...      | Bi 0.024 | 40x15 or 50x20 | c         |
|                         | 51 X G00H2D  | 0.18             | 0.05     | 0.45    | 0.4    | 0.20     | 0.11     | 0.18    | 0.15     | 0.01    | 0.10    | 0.08    | ...     | ...     | ...     | ...      | ...      | 40 x 15        |           |
|                         | 51 X G00H3C  | 0.29             | <0.01    | 0.75    | 0.2    | 0.4      | <0.01    | 0.03    | 0.06     | 0.08    | <0.01   | 0.12    | ...     | ...     | ...     | ...      | ...      | 40 x 15        |           |
| CRM                     | 51 X G00H4A  | 0.035            | 0.039    | 0.12    | 0.052  | 0.041    | 0.039    | 0.042   | 0.018    | 0.028   | 0.031   | 0.027   | ...     | 0.016   | ...     | 0.0004   | ...      | continued      |           |
| CRM                     | 51 X G00H5A  | 0.173            | 0.088    | 0.61    | 0.49   | 0.303    | 0.206    | 0.219   | 0.116    | 0.122   | 0.136   | 0.100   | ...     | 0.070   | ...     | 0.0024   | ...      | continued      |           |
|                         | 51 S NDC4    | 0.0005           | 0.495    | 0.423   | 0.197  | 0.0005   | 0.0002   | 0.0004  | <0.0001  | <0.0001 | 0.0003  | 0.0001  | 0.0002  | 0.0002  | <0.0001 | <0.0001  | ...      | continued      |           |
|                         | 51 S NDC5    | 0.0021           | 0.582    | 0.527   | 0.3    | 0.0017   | 0.001    | 0.0012  | 0.0013   | 0.0018  | 0.0005  | 0.0013  | 0.0044  | 0.001   | 0.0008  | 0.0004   | ...      | continued      |           |
|                         | 51 S NDC7    | 0.0041           | 0.398    | 0.209   | 0.298  | 0.0055   | 0.0046   | 0.0052  | 0.0007   | 0.0012  | 0.016   | 0.0045  | 0.01    | 0.0052  | 0.044   | 0.0001   | ...      | continued      |           |
|                         | 51 ZA 133/02 | 0.0105           | 0.0058   | 0.050   | 0.20   | 0.0115   | 0.021    | 0.021   | 0.0015   | 0.0012  | 0.0130  | 0.020   | 0.031   | 0.023   | 0.0048  | 0.00020  | ...      | continued      |           |
|                         | 51 ZA 135/02 | 0.020            | 0.020    | 0.052   | 0.29   | 0.020    | 0.016    | 0.0080  | 0.0023   | 0.0052  | 0.023   | 0.015   | 0.013   | 0.0062  | 0.0050  | ...      | ...      | continued      |           |
|                         | 51 ZA 136/02 | 0.050            | 0.040    | 0.24    | 0.36   | 0.050    | 0.031    | 0.041   | 0.0024   | 0.0022  | 0.032   | 0.032   | 0.020   | 0.0340  | 0.0090  | 0.0005   | ...      | continued      |           |
|                         | 51 ZA 141/01 | 0.020            | 0.0110   | 0.41    | 0.40   | 0.022    | 0.0060   | 0.0140  | 0.010    | 0.010   | <0.001  | 0.0040  | ...     | 0.0010  | ...     | ...      | ...      | continued      |           |
|                         | 51 ZA 142/02 | 0.040            | 0.044    | 0.50    | 0.49   | 0.042    | 0.041    | 0.083   | 0.0052   | 0.0039  | 0.043   | 0.045   | (0.010) | 0.038   | 0.0090  | ...      | ...      | continued      |           |
|                         | 51 ZA 143/04 | 0.0028           | 0.0060   | 0.150   | 0.62   | 0.0069   | 0.0020   | 0.0136  | 0.0032   | 0.0030  | 0.0019  | 0.020   | 0.014   | 0.0030  | 0.0048  | 0.00010  | ...      | continued      |           |
|                         | 51 ZA 144/01 | 0.20             | 0.160    | 0.65    | 0.73   | 0.100    | 0.022    | 0.055   | 0.0600   | 0.0050  | 0.053   | 0.034   | ...     | 0.036   | 0.007   | ...      | ...      | continued      |           |
|                         | 51 ZA 145/01 | 0.150            | 0.059    | 0.81    | 0.86   | 0.050    | 0.010    | 0.033   | 0.0030   | 0.0023  | 0.012   | 0.010   | ...     | 0.024   | 0.0030  | ...      | ...      | continued      |           |
| CRM                     | 51 DB 310    | 0.00169          | 0.994    | 0.0797  | 0.0705 | 0.00307  | 0.00244  | 0.0086  | 0.00347  | 0.00238 | 0.00301 | 0.00090 | 0.01152 | 0.00444 | 0.00135 | 0.000128 | ...      | continued      |           |
| CRM                     | 51 DB 312    | 0.0419           | 0.410    | 0.415   | 0.185  | 0.0416   | 0.00452  | 0.0290  | 0.00439  | (0.002) | 0.0288  | 0.0276  | 0.0115  | 0.00615 | 0.00101 | ...      | ...      | continued      |           |
| Continuation from above |              |                  |          |         |        |          |          |         |          |         |         |         |         |         |         |          |          | Size (mm)      |           |
|                         |              | Ca               | Co       | Bi      | Ba     | Li       | Na       | Sr      | B        | Cd      | Sb      | Ag      |         |         |         |          |          |                |           |
|                         | 51 X G00H4A  | ...              | 0.012    | 0.011   | ...    | ...      | ...      | ...     | ...      | ...     | <0.005  | ...     |         |         |         |          |          | 40 x 15        | c         |
|                         | 51 X G00H5A  | ...              | 0.079    | 0.062   | ...    | ...      | ...      | ...     | ...      | ...     | 0.057   | ...     |         |         |         |          |          | 40 x 15        |           |
|                         | 51 S NDC4    | <0.0001          | <0.0001  | <0.0001 | 0.0003 | <0.0001  | <0.0001  | <0.0001 | 0.0001   | ...     | ...     | ...     |         |         |         |          |          | 50-60 x 25     |           |
|                         | 51 S NDC5    | 0.0003           | 0.0004   | 0.0009  | 0.001  | 0.0002   | 0.0005   | 0.0004  | 0.0006   | ...     | ...     | ...     |         |         |         |          |          | 50-60 x 25     |           |
|                         | 51 S NDC7    | 0.0001           | 0.0002   | 0.0004  | 0.0008 | 0.0002   | 0.0003   | 0.0008  | 0.0022   | ...     | ...     | ...     |         |         |         |          |          | 50-60 x 25     |           |
|                         | 51 ZA 133/02 | 0.00010          | <0.0001  | 0.00010 | ...    | 0.00003  | 0.0007   | <0.0001 | 0.00005  | 0.0010  | 0.0010  | ...     |         |         |         |          |          | 60 x 25        | c         |
|                         | 51 ZA 135/02 | ...              | 0.0010   | 0.0020  | ...    | ...      | ...      | ...     | ...      | ...     | ...     | ...     |         |         |         |          |          | 60 x 25        |           |
|                         | 51 ZA 136/02 | 0.00025          | <0.0001  | 0.00010 | ...    | 0.00003  | ...      | <0.0001 | 0.0002   | 0.00050 | 0.0020  | ...     |         |         |         |          |          | 60 x 25        |           |
|                         | 51 ZA 141/01 | ...              | 0.0090   | ...     | ...    | ...      | ...      | ...     | 0.0150   | ...     | 0.010   | ...     |         |         |         |          |          | 60 x 25        | c         |
|                         | 51 ZA 142/02 | ...              | 0.00010  | ...     | ...    | ...      | ...      | ...     | ...      | ...     | 0.0046  | ...     |         |         |         |          |          | 60 x 25        |           |
|                         | 51 ZA 143/04 | <0.0001          | ...      | ...     | ...    | 0.00010  | (0.0003) | ...     | ...      | ...     | ...     | ...     |         |         |         |          |          | 60 x 25        |           |
|                         | 51 ZA 144/01 | ...              | ...      | ...     | ...    | ...      | ...      | ...     | ...      | ...     | ...     | 0.010   |         |         |         |          |          | 60 x 25        |           |
|                         | 51 ZA 145/01 | ...              | ...      | ...     | ...    | ...      | ...      | ...     | ...      | ...     | ...     | ...     |         |         |         |          |          | 60 x 25        |           |
|                         | 51 DB 310    | 0.00073          | (0.0009) | ...     | ...    | 0.000366 | (0.0003) | ...     | (0.0006) | 0.00237 | ...     | ...     |         |         |         |          |          | 60 x 25        |           |
|                         | 51 DB 312    | ...              | ...      | 0.0023  | ...    | ...      | ...      | 0.00082 | ...      | 0.00226 | ...     | ...     |         |         |         |          |          | 60 x 25        |           |

# 5. Aluminium Base

Blocks/Discs

| 5.4 Al/Si  |              | Cu       | Mg        | Si        | Fe        | Mn        | Ni        | Zn       | Pb        | Sn        | Ti        | Cr     | V        | Be        | Others              | Typical Alloy Type | Size (mm)<br>Ø H         |                  |   |
|--|--------------|----------|-----------|-----------|-----------|-----------|-----------|----------|-----------|-----------|-----------|--------|----------|-----------|---------------------|--------------------|--------------------------|------------------|---|
| CRM  | 54 X G25D1L  | 0.010    | 0.67      | 3.37      | 0.721     | 0.815     | 0.262     | 0.359    | (0.0033)  | <0.005    | 0.099     | 0.140  | 0.016    | 0.0011    | Bi 0.112            |                    | 40x15 or 50x20           | c                |   |
| CRM  | 54 X G25D2K  | 0.130    | 0.59      | 3.93      | 0.576     | 0.479     | 0.139     | 0.169    | 0.073     | 0.042     | 0.152     | 0.150  | (0.006)  | 0.049     | Co, Bi, Cd          | LM 8               | 40x15 or 50x20           |                  |   |
| CRM  | 54 X G25D3R  | 0.117    | 0.208     | 5.97      | 0.454     | 0.289     | 0.111     | 0.092    | 0.074     | 0.054     | 0.078     | 0.061  | 0.011    | 0.0032    | Ga 0.016            | LM 16              | 40x15 or 50x20           |                  |   |
| CRM  | 54 X G25D4M  | 0.162    | 0.075     | 7.34      | 0.125     | 0.093     | 0.098     | 0.111    | 0.160     | 0.092     | 0.09      | 0.020  | (0.0022) | 0.019     | Co, Bi, Cd          | LM 18              | 40x15 or 50x20           |                  |   |
| CRM  | 54 X G25D5L  | 0.273    | (0.0011)  | 8.14      | 0.191     | (0.0046)  | 0.0082    | 0.020    | 0.273     | 0.130     | 0.0068    | 0.0097 | (0.0025) | 0.022     | Co 0.0024           | LM 25              | 40x15 or 50x20           |                  |   |
| CRM  | 54 X G06H1R  | 0.630    | 0.489     | 8.43      | 1.08      | 0.022     | 0.611     | 0.60     | 0.082     | 0.133     | 0.248     | 0.084  | 0.01     | ...       | Co, Bi, Cd          |                    | 40x15 or 50x20           | c                |   |
| CRM  | 54 X G06H2S  | 0.54     | 0.40      | 10.19     | 0.640     | 0.234     | 0.55      | 0.47     | 0.213     | 0.116     | 0.179     | 0.130  | 0.018    | ...       | Co 0.0086, Bi 0.027 |                    | 40x15 or 50x20           |                  |   |
| CRM  | 54 X G06H3N  | 0.327    | 0.179     | 11.27     | 0.500     | 0.445     | 0.295     | 0.072    | 0.065     | 0.050     | 0.084     | 0.069  | 0.010    | ...       | Co, Ga, Cd          | LM 6               | 40x15 or 50x20           |                  |   |
| CRM  | 54 X G06H4Q  | 0.237    | 0.134     | 13.21     | 0.138     | 0.691     | 0.139     | 0.131    | 0.040     | (0.007)   | 0.124     | 0.120  | 0.011    | ...       | Co 0.207            | LM 9               | 40x15 or 50x20           |                  |   |
| CRM  | 54 X G06H5L  | 0.0229   | (0.0022)  | 13.76     | 0.210     | 0.85      | 0.0067    | 0.225    | (0.0020)  | 0.022     | 0.0106    | 0.026  | 0.008    | ...       | Co <0.0005          | LM 20              | 40x15 or 50x20           |                  |   |
| CRM  | 54 X G13H1N  | 1.87     | 2.89      | 8.91      | 0.801     | 0.0137    | 1.83      | 0.37     | 0.240     | 0.260     | 0.112     | 0.062  | ...      | 0.0078    | Co 0.0051           |                    | 40x15 or 50x20           | c                |   |
| CRM  | 54 X G13H2M  | 1.29     | 1.37      | 10.42     | 0.767     | 0.248     | 1.15      | 0.530    | 0.083     | 0.145     | 0.166     | 0.103  | ...      | ...       | Co 0.004            |                    | 40x15 or 50x20           |                  |   |
| CRM  | 54 X G13H3M  | 0.82     | 0.89      | 10.2      | 0.79      | 0.43      | 0.95      | 0.42     | 0.050     | 0.092     | 0.152     | 0.060  | ...      | 0.0075    | Co 0.009            | LM 13              | 40x15 or 50x20           |                  |   |
| CRM  | 54 X G13H4N  | 0.643    | 0.78      | 12.55     | 0.405     | 0.617     | 0.84      | 0.251    | 0.055     | 0.068     | 0.083     | 0.0264 | ...      | 0.0047    | Zr, Sb, Sr          |                    | 40x15 or 50x20           |                  |   |
|  | 54 X G13H5K  | 0.39     | 0.35      | 13.0      | 0.29      | 0.80      | 0.41      | 0.02     | 0.02      | 0.009     | 0.044     | <0.01  | ...      | ...       |                     |                    | 40 x 15                  |                  |   |
| CRM  | 54 X G231H1C | 1.19     | 0.45      | 9.82      | 0.80      | 0.029     | 0.31      | 0.60     | 0.145     | 0.082     | 0.022     | 0.089  | ...      | (0.0002)  |                     |                    | 40x15 or 50x20           | c                |   |
|  | 54 X G231H2B | 0.91     | 0.20      | 11.6      | 0.84      | 0.27      | 0.20      | 0.47     | 0.13      | 0.13      | 0.07      | 0.05   | ...      | ...       |                     |                    | 40 x 15                  |                  |   |
|  | 54 X G231H3B | 0.43     | 0.08      | 13.5      | 0.63      | 0.55      | 0.11      | 0.26     | <0.01     | 0.01      | 0.12      | 0.10   | ...      | ...       |                     | 231.0              | 40 x 15                  |                  |   |
|  | 54 X G231H4B | 0.24     | 0.03      | 13.7      | 0.34      | 0.65      | 0.01      | 0.13     | 0.05      | 0.07      | 0.18      | 0.01   | ...      | ...       |                     | A413               | 40 x 15                  |                  |   |
| CRM  | 54 X GS20J1E | 0.308    | 0.186     | 18.8      | 0.79      | 0.097     | 0.159     | 0.43     | 0.120     | 0.130     | 0.129     | 0.115  | ...      | (0.00012) |                     |                    | 40x15 or 50x20           | c                |   |
| CRM  | 54 X GS20J2E | 0.168    | 0.178     | 18.7      | 0.56      | 0.059     | 0.091     | 0.305    | 0.066     | 0.075     | 0.082     | 0.066  | ...      | <0.0001   |                     |                    | 40x15 or 50x20           |                  |   |
| CRM  | 54 X GS20J3D | 0.079    | 0.118     | 23.9      | 0.328     | 0.302     | (0.003)   | 0.030    | 0.077     | (0.012)   | 0.0055    | 0.0017 | ...      | <0.0001   |                     |                    | 40x15 or 50x20           |                  |   |
| CRM  | 54 X GS20J4D | (0.0037) | 0.0050    | 25.5      | 0.227     | 0.146     | 0.265     | 0.224    | 0.0014    | (0.0021)  | 0.107     | 0.194  | ...      | 0.0017    |                     |                    | 40x15 or 50x20           |                  |   |
| <b>Ga</b>  |              |          |           |           |           |           |           |          |           |           |           |        |          |           |                     |                    |                          |                  |   |
|  | 54 ZA 411/03 | 0.0112   | 0.0125    | 9.54      | 0.094     | 0.0241    | 0.0112    | 0.0126   | 0.0050    | 0.0050    | 0.0142    | 0.0119 | 0.0132   | ...       | ...                 |                    |                          |                  |   |
|  | 54 ZA 414/04 | 0.103    | 0.544     | 11.90     | 0.43      | 0.25      | 0.013     | 0.100    | 0.0022    | 0.0015    | 0.071     | 0.011  | 0.013    | ...       | ...                 |                    | continued                |                  |   |
|  | 54 ZA 415/03 | 0.054    | 0.500     | 12.80     | 0.180     | 0.096     | 0.050     | 0.036    | 0.051     | 0.048     | 0.055     | 0.0300 | 0.020    | ...       | 0.0088              |                    |                          |                  |   |
| <b>Continuation from above</b>   |              |          |           |           |           |           |           |          |           |           |           |        |          |           |                     |                    |                          |                  |   |
|  |              |          | <b>Ca</b> | <b>Na</b> | <b>Sr</b> | <b>Zr</b> | <b>Sb</b> | <b>P</b> | <b>Co</b> | <b>Bi</b> | <b>Cd</b> |        |          |           |                     |                    | <b>Size (mm)<br/>Ø H</b> |                  |   |
|  | 54 ZA 411/03 |          | 0.00054   | 0.0047    | ...       | 0.0095    | ...       | 0.0020   | ...       | ...       | ...       |        |          |           |                     |                    | 60 x 25                  |                  |   |
|  | 54 ZA 414/04 |          | 0.0030    | 0.00010   | 0.054     | 0.010     | 0.0026    | 0.0021   | ...       | ...       | ...       |        |          |           |                     |                    | 60 x 25                  |                  |   |
|  | 54 ZA 415/03 |          | 0.018     | (0.007)   | 0.0006    | ...       | 0.017     | 0.0020   | 0.050     | 0.0084    | ...       |        |          |           |                     |                    | 60 x 25                  |                  |   |
| 5.5 Al/Si/Cu   |              | Cu       | Mg        | Si        | Fe        | Mn        | Ni        | Zn       | Pb        | Sn        | Ti        | Cr     | Li       | Co        | V                   | Others             | Typical Alloy Type       | Size (mm)<br>Ø H |   |
|  | 55 X G900J1E | 1.02     | 0.94      | 0.14      | 0.81      | 0.008     | 0.005     | 0.26     | 0.35      | 0.32      | <0.005    | 0.002  | ...      | ...       | ...                 |                    |                          | 40x15 or 50x20   | c |
| CRM  | 55 X G900J2F | 0.86     | 0.62      | 0.44      | 0.38      | 0.145     | 0.133     | 0.309    | 0.52      | 0.34      | 0.054     | 0.118  | ...      | ...       | ...                 | Bi 0.55            | HE 9                     | 40x15 or 50x20   |   |
|  | 55 X G900J3F | 0.41     | 0.38      | 0.82      | 0.29      | 0.56      | 0.21      | 0.39     | 0.14      | 0.15      | 0.16      | 0.25   | ...      | 0.070     | ...                 |                    | HE 20                    | 40x15 or 50x20   |   |
| CRM  | 55 X G900J4F | 0.249    | 0.459     | 1.39      | 0.306     | 0.75      | 0.351     | 0.149    | 0.088     | 0.153     | 0.171     | 0.343  | ...      | ...       | (0.010)             | Bi 0.285           | HE 30                    | 40x15 or 50x20   |   |
|  | 55 X G900J5E | 0.024    | 0.009     | 1.65      | 0.18      | 1.16      | 0.41      | 0.023    | 0.014     | 0.006     | 0.33      | 0.46   | ...      | ...       | ...                 |                    |                          | 40x15 or 50x20   |   |
| CRM  | 55 X G04H6E  | 5.56     | 0.151     | 3.30      | 0.83      | 0.028     | 0.77      | 0.199    | 0.221     | 0.181     | 0.126     | 0.126  | 0.019    | 0.0024    | 0.014               | Bi, Cd             |                          | 40x15 or 50x20   | c |
| CRM  | 55 X G04H7E  | 4.65     | 0.263     | 4.43      | 0.633     | 0.212     | 0.500     | 0.537    | 0.227     | 0.174     | 0.0476    | 0.035  | 0.0066   | 0.030     | 0.0057              | Bi, Sb, Cd         |                          | 40x15 or 50x20   |   |
| CRM  | 55 X G04H8H  | 3.34     | 0.17      | 5.39      | 0.663     | 0.410     | 0.35      | 1.28     | 0.166     | 0.075     | 0.18      | 0.051  | ...      | 0.021     | 0.0105              | Cd 0.0056          | LM 4                     | 40x15 or 50x20   |   |
| CRM  | 55 X G04H9D  | 2.62     | 0.078     | 6.00      | 0.303     | 0.301     | 0.229     | 1.89     | 0.063     | 0.030     | 0.31      | 0.005  | ...      | 0.010     | 0.008               | Cd 0.0015          | LM 21                    | 40x15 or 50x20   |   |
| CRM  | 55 X G04H10D | 1.36     | 0.004     | 7.21      | 0.512     | 0.532     | 0.0232    | 2.26     | (0.0074)  | <0.01     | 0.0097    | 0.090  | ...      | 0.043     | 0.008               | Bi, Ga             | LM 22                    | 40x15 or 50x20   |   |
|  | 55 ML SS-308 | 4.50     | 0.08      | 5.50      | 0.65      | 0.10      | 0.10      | 0.25     | ...       | ...       | 0.06      | <0.005 | ...      | ...       | ...                 | Sr 0.02            |                          | 64 x 25          | c |
|  | 55 ML SS-319 | 3.80     | 0.10      | 6.20      | 0.85      | 0.40      | 0.20      | 0.35     | 0.20      | 0.20      | 0.15      | 0.01   | ...      | ...       | 0.02                | Sr, Bi             |                          | 64 x 25          |   |
|  | 55 ML SS-332 | 3.20     | 1.00      | 9.20      | 0.70      | 0.25      | 0.50      | 0.25     | 0.10      | 0.10      | 0.14      | <0.005 | ...      | ...       | 0.02                | Sr 0.02            |                          | 64 x 25          |   |
|  | 55 ML SS-336 | 1.00     | 1.20      | 12.00     | 0.65      | 0.06      | 2.50      | 0.05     | ...       | ...       | 0.04      | <0.005 | ...      | ...       | ...                 | Sr, P              |                          | 64 x 25          |   |
|  | 55 ML SS-390 | 4.50     | 0.60      | 16.50     | 0.90      | 0.25      | 0.10      | 0.50     | 0.08      | 0.08      | 0.10      | 0.05   | ...      | ...       | ...                 | Sr <0.005          |                          | 64 x 25          |   |
| Note: all values given for this series are nominal. Exact values will be given on the certificate. |              |          |           |           |           |           |           |          |           |           |           |        |          |           |                     |                    |                          |                  |   |
|  | 55 X G26H1F  | 4.34     | 0.29      | 7.69      | 1.78      | 0.015     | 0.012     | 1.14     | 0.24      | (0.008)   | 0.21      | 0.20   | ...      | 0.022     | 0.012               | Bi 0.07            |                          | 40x15 or 50x20   | c |
| CRM  | 55 X G26H2F  | 4.14     | 1.49      | 9.36      | 0.71      | 0.52      | 0.41      | 0.64     | 0.111     | 0.110     | 0.120     | 0.083  | ...      | 0.052     | 0.011               | Bi 0.035           |                          | 40x15 or 50x20   |   |
|  | 55 X G26H3F  | 2.19     | 1.01      | 9.6       | 1.07      | 0.45      | 0.51      | 0.79     | 0.23      | 0.16      | 0.147     | 0.130  | 0.006    | 0.076     | 0.020               | Ga 0.011           | LM 26                    | 40x15 or 50x20   |   |
| CRM  | 55 X G26H4D  | 3.75     | 1.65      | 10.33     | 0.51      | 0.165     | 0.895     | 0.285    | 0.123     | 0.234     | 0.295     | 0.062  | ...      | 0.003     | 0.018               | Bi 0.025           |                          | 40x15 or 50x20   |   |
|  | 55 X G26H5D  | 1.41     | 1.48      | 10.7      | 0.21      | 0.58      | 1.28      | 0.02     | (0.005)   | 0.073     | (0.005)   | 0.029  | ...      | ...       | ...                 |                    |                          | 40 x 15          |   |
| CRM  | 55 X G02D6J  | 0.487    | 0.336     | 12.3      | 1.27      | 0.65      | 0.027     | 0.083    | 0.46      | <0.005    | 0.34      | 0.035  | 0.0055   | 0.018     | ...                 | Ca 0.006           | LM 2                     | 40x15 or 50x20   | c |
| CRM  | 55 X G02D7K  | 1.59     | 0.52      | 10.74     | 0.90      | 0.45      | 0.249     | 0.614    | 0.219     | 0.046     | 0.160     | 0.094  | <0.001   | 0.093     | 0.007               | Be, Bi             |                          | 40x15 or 50x20   |   |
| CRM  | 55 X G02D8H  | 2.26     | 0.205     | 9.91      | 0.94      | 0.453     | 0.366     | 1.29     | 0.335     | 0.186     | 0.240     | 0.0527 | <0.001   | 0.058     | 0.024               | Be 0.0008          | LM 24                    | 40x15 or 50x20   |   |
| CRM  | 55 X G02D9H  | 3.42     | 0.206     | 8.61      | 0.81      | 0.114     | 0.62      | 2.46     | 0.106     | 0.177     | 0.091     | 0.109  | (0.008)  | 0.053     | 0.0059              | Be, Ga             |                          | 40x15 or 50x20   |   |
| CRM  | 55 X G02D10K | 4.68     | (0.006)   | 6.52      | 0.178     | 0.015     | 0.95      | 4.80     | (0.0034)  | 0.87      | (0.0020)  | 0.162  | ...      | 0.059     | ...                 | Be, Bi             |                          | 40x15 or 50x20   |   |
| CRM  | 55 X A30J1H  | 5.75     | 1.03      | 14.6      | 1.07      | 0.132     | 0.014     | 0.233    | 0.135     | 0.006     | 0.194     | 0.031  | ...      | 0.091     | 0.0114              | Be, Bi             |                          | 40x15 or 50x20   | c |
| CRM  | 55 X A30J2K  | 4.51     | 0.554     | 14.9      | 1.27      | 0.160     | 0.008     | 0.360    | 0.014     | 0.134     | 0.110     | 0.0071 | ...      | 0.196     | 0.0064              | Be 0.0058          | LM 30                    | 40x14 or 50x18   |   |
| CRM  | 55 X A30J3J  | 4.02     | 0.31      | 16.5      | 0.29      | 0.259     | 0.072     | 0.048    | 0.018     | 0.083     | 0.144     | 0.037  | ...      | 0.194     | 0.006               | Be, Bi             |                          | 40x15 or 50x20   |   |
| CRM  | 55 X A30J4G  | 3.22     | 0.50      | 16.5      | 0.515     | 0.355     | 0.162     | 0.065    | 0.025     | 0.018     | 0.023     | 0.075  | ...      | 0.002     | 0.020               | P (0.003)          |                          |                  |   |

# 5. Aluminium Base

Blocks/Discs

| 5.5 Al/Si/Cu (continued)   |               | Cu      | Mg      | Si    | Fe     | Mn     | Ni     | Zn      | Pb       | Sn      | Ti      | Cr      | Co      | V       | Others                 | Typical Alloy Type | Size (mm)<br>Ø H   |                  |   |
|--|---------------|---------|---------|-------|--------|--------|--------|---------|----------|---------|---------|---------|---------|---------|------------------------|--------------------|--------------------|------------------|---|
| CRM  | 55 X G28J1Z   | 1.82    | 1.26    | 14.33 | 0.678  | 0.024  | 2.47   | 0.258   | 0.0036   | 0.182   | 0.104   | 0.319   | 0.119   | 0.0095  | P (0.0048)             |                    | 40x15 or 50x20     | c                |   |
|  | 55 X G28J2S   | 1.56    | 0.99    | 17.5  | 0.49   | 0.38   | 1.81   | 0.32    | 0.081    | 0.058   | 0.07    | 0.26    | 0.35    | 0.012   | Be 0.0042              | LM 28              | 40x15 or 50x20     |                  |   |
|  | 55 X G28J3U   | 1.45    | 1.30    | 21.6  | 0.43   | 0.33   | 1.47   | 0.30    | 0.07     | 0.11    | 0.07    | 0.09    | ...     | ...     |                        | LM 29              | 40x15 or 50x20     |                  |   |
| CRM  | 55 X G28J4S   | 1.07    | 0.60    | 19.2  | 0.124  | 0.615  | 1.17   | 0.040   | 0.108    | 0.062   | 0.03    | 0.139   | 0.032   | ...     | B (0.005)              |                    | 40x15 or 50x20     |                  |   |
| CRM  | 55 X G28J4T   | 0.82    | 0.60    | 20.4  | 0.52   | 0.45   | 0.84   | 0.32    | 0.094    | 0.041   | 0.28    | 0.040   | 0.079   | 0.010   |                        |                    | 40x15 or 50x20     |                  |   |
|  | 55 X G28J5Y   | 0.69    | 0.73    | 27.6  | 0.26   | 0.67   | 0.43   | 0.015   | 0.18     | 0.03    | 0.24    | 0.009   | ...     | ...     |                        |                    | 40 x 15            |                  |   |
| CRM  | 55 X G28J6A   | (0.035) | (0.032) | 27.15 | (0.26) | (0.12) | <0.01  | (0.052) | (0.008)  | <0.002  | (0.024) | (0.006) | ...     | ...     | Sr (0.038), Ca (0.007) |                    | 65 x 30            | sc               |   |
|  |               | Cu      | Mg      | Si    | Fe     | Mn     | Ni     | Zn      | Pb       | Sn      | Ti      | Cr      | V       | Zr      | Ga                     | Ca                 | P                  | Size (mm)<br>Ø H |   |
|  | 55 ZA 471/02  | 4.90    | 0.637   | 15.8  | 0.84   | 0.113  | 0.102  | 0.115   | 0.054    | 0.053   | 0.178   | 0.052   | 0.077   | 0.058   | 0.0098                 | 0.0050             | 0.0019             | 60 x 25          | c |
|  | 55 ZA 472/02  | 4.02    | 0.344   | 17.7  | 1.43   | 0.321  | 0.498  | 0.321   | 0.117    | 0.094   | 0.103   | 0.035   | 0.057   | 0.0192  | 0.0113                 | 0.0070             | 0.0022             | 60 x 25          |   |
|  | 55 ZA 473/02  | 0.96    | 1.08    | 19.6  | 0.194  | 0.062  | 1.20   | 0.51    | 0.086    | 0.29    | 0.059   | 0.013   | 0.020   | 0.0076  | 0.008                  | 0.0020             | 0.0043             | 60 x 25          |   |
|  | 55 ZA 475/01  | 0.59    | 0.86    | 23.0  | 0.72   | 0.11   | 2.21   | 0.060   | 0.0010   | 0.010   | 0.111   | 0.012   | 0.070   | 0.0012  | ...                    | ...                | 0.0039             | 60 x 25          |   |
| CRM  | 55 DB 306     | 2.636   | 0.293   | 8.57  | 1.140  | 0.330  | 0.296  | 0.887   | 0.180    | 0.096   | 0.152   | ...     | ...     | ...     | ...                    | ...                | ...                | 60 x 25          |   |
| CRM  | 55 DB 314     | 2.071   | 0.1805  | 11.49 | 0.757  | 0.400  | 0.221  | 1.195   | 0.221    | 0.199   | 0.1638  | 0.0517  | 0.0192  | 0.00552 | 0.0154                 | ...                | ...                | 60 x 25          |   |
| 5.6 Al/Cu  |               | Cu      | Mg      | Si    | Fe     | Mn     | Ni     | Zn      | Pb       | Sn      | Ti      | Cr      | Co      | Zr      | Sb                     | Others             | Typical Alloy Type | Size (mm)<br>Ø H |   |
|  | 56 X G14H2C   | 4.61    | 0.97    | 0.18  | 0.31   | 0.48   | 1.82   | 0.16    | 0.03     | 0.07    | 0.20    | 0.08    | ...     | ...     | ...                    |                    |                    | 40 x 15          | c |
|  | 56 X G14H4B   | 3.78    | 1.80    | 0.69  | 0.62   | 0.17   | 2.21   | 0.12    | 0.12     | 0.03    | 0.09    | 0.03    | ...     | ...     | ...                    |                    |                    | 40 x 15          |   |
|  | 56 X G14H5C   | 3.02    | 2.19    | 0.76  | 0.81   | 0.01   | 2.56   | 0.01    | 0.15     | 0.02    | 0.01    | 0.01    | ...     | ...     | ...                    |                    |                    | 40 x 15          |   |
| CRM  | 56 X G250J1C  | 3.82    | 0.075   | 0.26  | 0.41   | 0.040  | 1.33   | 0.28    | 0.101    | 0.125   | 0.008   | 0.0067  | 0.008   | (0.003) | (0.003)                | V 0.102            |                    | 40x15 or 50x20   | c |
| CRM  | 56 X G250J2D  | 4.81    | 0.060   | 0.211 | 0.346  | 0.225  | 1.10   | 0.155   | (0.0016) | (0.004) | 0.210   | 0.063   | 0.195   | 0.247   | 0.324                  | V 0.018            |                    | 40x15 or 50x20   |   |
| CRM  | 56 X G250J3C  | 4.90    | (0.001) | 0.11  | 0.079  | 0.278  | 0.92   | 0.103   | 0.024    | 0.031   | 0.162   | 0.024   | 0.264   | 0.275   | 0.35                   | V, Be              |                    | 40x15 or 50x20   |   |
|  | 56 X G250J4B  | 7.0 (6) | <0.01   | 0.05  | 0.17   | 0.54   | 0.80   | 0.05    | 0.09     | 0.16    | 0.16    | 0.04    | 0.12    | <0.01   | 0.06                   |                    | BSL 119            | 40 x 15          |   |
| CRM  | 56 X G250J5D  | 4.36    | 0.022   | 0.205 | 0.535  | 0.150  | 1.77   | 0.086   | 0.076    | 0.097   | 0.051   | 0.047   | 0.34    | 0.22    | 0.076                  | V, Be              |                    | 40x15 or 50x20   |   |
|  | 56 X G250J6C  | 5.96    | 0.01    | 0.16  | 0.27   | 0.10   | 1.93   | 0.31    | 0.08     | 0.13    | 0.12    | 0.12    | <0.01   | 0.22    | <0.01                  |                    |                    | 40 x 15          |   |
|  | 56 X G250J7A  | 5.14    | 0.06    | 0.23  | 0.43   | 0.17   | 1.30   | 0.185   | <0.01    | <0.01   | 0.247   | 0.09    | 1.48    | <0.01   | 0.24                   |                    |                    | 40 x 15          |   |
|  | 56 ML SS-242  | 4.0     | 1.5     | 0.50  | 0.55   | 0.08   | 2.0    | 0.10    | <0.005   | <0.005  | 0.12    | 0.03    | ...     | ...     | ...                    | Bi <0.005          |                    | 64 x 25          | c |
|  | 56 ML KA-242  | 3.6     | 1.8     | 0.25  | 0.40   | 0.02   | 2.2    | 0.03    | 0.02     | 0.02    | 0.06    | <0.005  | ...     | ...     | ...                    | Bi 0.02            |                    | 64 x 25          |   |
|  | 56 ML KB-242  | 4.4     | 1.2     | 0.40  | 0.20   | 0.05   | 1.8    | 0.05    | 0.05     | 0.05    | 0.15    | <0.005  | ...     | ...     | ...                    | Bi 0.05            |                    | 64 x 25          |   |
| Note: all values given for this series are nominal. Exact values will be given on the certificate. |               |         |         |       |        |        |        |         |          |         |         |         |         |         |                        |                    |                    |                  |   |
|  |               | Cu      | Mg      | Si    | Fe     | Mn     | Ni     | Zn      | Pb       | Sn      | Ti      | Cr      | Zr      | Bi      | V                      | Ag                 | Typical Alloy Type | Size (mm)<br>Ø H |   |
| CRM  | 56 X G2000J1C | 3.28    | 1.80    | 0.095 | 0.085  | 1.24   | 0.006  | 0.87    | 0.0023   | 0.098   | 0.0053  | 0.001   | 0.275   | 0.006   | 0.009                  | 0.005              | 2007               | 40x15 or 50x20   | c |
|  | 56 X G2000J2B | 4.01    | 1.28    | 0.96  | 0.23   | 0.94   | 0.07   | 0.23    | 0.031    | 0.073   | 0.064   | 0.047   | 0.18    | 0.052   | 0.005                  | ...                | 2014               | 40 x 15          |   |
| CRM  | 56 X G2000J3C | 4.75    | 1.06    | 0.765 | 0.380  | 0.57   | 0.088  | 0.113   | 0.365    | 0.015   | 0.190   | 0.058   | 0.026   | 0.150   | 0.010                  | 0.010              | 2017               | 40x15 or 50x20   |   |
| CRM  | 56 X G2000J4C | 5.02    | 0.535   | 1.35  | 0.700  | 0.267  | 0.087  | 0.014   | 0.83     | 0.008   | 0.135   | 0.056   | 0.105   | 0.002   | 0.013                  | 0.012              | 2030               | 40x15 or 50x20   |   |
| CRM  | 56 X G2000J5C | 5.52    | 0.39    | 0.321 | 0.98   | 0.007  | 0.204  | 0.368   | 0.69     | <0.005  | 0.063   | 0.0078  | 0.064   | 0.136   | 0.027                  | ...                | 2124               | 40x15 or 50x20   |   |
|  | 56 AU E111    | 1.88    | 0.692   | 1.25  | 0.825  | 1.24   | 0.161  | 0.401   | ...      | ...     | 0.121   | 0.092   | 0.191   | ...     | ...                    | ...                |                    | 62 x 30          |   |
|  | 56 AU E112    | 2.89    | 0.298   | 0.893 | 0.657  | 0.932  | 0.113  | 0.343   | ...      | ...     | 0.169   | 0.223   | 0.250   | ...     | ...                    | ...                |                    | each             |   |
|  | 56 AU E113    | 4.03    | 0.481   | 0.552 | 0.427  | 0.561  | 0.045  | 0.236   | ...      | ...     | 0.047   | 0.157   | 0.137   | ...     | ...                    | ...                |                    |                  |   |
|  | 56 AU E114    | 5.47    | 0.108   | 0.236 | 0.188  | 0.241  | 0.089  | 0.125   | ...      | ...     | 0.078   | 0.193   | 0.048   | ...     | ...                    | ...                |                    | Set only         |   |
|  | 56 AU E115    | 0.658   | 0.922   | 1.59  | 1.08   | 1.54   | 0.22   | 0.051   | ...      | ...     | 0.225   | 0.311   | 0.0064  | ...     | ...                    | ...                |                    |                  |   |
|  | 56 AU E116    | 6.61    | 0.035   | 0.101 | 0.122  | 0.071  | 0.0095 | 0.566   | ...      | ...     | 0.018   | 0.011   | 0.319   | ...     | ...                    | ...                |                    |                  |   |
|  | 56 ML SS-2011 | 5.5     | 0.04    | 0.3   | 0.55   | 0.04   | 0.04   | 0.10    | 0.5      | ...     | <0.005  | 0.04    | ...     | 0.5     | 0.01                   | ...                |                    | 64 x 25          | c |
|  | 56 ML WA-2011 | 4.9     | 0.02    | 0.2   | 0.70   | 0.06   | 0.02   | 0.15    | 0.4      | ...     | <0.005  | 0.06    | ...     | 0.6     | 0.01                   | ...                |                    | 64 x 25          |   |
|  | 56 ML WB-2011 | 6.0     | 0.06    | 0.1   | 0.25   | 0.02   | 0.06   | 0.05    | 0.6      | ...     | <0.005  | 0.02    | ...     | 0.4     | 0.01                   | ...                |                    | 64 x 25          |   |
| Note: all values given for this series are nominal. Exact values will be given on the certificate. |               |         |         |       |        |        |        |         |          |         |         |         |         |         |                        |                    |                    |                  |   |
| 5.7 Al/Cu/Si   |               | Cu      | Mg      | Si    | Fe     | Mn     | Ni     | Zn      | Pb       | Sn      | Ti      | Cr      | Co      | V       | Others                 | Typical Alloy Type | Size (mm)<br>Ø H   |                  |   |
| CRM  | 57 X G12H1C   | 5.54    | 0.40    | 2.52  | 0.88   | 0.032  | 0.31   | 1.03    | 0.016    | 0.095   | 0.114   | 0.069   | 0.113   | 0.15    | Zr, Be, Cd, Li         |                    | 40x15 or 50x20     | c                |   |
|  | 57 X G12H2B   | 8.5     | 0.32    | 2.57  | 1.30   | 0.15   | 0.35   | 0.71    | 0.17     | 0.27    | 0.15    | 0.03    | ...     | ...     |                        |                    | 40 x 15            |                  |   |
|  | 57 X G12H3B   | 9.75    | 0.25    | 1.57  | 0.89   | 0.32   | 0.63   | 0.60    | 0.09     | 0.19    | 0.21    | 0.04    | ...     | ...     |                        | LM 12              | 40 x 15            |                  |   |
|  | 57 X G12H4B   | 12.8    | 0.18    | 1.26  | 0.37   | 0.58   | 0.17   | 0.40    | 0.01     | 0.04    | 0.06    | 0.07    | ...     | ...     |                        |                    | 40 x 15            |                  |   |
|  | 57 X G12H5G   | 12.2    | 0.028   | 0.55  | 0.19   | 0.073  | 0.11   | 0.072   | 0.068    | 0.067   | 0.036   | 0.016   | 0.054   | 0.033   | Zr, Be, Ga, Cd         |                    | 40x15 or 50x20     |                  |   |
| 5.8 Al/Zn  |               | Cu      | Mg      | Si    | Fe     | Mn     | Ni     | Zn      | Pb       | Sn      | Ti      | Cr      | Zr      | Co      | Be                     | Others             | Typical Alloy Type | Size (mm)<br>Ø H |   |
| CRM  | 58 X G40H6B   | 0.111   | (0.003) | 0.09  | 0.08   | 0.004  | 0.008  | 7.55    | <0.002   | <0.005  | 0.065   | 0.005   | (0.004) | 0.006   | (0.002)                | Cd 0.032           |                    | 40x15 or 50x20   | c |
| CRM  | 58 X G40H7B   | 0.050   | 0.304   | 0.161 | 0.101  | 0.078  | 0.142  | 7.16    | 0.054    | 0.067   | 0.0045  | 0.0018  | 0.0030  | 0.026   | 0.0012                 | Sb, Cd             |                    | 40x15 or 50x20   |   |
|  | 58 X G40H8B   | 0.14    | 0.69    | 0.1   | 0.30   | 0.20   | 0.22   | 6.5     | 0.090    | 0.010   | 0.063   | 0.22    | (0.004) | ...     | ...                    |                    | LM 31              | 40x15 or 50x20   |   |
|  | 58 X G40H9B   | 0.19    | 1.12    | 0.24  | 0.47   | 0.046  | 0.048  | 5.0     | 0.40     | 0.14    | 0.25    | 0.37    | 0.17    | ...     | ...                    |                    | 7000               | 40 x 15          |   |
|  | 58 X G40H10B  | 0.23    | 1.28    | 0.19  | 0.61   | 0.31   | 0.22   | 3.85    | 0.15     | 0.10    | 0.19    | 0.62    | 0.23    | ...     | ...                    |                    |                    | 40 x 15          |   |
| 5.9 Al/Zn/Mg/Cu  |               | Cu      | Mg      | Si    | Fe     | Mn     | Ni     | Zn      | Pb       | Sn      | Ti      | Cr      | Zr      | Cd      | Others                 | Typical Alloy Type | Size (mm)<br>Ø H   |                  |   |
|  | 59 X G77J1F   | 2.41    | 4.83    | 0.15  | 0.21   | 0.46   | 0.17   | 1.91    | 0.125    | 0.126   | 0.178   | 0.24    | 0.01    | 0.004   | V, Co, Mo, Bi, As      |                    | 40x15 or 50x20     | c                |   |
| CRM  | 59 X G77J2E   | 2.35    | 3.05    | 0.212 | 0.295  | 0.245  | 0.52   | 3.35    | 0.125    | 0.006   | 0.015   | 0.096   | 0.153   | 0.0025  | V 0.0155               |                    | 40x15 or 50x20     |                  |   |
| CRM  | 59 X G77J3E   | 2.42    | 2.27    | 0.37  | 0.71   | 0.594  | 0.43   | 4.57    | 0.075    | 0.137   | 0.107   | 0.023   | 0.026   | 0.0115  | V 0.006, Bi 0.046      |                    | RR 77              | 40x15 or 50x20   |   |
| CRM  | 59 X G77J4E   | 0.81    | 1.47    | 0.59  | 1.04   | 0.224  | 0.0037 | 5.30    | 0.073    | 0.219   | 0.119   | 0.071   | 0.080   | 0.00054 | V 0.0067               |                    |                    | 40x15 or 50x20   |   |
|  | 59 X G77J5D   | 0.122   | 0.72    | 0.30  | 1.32   | 0.030  | 1.38   | 7.57    | (0.003)  | <0.01   | 0.058   | 0.050   | ...     | 0.012   | Ga 0.020               |                    |                    | 40x15 or 50x20   |   |
| CRM  | 59 X G77J6A   | 1.13    | 2.63    | 0.04  | 0.054  |        |        |         |          |         |         |         |         |         |                        |                    |                    |                  |   |

# 5. Aluminium Base

Blocks/Discs

| 5.11 Al/Mg   |                | Cu     | Mg      | Si    | Fe    | Mn     | Ni       | Zn     | Pb           | Sn      | Ti     | Cr     | Be       | Li      | Others            | Typical Alloy Type | Size (mm)<br>Ø H |                  |                  |    |      |         |   |
|--|----------------|--------|---------|-------|-------|--------|----------|--------|--------------|---------|--------|--------|----------|---------|-------------------|--------------------|------------------|------------------|------------------|----|------|---------|---|
| CRM  | 511 X G05H1H   | 0.32   | 2.02    | 0.42  | 0.79  | 0.012  | 0.125    | 0.47   | 0.023        | 0.178   | 0.204  | 0.242  | (0.0002) | ...     | V, Cd             |                    | 40x15 or 50x20   | c                |                  |    |      |         |   |
| CRM  | 511 X G05H2G   | 0.37   | 3.12    | 0.35  | 0.60  | 0.186  | 0.22     | 0.26   | 0.068        | 0.154   | 0.079  | 0.30   | 0.004    | ...     | Cd, Ga            |                    | 40x15 or 50x20   |                  |                  |    |      |         |   |
|  | 511 X G05H3H   | 0.093  | 3.97    | 0.21  | 0.41  | 0.40   | 0.090    | 0.092  | 0.107        | 0.096   | 0.25   | 0.095  | 0.0074   | ...     |                   | LM 5               | 40x15 or 50x20   |                  |                  |    |      |         |   |
|  | 511 X G05H4F   | 0.056  | 5.1     | 0.11  | 0.14  | 0.55   | 0.040    | 0.062  | 0.15         | 0.14    | 0.048  | 0.029  | 0.014    | ...     |                   |                    | 40x15 or 50x20   |                  |                  |    |      |         |   |
|  | 511 X G05H5E   | 0.007  | 7.87    | 0.05  | 0.11  | 0.87   | (0.002)  | 0.010  | 0.21         | (0.004) | <0.005 | <0.005 | ...      | ...     |                   |                    | 40 x 15          |                  |                  |    |      |         |   |
|  | 511 X G10H4B   | 0.052  | 10.4    | 0.33  | 0.19  | 0.12   | 0.085    | 0.21   | 0.10         | 0.051   | 0.097  | 0.15   | 0.023    | <0.0005 | B 0.004           | LM 10              | 40 x 15          | c                |                  |    |      |         |   |
|  | 511 X G10H5A   | 0.02   | 13.7    | 0.19  | 0.18  | 0.21   | 0.07     | 0.02   | 0.19         | <0.01   | <0.01  | <0.01  | 0.013    | ...     |                   |                    | 40 x 15          |                  |                  |    |      |         |   |
| CRM  | 511 X G3000B1C | 0.288  | 0.250   | 0.785 | 0.678 | 0.750  | 0.142    | 0.035  | 0.148        | 0.157   | 0.033  | 0.097  | <0.0001  | ...     | Ga 0.048, V 0.052 |                    | 40x15 or 50x20   | c                |                  |    |      |         |   |
| CRM  | 511 X G3000B2B | 0.20   | 0.68    | 0.23  | 0.335 | 0.81   | 0.063    | 0.098  | 0.137        | 0.105   | 0.111  | 0.200  | 0.0017   | 0.017   | Co, Ga            |                    | 40x15 or 50x20   |                  |                  |    |      |         |   |
| CRM  | 511 X G3000B3B | 0.120  | 0.80    | 0.35  | 0.376 | 1.06   | 0.116    | 0.140  | 0.062        | 0.028   | 0.22   | 0.056  | 0.005    | ...     | Co, Ga            | 3000               | 40x15 or 50x20   |                  |                  |    |      |         |   |
|  | 511 X G3000B4B | 0.10   | 1.39    | 0.12  | 0.88  | 1.14   | 0.04     | 0.11   | 0.03         | 0.04    | 0.11   | 0.04   | ...      | ...     |                   |                    | 40 x 15          |                  |                  |    |      |         |   |
|  | 511 X G3000B5B | 0.054  | 1.55    | 0.05  | 0.93  | 0.79   | 0.007    | 0.009  | <0.01        | 0.008   | 0.19   | 0.003  | ...      | ...     |                   |                    | 40 x 15          |                  |                  |    |      |         |   |
|  | 511 ML SS-3004 | 0.15   | 1.1     | 0.18  | 0.5   | 1.1    | <0.005   | 0.05   | 0.001        | <0.001  | 0.02   | <0.005 | ...      | <0.001  | V, Bi, Ga, Cd     |                    | 64 x 25          |                  |                  |    |      |         |   |
|  | 511 ML WA-3004 | 0.10   | 1.3     | 0.22  | 0.6   | 1.3    | 0.01     | 0.15   | 0.006        | ...     | <0.005 | 0.01   | ...      | ...     | V, Bi, Ga, Cd     | 3004               | 64 x 25          |                  |                  |    |      |         |   |
|  | 511 ML WB-3004 | 0.20   | 0.9     | 0.10  | 0.4   | 0.9    | 0.02     | 0.10   | 0.020        | ...     | 0.05   | 0.02   | ...      | ...     | V, Bi, Ga, Cd     |                    | 64 x 25          |                  |                  |    |      |         |   |
| Note: all values given for this series are nominal. Exact values will be given on the certificate. |                |        |         |       |       |        |          |        |              |         |        |        |          |         |                   |                    |                  |                  |                  |    |      |         |   |
|  | 511 AU E232    | 0.092  | 5.44    | 0.291 | 0.351 | 0.365  | 0.048    | 0.146  | ...          | ...     | 0.044  | 0.195  | 0.0028   | ...     |                   |                    | 62 x 30          |                  |                  |    |      |         |   |
|  | 511 AU E233    | 0.132  | 6.33    | 0.361 | 0.440 | 0.520  | 0.073    | 0.165  | ...          | ...     | 0.082  | 0.140  | 0.0051   | ...     |                   |                    | each             |                  |                  |    |      |         |   |
|  | 511 AU E234    | 0.124  | 6.83    | 0.477 | 0.581 | 0.688  | 0.178    | 0.613  | ...          | ...     | 0.118  | 0.241  | 0.00087  | ...     |                   |                    |                  |                  |                  |    |      |         |   |
|  | 511 AU E235    | 0.0084 | 9.96    | 0.076 | 0.120 | 0.060  | 0.137    | 0.032  | ...          | ...     | 0.0085 | 0.014  | 0.010    | ...     |                   |                    | Set only         |                  |                  |    |      |         |   |
|  | 511 AU E236    | 0.246  | 3.93    | 0.600 | 0.653 | 0.879  | 0.037    | 0.313  | ...          | ...     | 0.197  | 0.296  | 0.00064  | ...     |                   |                    |                  |                  |                  |    |      |         |   |
| 5.12 Al/Zn/Si  |                | Cu     | Mg      | Si    | Fe    | Mn     | Ni       | Zn     | Ti           | Cr      | Sr     |        |          |         |                   |                    |                  |                  | Size (mm)<br>Ø H |    |      |         |   |
|  | 512 ZA 871/01  | 0.011  | 0.295   | 9.67  | 0.155 | 0.023  | 0.022    | 8.94   | 0.056        | 0.019   | 0.0055 |        |          |         |                   |                    |                  |                  | 60 x 25          | c  |      |         |   |
|  | 512 ZA 872/01  | 0.10   | 0.405   | 8.76  | 0.41  | 0.20   | 0.011    | 10.00  | 0.037        | 0.011   | 0.0018 |        |          |         |                   |                    |                  |                  | 60 x 25          |    |      |         |   |
|  | 512 ZA 873/01  | 0.049  | 0.535   | 7.25  | 0.26  | 0.104  | 0.006    | 11.0   | 0.0154       | 0.032   | ...    |        |          |         |                   |                    |                  |                  | 60 x 25          |    |      |         |   |
| 5.14 Al/Mn   |                | Cu     | Mg      | Si    | Fe    | Mn     | Ni       | Zn     | Pb           | Sn      | Ti     | Cr     | Zr       |         |                   |                    |                  |                  | Size (mm)<br>Ø H |    |      |         |   |
| CRM  | 514 X 9091.1C  | 0.046  | (0.001) | 0.035 | 0.081 | 6.93   | (0.0026) | 0.029  | 0.016        | 0.013   | 0.0017 | <0.005 | 0.184    |         |                   |                    |                  |                  | 40x15 or 50x20   | c  |      |         |   |
|  | 514 X 9091.2C  | 0.44   | 0.03    | 0.45  | 0.90  | 10.8   | 0.07     | 0.16   | 0.10         | 0.04    | 0.16   | 0.06   | ...      |         |                   |                    |                  |                  | 40 x 15          |    |      |         |   |
| CRM  | 514 X 9091.3D  | 0.62   | 0.148   | 0.74  | 0.94  | 11.3   | 0.141    | 0.223  | 0.111        | 0.019   | 0.424  | 0.106  | <0.005   |         |                   |                    |                  |                  | 40x15 or 50x20   |    |      |         |   |
|  | 514 AU E211    | 0.220  | 0.011   | 0.653 | 0.694 | 0.919  | 0.018    | 0.023  | ...          | ...     | 0.020  | ...    | ...      |         |                   |                    |                  |                  | 62 x 30          |    |      |         |   |
|  | 514 AU E212    | 0.109  | 0.039   | 0.318 | 0.534 | 1.21   | 0.056    | 0.112  | ...          | ...     | 0.046  | ...    | ...      |         |                   |                    |                  |                  | each             |    |      |         |   |
|  | 514 AU E213    | 0.157  | 0.063   | 0.460 | 0.312 | 1.50   | 0.101    | 0.054  | ...          | ...     | 0.071  | ...    | ...      |         |                   |                    |                  |                  |                  |    |      |         |   |
|  | 514 AU E214    | 0.051  | 0.078   | 0.170 | 0.212 | 1.79   | 0.135    | 0.084  | ...          | ...     | 0.104  | ...    | ...      |         |                   |                    |                  |                  | Set only         |    |      |         |   |
|  | 514 AU E215    | 0.255  | 0.109   | 0.820 | 0.886 | 0.597  | 0.197    | 0.157  | ...          | ...     | 0.130  | ...    | ...      |         |                   |                    |                  |                  |                  |    |      |         |   |
|  | 514 AU E216    | 0.0072 | 0.0034  | 0.047 | 0.133 | 2.19   | 0.0032   | 0.0092 | ...          | ...     | 0.013  | ...    | ...      |         |                   |                    |                  |                  |                  |    |      |         |   |
| 5.15 Al/Sr Binaries  |                |        |         |       | Sr    |        |          |        | Sr           |         |        |        | Sr       |         |                   |                    |                  |                  | Size (mm)<br>Ø H |    |      |         |   |
|  | 515 X AlSr1A   |        |         |       | 1.05  |        |          |        | 515 X AlSr4A |         |        |        | 3.84     |         |                   |                    | 515 X AlSr7A     |                  |                  |    | 6.67 | 50 x 20 | c |
|  | 515 X AlSr2A   |        |         |       | 2.2   |        |          |        | 515 X AlSr5A |         |        |        | 5.2      |         |                   |                    | 515 X AlSr9A     |                  |                  |    | 9.18 | 50 x 20 |   |
| 5.16 Al/Fe   |                | Cu     | Mg      | Si    | Fe    | Mn     | Ni       | Zn     | Pb           | Sn      | Ti     | Cr     | Sb       | V       | Zr                | Ga                 | B                | Size (mm)<br>Ø H |                  |    |      |         |   |
|  | 516 ZA 155/02  | 0.100  | 0.150   | 0.50  | 1.00  | 0.081  | 0.053    | 0.062  | 0.010        | 0.011   | 0.065  | 0.051  | ...      | 0.050   | 0.042             | 0.007              | ...              | 60 x 25          | c                |    |      |         |   |
|  | 516 ZA 156/02  | 0.052  | 0.063   | 0.31  | 1.28  | 0.056  | 0.022    | 0.035  | 0.0007       | ...     | 0.042  | 0.031  | ...      | 0.0073  | 0.0100            | ...                | ...              | 60 x 25          |                  |    |      |         |   |
|  | 516 ZA 157/02  | 0.0112 | 0.0203  | 0.117 | 1.62  | 0.0166 | 0.0025   | 0.0101 | 0.0050       | 0.0019  | 0.0024 | 0.0004 | ...      | 0.0027  | 0.0051            | ...                | ...              | 60 x 25          |                  |    |      |         |   |
|  | 516 ZA 158/03  | 0.0120 | 0.020   | 0.053 | 1.98  | 0.021  | 0.0085   | 0.0075 | 0.007        | 0.0050  | 0.0130 | 0.0070 | ...      | 0.013   | 0.0055            | 0.010              | 0.0010           | 60 x 25          |                  |    |      |         |   |
| CRM  | 516 ZA 161/01  | 0.023  | 0.024   | 0.12  | 2.66  | 0.035  | 0.013    | 0.012  | 0.0110       | 0.010   | 0.023  | 0.012  | 0.0053   | 0.022   | 0.010             | ...                | ...              | 60 x 25          | HP               |    |      |         |   |
| 5.17 Al/Zn Sacrificial Anode   |                | Cu     | Si      | Fe    | Zn    | Pb     | Ti       | Cd     | In           | Ga      | Hg     |        |          |         |                   |                    |                  |                  | Size (mm)<br>Ø H |    |      |         |   |
|  | 517 GO LF30    | 0.023  | ...     | 0.01  | 4.1   | ...    | 0.027    | 0.028  | 0.034        | 0.020   | ...    |        |          |         |                   |                    |                  |                  | 55 x 4           | CC |      |         |   |
|  | 517 GO LF31    | 0.013  | 0.07    | 0.06  | 4.3   | ...    | 0.020    | 0.019  | 0.029        | 0.010   | ...    |        |          |         |                   |                    |                  |                  | 55 x 4           |    |      |         |   |
|  | 517 GO LF32    | ...    | 0.09    | 0.11  | 4.6   | ...    | 0.010    | 0.010  | 0.021        | 0.005   | ...    |        |          |         |                   |                    |                  |                  | 55 x 4           |    |      |         |   |
|  | 517 GO LF33    | ...    | 0.14    | 0.20  | 5.1   | ...    | 0.005    | 0.005  | 0.014        | 0.002   | ...    |        |          |         |                   |                    |                  |                  | 55 x 4           |    |      |         |   |
|  | 517 GO LF34    | 0.008  | 0.05    | 0.05  | 0.32  | 0.007  | ...      | ...    | ...          | ...     | 0.030  |        |          |         |                   |                    |                  |                  | 55 x 4           | CC |      |         |   |
|  | 517 GO LF35    | 0.014  | 0.10    | 0.19  | 0.84  | 0.018  | ...      | ...    | ...          | ...     | 0.037  |        |          |         |                   |                    |                  |                  | 55 x 4           |    |      |         |   |
|  | 517 GO LF36    | 0.002  | 0.18    | 0.10  | 1.32  | 0.014  | ...      | ...    | ...          | ...     | 0.029  |        |          |         |                   |                    |                  |                  | 55 x 4           |    |      |         |   |
|  | 517 GO LF37    | 0.009  | 0.05    | 0.15  | 2.03  | 0.008  | ...      | ...    | ...          | ...     | 0.044  |        |          |         |                   |                    |                  |                  | 55 x 4           |    |      |         |   |
|  | 517 GO LF39    | 0.006  | 0.02    | 0.05  | 3.25  | ...    | ...      | ...    | ...          | ...     | 0.065  |        |          |         |                   |                    |                  |                  | 55 x 4           |    |      |         |   |
|  | 517 GO LF40    | 0.004  | 0.16    | 0.09  | 4.47  | ...    | ...      | ...    | ...          | ...     | 0.036  |        |          |         |                   |                    |                  |                  | 55 x 4           |    |      |         |   |
|  | 517 GO LF41    | 0.024  | 0.02    | ...   | 5.55  | 0.025  | ...      | ...    | ...          | ...     | 0.055  |        |          |         |                   |                    |                  |                  | 55 x 4           |    |      |         |   |
| 5.18 Pressed Powder Alloys   |                | Cu     | Mg      | Si    | Fe    | Mn     | Ni       | Zn     | Pb           | Sn      | Ti     | Cr     | Co       | V       | Zr                | Ca                 | Mo               | Size (mm)<br>Ø H |                  |    |      |         |   |
| CRM  | 518 X 429      | 1.01   | 1.46    | 28.36 | 0.348 | 0.016  | 0.022    | 0.061  | 0.002        | 0.001   | 0.019  | 0.0069 | 2.18     | 0.009   | ...               | 0.0184             | ...              | 65 x 25          | HP               |    |      |         |   |
| CRM  | 518 X 905      | 2.52   | 0.639   | 0.105 | 2.54  | 0.984  | 5.05     | 0.006  | <0.001       | 0.003   | 0.596  | 0.0085 | 0.003    | 0.019   | 0.80              | <0.001             | 0.804            | 45 x 40          |                  |    |      |         |   |

# 6. Magnesium Base

Blocks/Discs

| 6.1 Residuals in Pure Magnesium  |                 |        |        |        |          |        |         |          |         |         |        |        |          |         |          |        |        |         | Size (mm) |         |                |   |
|--|-----------------|--------|--------|--------|----------|--------|---------|----------|---------|---------|--------|--------|----------|---------|----------|--------|--------|---------|-----------|---------|----------------|---|
|  |                 | Al     | Zn     | Mn     | Zr       | Cu     | Si      | Fe       | Ni      | Ca      | Sn     | Pb     | Ag       | Be      | Cd       | Ce     | La     | P       | Na        | Ø       | H              |   |
| CRM  | 61 X MgP1A **   | 0.014  | ...    | 0.0035 | <0.0005  | 0.0008 | 0.005   | 0.027    | ...     | <0.001  | <0.002 | <0.002 | <0.0002  | <0.0002 | <0.0002  | <0.001 | <0.001 | ...     | ...       | 45 x 20 | c              |   |
| CRM  | 61 X MgP2A **   | 0.065  | 0.0122 | 0.0118 | (0.0007) | 0.0109 | 0.031   | 0.0061   | 0.0029  | 0.0138  | 0.0073 | 0.0061 | 0.003    | <0.0001 | 0.0063   | 0.0019 | 0.0014 | ...     | ...       | 45 x 20 |                |   |
| CRM  | 61 X MgP3A **   | 0.096  | 0.0196 | 0.0137 | (0.0014) | 0.0292 | 0.044   | 0.014    | 0.0048  | 0.054   | 0.0155 | 0.0148 | 0.0125   | <0.0001 | 0.0154   | 0.0055 | 0.0038 | ...     | ...       | 45 x 20 |                |   |
| CRM  | 61 X MgP4A **   | 0.0243 | 0.0158 | 0.0102 | 0.030    | 0.0109 | 0.039   | (0.0044) | 0.0028  | 0.028   | 0.0068 | 0.0069 | 0.021    | <0.0001 | 0.0071   | 0.0043 | 0.0029 | ...     | ...       | 45 x 20 |                |   |
| Samples marked ** may be unsuitable for use with glow discharge analysis |                 |        |        |        |          |        |         |          |         |         |        |        |          |         |          |        |        |         |           |         |                |   |
|  | 61 NH R0-90     | 0.0020 | 0.0037 | 0.0014 | ...      | 0.0006 | 0.0015  | 0.0098   | 0.0013  | 0.00005 | ...    | 0.0004 | ...      | ...     | <0.00005 | ...    | ...    | <0.0001 | ...       | 64 x 13 |                |   |
|  | 61 NH R1-88     | 0.0059 | 0.0003 | 0.0542 | ...      | 0.0013 | 0.0044  | 0.0251   | 0.0006  | ...     | ...    | ...    | ...      | ...     | ...      | ...    | ...    | ...     | ...       | 64 x 13 |                |   |
|  | 61 NH R2-88     | 0.0118 | 0.0011 | 0.0272 | ...      | 0.0028 | 0.0091  | 0.0294   | 0.0027  | ...     | ...    | ...    | ...      | ...     | ...      | ...    | ...    | ...     | ...       | 64 x 13 |                |   |
|  | 61 NH R3-88     | 0.0194 | 0.0153 | 0.0197 | ...      | 0.0067 | 0.0139  | 0.0298   | 0.0013  | ...     | ...    | ...    | ...      | ...     | ...      | ...    | ...    | ...     | ...       | 64 x 13 |                |   |
|  | 61 NH R4-88     | 0.0259 | 0.0271 | 0.0111 | ...      | 0.0098 | 0.0227  | 0.0359   | 0.0016  | ...     | ...    | ...    | ...      | ...     | ...      | ...    | ...    | ...     | ...       | 64 x 13 |                |   |
|  | 61 NH R5-88     | 0.0473 | 0.0520 | 0.0061 | ...      | 0.0150 | 0.0362  | 0.0274   | 0.0012  | ...     | ...    | ...    | ...      | ...     | ...      | ...    | ...    | ...     | ...       | 64 x 13 |                |   |
|  | 61 NH RMGH-88   | 0.0535 | 0.0112 | 0.0012 | ...      | 0.0055 | 0.0209  | 0.0222   | 0.0041  | ...     | ...    | ...    | ...      | ...     | ...      | ...    | ...    | ...     | ...       | 64 x 13 |                |   |
|  | 61 NH RMGL-88   | 0.0055 | 0.0073 | 0.0298 | ...      | 0.0008 | 0.0004  | 0.0031   | 0.0003  | ...     | ...    | ...    | ...      | ...     | ...      | ...    | ...    | ...     | ...       | 64 x 13 |                |   |
|  | 61 NH RMGL-93   | <0.001 | 0.0013 | 0.0005 | ...      | 0.0012 | 0.0002  | 0.0032   | 0.0005  | ...     | ...    | ...    | ...      | ...     | ...      | ...    | ...    | ...     | ...       | 64 x 13 |                |   |
|  | 61 NH RTC-90    | 0.0055 | 0.0027 | 0.0702 | ...      | 0.0011 | 0.0013  | 0.0309   | 0.0012  | 0.0004  | 0.0000 | 0.0020 | ...      | ...     | <0.0001  | ...    | ...    | 0.0027  | 0.0001    | 64 x 13 |                |   |
|  | 61 NH RT400-01  | 0.0161 | 0.0012 | 0.0191 | ...      | 0.0034 | 0.0084  | 0.0329   | 0.0012  | 0.0009  | 0.0018 | 0.0025 | ...      | ...     | 0.0007   | ...    | ...    | 0.0043  | 0.0028    | 64 x 13 |                |   |
| 6.3 Mg/In  |                 |        |        |        |          |        |         |          |         |         |        |        |          |         |          |        |        |         | Size (mm) |         |                |   |
|  |                 | Al     | Zn     | Mn     | Zr       | Cu     | Si      | Fe       | Ni      | Ca      | Sn     | Pb     | Ag       | Be      | Cd       |        |        |         |           |         | Ø              | H |
| CRM  | 63 X MgE1C **   | 0.40   | 0.033  | 0.76   | (0.0013) | 0.044  | 0.006   | 0.010    | (0.002) | 0.04    | 0.013  | 0.010  | 0.015    | <0.0005 | ...      |        |        |         |           |         | 45 x 20        | c |
|  | 63 X MgE2A      | 0.07   | 0.02   | 1.47   | <0.002   | 0.02   | 0.01(5) | 0.02     | 0.005   | 0.01    | 0.01   | 0.007  | ...      | ...     | ...      |        |        |         |           |         | 40 x 15        |   |
| CRM  | 63 X MgE3B      | 0.015  | 0.022  | 2.36   | <0.001   | 0.012  | 0.01    | 0.004    | 0.0023  | 0.13    | 0.0057 | 0.005  | 0.005    | ...     | 0.001    |        |        |         |           |         | 40x15 or 50x20 |   |
| Samples marked ** may be unsuitable for use with glow discharge analysis |                 |        |        |        |          |        |         |          |         |         |        |        |          |         |          |        |        |         |           |         |                |   |
|  | 63 NH K0-87     | 1.03   | 0.050  | 0.489  | ...      | 0.0022 | 0.0076  | 0.0043   | 0.0005  | ...     | ...    | ...    | ...      | 0.0005  | ...      |        |        |         |           |         | 64 x 13        |   |
|  | 63 NH M12-X-91  | 0.094  | 0.251  | 2.18   | ...      | 0.0271 | 0.0128  | 0.0015   | 0.0050  | ...     | 0.0457 | 0.0169 | ...      | 0.0003  | ...      |        |        |         |           |         | 64 x 13        |   |
|  | 63 CA SMD3A     | 0.08   | 0.058  | 1.69   | ...      | 0.032  | 0.034   | ...      | 0.002   | ...     | ...    | ...    | ...      | ...     | ...      |        |        |         |           |         | 60 X 6         |   |
| 6.4 Mg/Al  |                 |        |        |        |          |        |         |          |         |         |        |        |          |         |          |        |        |         | Size (mm) |         |                |   |
|  |                 | Al     | Zn     | Mn     | Cu       | Si     | Fe      | Ni       | Ca      | Sn      | Pb     | Be     | Cd       | P       | Na       |        |        |         |           |         | Ø              | H |
|  | 64 NH STD1-85   | 9.54   | 0.0009 | 0.0169 | 0.0130   | 1.14   | 0.0278  | 0.0127   | ...     | ...     | ...    | 0.0015 | ...      | ...     | ...      |        |        |         |           |         | 64 x 13        |   |
|  | 64 NH AM2002-91 | 1.99   | 0.088  | 0.440  | 0.0235   | 0.0831 | 0.0036  | 0.0011   | ...     | ...     | ...    | 0.0009 | ...      | ...     | ...      |        |        |         |           |         | 64 x 13        |   |
|  | 64 NH AM5002-91 | 4.92   | 0.054  | 0.189  | 0.0121   | 0.0722 | 0.0068  | 0.0022   | ...     | ...     | ...    | 0.0004 | ...      | ...     | ...      |        |        |         |           |         | 64 x 13        |   |
|  | 64 NH AM60-T-89 | 5.86   | 0.017  | 0.294  | 0.0013   | ...    | 0.0041  | 0.0007   | <0.0001 | 0.0004  | 0.0010 | ...    | <0.00005 | 0.0012  | 0.0004   |        |        |         |           |         | 64 x 13        |   |
|  | 64 NH A60-Y-91  | 5.45   | 0.070  | 0.193  | 0.0013   | 0.0167 | 0.0082  | 0.0005   | ...     | ...     | ...    | 0.0011 | ...      | ...     | ...      |        |        |         |           |         | 64 x 13        |   |
|  | 64 NH A60-T-00  | 5.98   | 0.084  | 0.37   | 0.0011   | 0.0148 | 0.0021  | 0.0009   | ...     | 0.0015  | 0.0016 | 0.0008 | ...      | ...     | ...      |        |        |         |           |         | 64 x 13        |   |
| 6.5 Mg/Al/Zn   |                 |        |        |        |          |        |         |          |         |         |        |        |          |         |          |        |        |         | Size (mm) |         |                |   |
|  |                 | Al     | Zn     | Mn     | Zr       | Cu     | Si      | Fe       | Ni      | Ca      | Sn     | Pb     | Ag       | Be      | Cd       | Ce     | La     | Sr      | Others    | Ø       | H              |   |
|  | 65 NH A8-H-98   | 9.89   | 2.04   | 0.074  | ...      | 0.0229 | 0.31    | 0.0179   | 0.0115  | ...     | 0.0100 | 0.0100 | ...      | 0.0020  | ...      | ...    | ...    | ...     | ...       | 64 x 13 |                |   |
|  | 65 NH A8-H-99   | 9.95   | 1.21   | 0.067  | ...      | 0.0118 | 0.091   | 0.0276   | 0.0109  | ...     | ...    | ...    | ...      | 0.0015  | ...      | ...    | ...    | ...     | ...       | 64 x 13 |                |   |
|  | 65 NH A8-L-98   | 2.62   | 0.10   | 0.50   | ...      | 0.0009 | 0.0070  | 0.0019   | 0.0012  | ...     | 0.0009 | 0.0016 | ...      | 0.0005  | ...      | ...    | ...    | ...     | ...       | 64 x 13 |                |   |
|  | 65 NH A8-L-02   | 4.73   | 0.206  | 0.43   | ...      | 0.0010 | 0.0040  | 0.0032   | 0.0003  | ...     | 0.0002 | 0.0009 | ...      | 0.0004  | <0.0001  | ...    | ...    | ...     | ...       | 64 x 13 |                |   |
|  | 65 NH A91-T-00  | 9.06   | 0.76   | 0.203  | ...      | 0.0012 | 0.0095  | 0.0010   | 0.0008  | ...     | 0.0017 | 0.0013 | ...      | 0.0006  | ...      | ...    | ...    | ...     | ...       | 64 x 13 |                |   |
|  | 65 NH A91-L-00  | 6.98   | 0.19   | 0.53   | ...      | 0.0004 | 0.0021  | 0.0004   | 0.0002  | ...     | 0.0009 | 0.0005 | ...      | 0.0001  | ...      | ...    | ...    | ...     | ...       | 64 x 13 |                |   |
|  | 65 NH AZ61-H-91 | 7.45   | 1.466  | 0.040  | ...      | 0.0301 | 0.32    | 0.0140   | 0.0413  | ...     | ...    | ...    | ...      | 0.0048  | ...      | ...    | ...    | ...     | ...       | 64 x 13 |                |   |
|  | 65 NH AZ61-L-91 | 4.92   | 0.112  | 0.502  | ...      | 0.0020 | 0.027   | 0.0044   | 0.0038  | ...     | ...    | ...    | ...      | 0.0004  | ...      | ...    | ...    | ...     | ...       | 64 x 13 |                |   |
|  | 65 NH AZ61-T-91 | 6.23   | 0.82   | 0.243  | ...      | 0.0184 | 0.166   | 0.0088   | 0.0188  | ...     | ...    | ...    | ...      | 0.0013  | ...      | ...    | ...    | ...     | ...       | 64 x 13 |                |   |
|  | 65 NH AZ61-X-91 | 6.65   | 1.223  | 0.127  | ...      | 0.0245 | 0.243   | 0.0154   | 0.0331  | ...     | ...    | ...    | ...      | 0.0021  | ...      | ...    | ...    | ...     | ...       | 64 x 13 |                |   |
|  | 65 NH AZ61-Y-91 | 5.56   | 0.476  | 0.355  | ...      | 0.0116 | 0.087   | 0.0053   | 0.0107  | ...     | ...    | ...    | ...      | 0.0006  | ...      | ...    | ...    | ...     | ...       | 64 x 13 |                |   |
|  | 65 NH AZ63-89   | 6.05   | 3.71   | 0.164  | ...      | 0.0234 | ...     | 0.0082   | 0.0032  | 0.0002  | 0.0055 | 0.0052 | ...      | 0.0012  | 0.0054   | ...    | ...    | ...     | P 0.0069  | 64 x 13 |                |   |
|  | 65 NH AZ63-X-90 | 6.33   | 3.21   | 0.160  | ...      | 0.0130 | 0.0616  | 0.0103   | 0.0016  | ...     | 0.0169 | 0.0182 | ...      | 0.0014  | 0.0192   | ...    | ...    | ...     | ...       | 64 x 13 |                |   |
|  | 65 NH A31-L-91  | 1.91   | 0.202  | 0.408  | ...      | 0.0037 | 0.020   | 0.0041   | 0.0007  | ...     | ...    | ...    | ...      | 0.0003  | ...      | ...    | ...    | ...     | ...       | 64 x 13 |                |   |
|  | 65 NH A31-T-91  | 3.06   | 1.098  | 0.256  | ...      | 0.0355 | 0.151   | 0.0103   | 0.0052  | ...     | ...    | ...    | ...      | 0.0017  | ...      | ...    | ...    | ...     | ...       | 64 x 13 |                |   |
|  | 65 NH A31-X-91  | 3.51   | 1.455  | 0.116  | ...      | 0.0475 | 0.263   | 0.0138   | 0.0071  | ...     | ...    | ...    | ...      | 0.0029  | ...      | ...    | ...    | ...     | ...       | 64 x 13 |                |   |
|  | 65 NH A31-Y-91  | 2.37   | 0.616  | 0.327  | ...      | 0.0124 | 0.0258  | 0.0073   | 0.0040  | ...     | ...    | ...    | ...      | 0.0007  | ...      | ...    | ...    | ...     | ...       | 64 x 13 |                |   |
|  | 65 NH A41-X-91  | 5.16   | 0.210  | 0.410  | ...      | 0.0173 | 0.924   | 0.0061   | 0.0029  | ...     | ...    | ...    | ...      | 0.0015  | ...      | ...    | ...    | ...     | ...       | 64 x 13 |                |   |
|  | 65 NH K2-87     | 6.14   | 0.32   | 0.165  | ...      | 0.0040 | 0.018   | 0.0129   | 0.0016  | ...     | ...    | ...    | ...      | 0.0012  | ...      | ...    | ...    | ...     | ...       | 64 x 13 |                |   |
|  | 65 NH K3-87     | 7.36   | 0.51   | 0.280  | ...      | 0.0084 | 0.030   | 0.0097   | 0.0028  | ...     | ...    | ...    | ...      | 0.0010  | ...      | ...    | ...    | ...     | ...       | 64 x 13 |                |   |
|  | 65 NH K5-87     | 8.11   | 1.07   | 0.351  | ...      | 0.0462 | 0.083   | 0.0009   | 0.0116  | ...     | ...    | ...    | ...      | 0.0001  | ...      | ...    | ...    | ...     | ...       | 64 x 13 |                |   |
|  | 65 NH K7-87     | 9.40   | 0.62   | 0.027  | ...      | 0.0047 | 0.046   | 0.0104   | 0.0017  | ...     | ...    | ...    | ...      | 0.0008  | ...      | ...    | ...    | ...     | ...       | 64 x 13 |                |   |
|  | 65 NH K8-87     | 10.32  | 0.73   | 0.190  | ...      | 0.0041 | 0.018   | 0.0127   | 0.0015  | ...     | ...    | ...    | ...      | 0.0007  | ...      | ...    | ...    | ...     | ...       | 64 x 13 |                |   |
|  | 65 NH APE-89    | 10.24  | 1.44   | 0.058  | ...      | 0.0298 | 0.086   | 0.0149   | 0.0055  | 0.0005  | 0.0062 | 0.0057 | ...      | 0.0018  | 0.0060   | ...    | ...    | ...     | P 0.0063  | 64 x 13 |                |   |
|  | 65 NH LT500-01  | 9.28   | 0.86   | 0.32   | ...      | 0.0052 | 0.0162  | 0.0050   | 0.0019  | ...     | 0.0025 | 0.0024 | ...      | 0.0013  | ...      | ...    | ...    | ...     | ...       | 64 x 13 |                |   |
|  | 65 NH LT60-01   | 5.99   | 0.15   | 0.37   | ...      | 0.0034 | 0.0161  | 0.0059   | 0.0016  | ...     | 0.0020 | 0.0027 | ...      | 0.0014  | ...      | ...    | ...    | ...     | ...       | 64 x 13 |                |   |

# 6. Magnesium Base

Blocks/Discs

| 6.5 Mg/Al/Zn (continued)   |               | Al   | Zn     | Mn     | Zr       | Cu     | Si    | Fe      | Ni      | Ca     | Sn     | Pb     | Ag       | Be      | Cd     | Ce    | La    | Sr      | Ti    | Size (mm) |                |   |
|--|---------------|--|--------|--------|----------|--------|-------|---------|---------|--------|--------|--------|----------|---------|--------|-------|-------|---------|-------|-----------|----------------|---|
|  |               |  |        |        |          |        |       |         |         |        |        |        |          |         |        |       |       |         |       |           | Ø              | H |
| CRM  | 65 X MgA1H ** | 3.83   | 1.40   | 0.20   | ...      | 0.148  | 0.17  | (0.01)  | 0.008   | 0.008  | 0.090  | 0.016  | ...      | 0.00055 | ...    | ...   | ...   | 0.0007  | ...   | ...       | 45 x 20        | c |
| CRM  | 65 X MgA1J ** | 5.45   | 1.26   | 0.060  | (0.0015) | 0.221  | 0.20  | 0.021   | 0.021   | 0.029  | 0.072  | 0.012  | 0.012    | 0.006   | 0.013  | 0.009 | 0.007 | ...     | ...   | ...       | 45 x 20        |   |
| CRM  | 65 X MgA2G ** | 7.31   | 0.97   | 0.139  | ...      | 0.112  | 0.15  | 0.011   | (0.002) | (0.01) | 0.049  | 0.007  | ...      | 0.0007  | ...    | ...   | ...   | 0.0005  | ...   | ...       | 45 x 20        |   |
| CRM  | 65 X MgA3H ** | 8.99   | 0.706  | 0.152  | ...      | 0.0061 | 0.047 | 0.004   | (0.001) | <0.001 | 0.0026 | 0.004  | ...      | 0.0007  | ...    | ...   | ...   | <0.0002 | ...   | ...       | 45 x 20        |   |
| CRM  | 65 X MgA4H ** | 11.67  | 0.0050 | 0.0062 | ...      | 0.061  | 0.025 | 0.0092  | 0.0036  | 0.033  | 0.0102 | 0.0040 | 0.0186   | 0.0011  | ...    | ...   | ...   | ...     | ...   | ...       | 45 x 20        |   |
| CRM  | 65 X MgA5A    | 8.01   | 0.411  | 0.399  | ...      | 0.020  | 0.110 | 0.006   | 0.020   | 0.012  | 0.013  | 0.043  | 0.0050   | 0.0013  | 0.0035 | ...   | ...   | 0.00034 | ...   | ...       | 40x15 or 50x20 |   |
| CRM  | 65 X MgA7A    | 9.38   | 0.66   | 0.285  | (0.0008) | 0.0010 | 0.006 | 0.0103  | 0.0009  | ...    | <0.002 | <0.002 | <0.0005  | ...     | ...    | ...   | ...   | 0.015   | ...   | ...       | 40 x 17        |   |
| Samples marked ** may be unsuitable for use with glow discharge analysis |               |  |        |        |          |        |       |         |         |        |        |        |          |         |        |       |       |         |       |           |                |   |
| CRM  | 65 X MgB1C ** | 2.34   | 1.71   | 0.61   | (0.001)  | 0.195  | 0.14  | 0.006   | 0.012   | 0.001  | 0.012  | 0.01   | 0.03     | 0.0006  | 0.07   | 0.010 | 0.010 | ...     | ...   | ...       | 45 x 20        | c |
| CRM  | 65 X MgB1D ** | 2.39   | 1.71   | 0.68   | (0.003)  | 0.20   | 0.17  | 0.016   | 0.013   | 0.41   | 0.011  | 0.015  | 0.029    | 0.0007  | 0.070  | 0.015 | 0.013 | ...     | 0.009 | ...       | 45 x 20        |   |
|  | 65 X MgB2B    | 3.38   | 0.90   | 0.34   | <0.002   | 0.10   | 0.07  | 0.01(7) | 0.006   | ...    | 0.01   | 0.01   | ...      | ...     | ...    | ...   | ...   | ...     | ...   | ...       | 40 x 15        |   |
|  | 65 X MgB3B ** | 3.19   | 0.608  | 0.0122 | <0.001   | 0.0214 | 0.012 | (0.004) | 0.0020  | 0.030  | 0.0050 | 0.0037 | (0.0024) | 0.0029  | 0.012  | ...   | ...   | ...     | ...   | ...       | 45 x 20        |   |
| CRM  | 65 X MgB4C*   | 4.20   | 0.32   | 0.004  | <0.01    | 0.05   | 0.04  | 0.01    | <0.002  | ...    | <0.002 | <0.002 | ...      | ...     | ...    | ...   | ...   | ...     | ...   | ...       | 40 x 15        |   |
| * Target values  |               | Samples marked ** may be unsuitable for use with glow discharge analysis |        |        |          |        |       |         |         |        |        |        |          |         |        |       |       |         |       |           |                |   |
|  | 65 CA C8209   | 2.55   | 0.18   | 0.15   | ...      | 0.012  | 0.058 | (0.02)  | 0.001   | ...    | ...    | ...    | ...      | ...     | ...    | ...   | ...   | ...     | ...   | ...       | 60 X 6         |   |

| 6.6 Mg/Zn  |               | Al     | Zn   | Mn     | Zr     | Cu     | Si      | Fe       | Ni    | Ca       | Sn     | Pb     | Ag      | Be      | Ce    | La    | Sr     |     |     | Size (mm) |                |   |
|--|---------------|--------|------|--------|--------|--------|---------|----------|-------|----------|--------|--------|---------|---------|-------|-------|--------|-----|-----|-----------|----------------|---|
|  |               |        |      |        |        |        |         |          |       |          |        |        |         |         |       |       |        |     |     | Ø         | H              |   |
|  | 66 X MgD2A    | 0.30   | 1.13 | 0.74   | <0.01  | 0.08   | 0.07    | 0.014    | 0.008 | <0.005   | 0.011  | 0.012  | ...     | ...     | ...   | ...   | ...    | ... | ... | ...       | 40 x 15        | c |
|  | 66 X MgD3B ** | 0.041  | 1.97 | 0.28   | 0.029  | 0.058  | 0.020   | 0.023    | 0.002 | (0.07)   | 0.007  | 0.009  | 0.005   | 0.0003  | 0.004 | 0.004 | ...    | ... | ... | ...       | 45 x 20        |   |
| CRM  | 66 X MgD4B    | 0.0012 | 2.77 | 0.0053 | 0.69   | 0.0041 | <0.001  | 0.0010   | ...   | ...      | ...    | ...    | ...     | <0.0002 | 0.015 | 0.014 | ...    | ... | ... | ...       | 40 x 15        |   |
| Samples marked ** may be unsuitable for use with glow discharge analysis |               |        |      |        |        |        |         |          |       |          |        |        |         |         |       |       |        |     |     |           |                |   |
| CRM  | 66 X MgC1B    | <0.002 | 2.54 | 0.010  | 0.74   | 0.056  | <0.005  | (0.0014) | ...   | ...      | <0.002 | 0.010  | 0.006   | <0.0002 | ...   | ...   | ...    | ... | ... | ...       | 40 x 15        | c |
| CRM  | 66 X MgC2D    | 0.0008 | 4.49 | 0.0078 | 0.54   | 0.033  | <0.001  | 0.0011   | ...   | (0.0008) | 0.0058 | 0.0031 | <0.0002 | ...     | ...   | ...   | ...    | ... | ... | ...       | 40 x 15        |   |
| CRM  | 66 X MgC3B    | 0.011  | 4.97 | 0.020  | 0.13   | 0.009  | (0.003) | (0.001)  | 0.006 | ...      | <0.002 | 0.003  | 0.001   | ...     | ...   | ...   | ...    | ... | ... | ...       | 40 x 15        |   |
| CRM  | 66 X MgC4C    | 0.039  | 6.80 | 0.167  | <0.001 | 0.0023 | 0.06    | 0.006    | 0.01  | <0.001   | 0.021  | 0.003  | 0.0074  | 0.0001  | ...   | ...   | 0.0001 | ... | ... | ...       | 40x15 or 50x20 |   |

| 6.7 Mg/Rare Earth |              | Al     | Zn    | Mn     | Zr     | Ce    | La    | Nd     | Pr    | Total R.E. | Cu     | Si       | Fe      | Ni       | Sn     | Pb      | Ag      |     |     | Size (mm) |         |   |
|-------------------|--------------|--------|-------|--------|--------|-------|-------|--------|-------|------------|--------|----------|---------|----------|--------|---------|---------|-----|-----|-----------|---------|---|
|                   |              |        |       |        |        |       |       |        |       |            |        |          |         |          |        |         |         |     |     | Ø         | H       |   |
| CRM               | 67 X MgF1B   | 0.0176 | 0.501 | 0.0039 | 0.022  | 1.88  | 1.12  | (0.05) | 0.48  | ...        | 0.0048 | <0.005   | 0.0024  | (0.0003) | <0.002 | <0.001  | <0.001  | ... | ... | ...       | 40 x 15 | c |
| CRM               | 67 X MgF2B   | 0.0038 | 1.71  | 0.0047 | 0.30   | 1.42  | 0.98  | 0.29   | 0.112 | ...        | 0.0033 | <0.002   | (0.001) | 0.0008   | <0.002 | 0.019   | <0.001  | ... | ... | ...       | 40 x 15 |   |
| CRM               | 67 X MgF3B   | <0.001 | 3.34  | 0.0040 | 0.53   | 1.17  | 0.84  | 0.212  | 0.106 | ...        | 0.0010 | (0.001)  | <0.002  | ...      | <0.002 | 0.0140  | <0.001  | ... | ... | ...       | 40 x 15 |   |
| CRM               | 67 X MgF4B   | 0.079  | 5.04  | 0.0023 | 0.024  | 0.81  | 0.47  | 0.048  | 0.195 | ...        | 0.0302 | (0.0014) | <0.002  | ...      | <0.001 | <0.001  | <0.0005 | ... | ... | ...       | 40 x 15 |   |
| CRM               | 67 X MgF5B   | 0.094  | 6.29  | 0.171  | <0.001 | 0.412 | 0.239 | 0.011  | 0.100 | ...        | 0.0735 | 0.0026   | 0.0290  | 0.0004   | <0.001 | <0.0005 | <0.0005 | ... | ... | ...       | 40 x 15 |   |
|                   | 67 NH AEL-93 | 1.45   | 0.053 | 0.161  | ...    | 0.79  | 0.37  | 0.25   | 0.09  | ...        | 0.0121 | 0.0172   | 0.0058  | 0.0025   | ...    | ...     | ...     | ... | ... | ...       | 64 x 13 |   |
|                   | 67 NH AEH-93 | 4.96   | 0.40  | 0.30   | ...    | 2.29  | 0.90  | 0.61   | 0.28  | ...        | 0.0575 | 0.0376   | 0.0018  | 0.0084   | ...    | ...     | ...     | ... | ... | ...       | 64 x 13 |   |
|                   | 67 CA C7489  | 0.001  | ...   | 0.012  | 0.46   | 2.57  | ...   | ...    | ...   | (5.0)      | 0.004  | 0.002    | ...     | 0.015    | ...    | ...     | ...     | ... | ... | ...       | 60 x 6  | c |
|                   | 67 CA C7514  | 0.002  | ...   | 0.012  | 0.42   | 2.47  | ...   | ...    | ...   | (4.7)      | 0.12   | 0.002    | ...     | 0.002    | ...    | ...     | ...     | ... | ... | ...       | 60 x 6  |   |
|                   | 67 CA C7546  | 0.003  | ...   | 0.039  | 0.34   | 1.63  | ...   | ...    | ...   | (3.0)      | 0.058  | 0.001    | ...     | 0.004    | ...    | ...     | ...     | ... | ... | ...       | 60 x 6  |   |
|                   | 67 CA C7548  | 0.004  | ...   | 0.035  | 0.16   | 2.66  | ...   | ...    | ...   | (4.8)      | 0.022  | 0.002    | ...     | 0.001    | ...    | ...     | ...     | ... | ... | ...       | 60 x 6  |   |
|                   | 67 CA C7594  | 0.003  | ...   | 0.033  | 0.31   | 3.22  | ...   | ...    | ...   | (6.0)      | 0.080  | 0.002    | ...     | 0.001    | ...    | ...     | ...     | ... | ... | ...       | 60 x 6  |   |
|                   | 67 CA E1273  | ...    | 2.87  | 0.041  | 0.54   | 1.86  | ...   | ...    | ...   | (3.6)      | 0.022  | ...      | ...     | 0.002    | ...    | ...     | ...     | ... | ... | ...       | 60 x 6  |   |

| 6.8 Mg/Ag/ Rare Earth   |            | Al     | Zn     | Mn     | Zr     | Total R.E. | Ce    | La    | Nd   | Pr      | Th   | Cu     | Si      | Fe       | Ni       | Ca    | Sn     | Pb       | Ag     |     |     | Size (mm) |   |
|---|------------|--------|--------|--------|--------|------------|-------|-------|------|---------|------|--------|---------|----------|----------|-------|--------|----------|--------|-----|-----|-----------|---|
|   |            |        |        |        |        |            |       |       |      |         |      |        |         |          |          |       |        |          |        |     | Ø   | H         |   |
| CRM   | 68 X MgH1B | <0.002 | 0.053  | 0.0027 | 0.47   | ...        | 0.040 | 0.034 | 3.05 | (0.014) | ...  | 0.0046 | <0.005  | <0.002   | (0.0006) | ...   | <0.002 | <0.002   | 3.21   | ... | ... | 40 x 15   | c |
| CRM   | 68 X MgH2B | <0.002 | 0.123  | 0.0038 | 0.46   | ...        | 0.055 | 0.044 | 2.70 | (0.013) | ...  | 0.0050 | <0.002  | (0.0006) | (0.0006) | ...   | <0.005 | (0.0021) | 2.94   | ... | ... | 40 x 15   |   |
|   | 68 X MgH3  | <0.002 | 0.030  | 0.009  | 0.36   | 2.6        | ...   | ...   | ...  | ...     | ...  | 0.011  | <0.005  | 0.002    | 0.001    | 0.007 | <0.005 | 0.007    | 2.4    | ... | ... | 40 x 15   | c |
|   | 68 X MgH6A | 0.23   | 0.21   | 0.17   | <0.01  | (1.0)      | ...   | ...   | ...  | ...     | ...  | 0.11   | 0.01(5) | 0.03     | 0.01     | ...   | <0.002 | <0.005   | 1.13   | ... | ... | 40 x 15   |   |
| The rare-earths in the above series were added as Neodymium rich R.E. but breakdowns of the individual R.E. values are not available. |            |        |        |        |        |            |       |       |      |         |      |        |         |          |          |       |        |          |        |     |     |           |   |
|   | 68 X MgL2  | 0.003  | <0.002 | 0.008  | 0.54   | 1.02       | ...   | ...   | ...  | ...     | 0.69 | 0.012  | <0.005  | <0.001   | <0.002   | 0.003 | <0.005 | <0.001   | 2.32   | ... | ... | 40 x 15   | c |
|   | 68 X MgL3  | 0.003  | <0.002 | 0.008  | 0.39   | 1.23       | ...   | ...   | ...  | ...     | 1.22 | 0.029  | <0.005  | 0.002    | <0.002   | 0.003 | <0.005 | <0.001   | 2.91   | ... | ... | 40 x 15   |   |
|   | 68 X MgL4  | 0.023  | 0.19   | 0.17   | <0.005 | 1.33       | ...   | ...   | ...  | ...     | 1.32 | 0.049  | 0.01    | 0.017    | 0.012    | 0.006 | 0.009  | <0.001   | <0.005 | ... | ... | 40 x 15   |   |
| The rare-earths in the above series were added as Neodymium rich R.E. but breakdowns of the individual R.E. values are not available. |            |        |        |        |        |            |       |       |      |         |      |        |         |          |          |       |        |          |        |     |     |           |   |

| 6.9 Mg/Y/ Rare Earth    |              | Al       | Zn    | Mn     | Zr    | Cu       | Fe     | Ni       | Pb      | Li    | Y     | Ce    | La    | Nd   | Pr    |                    |           |                    |     | Size (mm) |         |  |
|-------------------------|--------------|----------|-------|--------|-------|----------|--------|----------|---------|-------|-------|-------|-------|------|-------|--------------------|-----------|--------------------|-----|-----------|---------|--|
|                         |              |          |       |        |       |          |        |          |         |       |       |       |       |      |       |                    |           | Typical Alloy Type | Ø   | H         |         |  |
| CRM                     | 69 X MgY1A   | (0.0019) | 0.121 | 0.0109 | 0.38  | (0.0015) | 0.0021 | (0.0005) | 0.014   | 0.119 | 4.64  | 0.029 | 0.166 | 2.26 | 0.059 | ...                | ...       | ...                | ... | ...       | 40 x 17 |  |
| CRM                     | 69 X MgY2A * | 0.020    | 0.33  | 0.008  | 0.37  | 0.002    | 0.003  | 0.010    | 0.009   | 0.010 | 1.85  | 0.048 | 0.033 | 2.60 | 0.018 | continued          | ...       | ...                | ... | ...       | 40 x 17 |  |
| CRM                     | 69 X MgY3A * | 0.030    | 0.29  | 0.010  | 0.44  | 0.003    | 0.004  | 0.020    | 0.010   | 0.010 | 3.35  | 0.030 | 0.025 | 2.40 | 0.015 | ...                | ...       | ...                | ... | ...       | 40 x 17 |  |
| * Target values         |              |          |       |        |       |          |        |          |         |       |       |       |       |      |       |                    |           |                    |     |           |         |  |
| Continuation from above |              | Eu       | Sm    | Gd     | Tb    | Dy       | Ho     | Er       | Tm      | Yb    | Lu    |       |       |      |       | Typical Alloy Type | Size (mm) |                    |     |           |         |  |
|                         | 69 X MgY1A   | (0.004)  | 0.09  | 0.284  | 0.045 | 0.313    | 0.065  | 0.13     | (0.013) | 0.078 | 0.007 |       |       |      |       | WE 43              | 40 x 17   |                    |     |           |         |  |
|                         | 69 X MgY2A   | (0.001)  | 0.015 | 0.080  | 0.010 | 0.085    | 0.005  | 0.015    | (0.004) | 0.010 | 0.003 |       |       |      |       |                    | 40 x 17   |                    |     |           |         |  |
|                         | 69 X MgY3A   | (0.002)  | 0.022 | 0.21   | 0.005 | 0.23     | 0.01   | 0.035    | (0.003) | 0.015 | 0.001 |       |       |      |       |                    | 40 x 17   |                    |     |           |         |  |

# 7. Tin Base

Blocks/Discs

| 7.1 Tin with Impurities |         |        |         |         |         |         |         |          |        |         |         |       |        |         |         |        | Size (mm) |              |   |
|-------------------------|---------|--------|---------|---------|---------|---------|---------|----------|--------|---------|---------|-------|--------|---------|---------|--------|-----------|--------------|---|
|                         | Sb      | As     | Bi      | Pb      | Cu      | Fe      | Ni      | Al       | Cd     | Zn      | In      | Te    | Ag     | Au      | Co      | S      | Sn        | Ø            | H |
| CRM 71 X SR0A           | 0.019   | <0.001 | 0.014   | 0.034   | 0.0020  | (0.001) | 0.0025  | 0.014    | 0.0013 | 0.007   | 0.0095  | ...   | 0.0025 | <0.0005 | ...     | 0.0008 | ...       | 40 x 15      | c |
| CRM 71 X SR1D           | 0.013   | 0.003  | 0.010   | 0.030   | 0.009   | 0.0017  | ...     | ...      | 0.007  | 0.007   | 0.014   | 0.003 | 0.009  | 0.003   | ...     | ...    | ...       | 40 x 15      |   |
| CRM 71 X SR2D           | 0.057   | 0.041  | 0.056   | 0.127   | 0.054   | 0.002   | 0.0096  | 0.002    | 0.041  | 0.015   | 0.049   | 0.022 | 0.025  | 0.008   | ...     | ...    | ...       | 40 x 15      |   |
| CRM 71 X SR3E           | 0.145   | 0.061  | 0.105   | 0.29    | 0.101   | 0.003   | 0.0009  | ...      | 0.022  | 0.014   | 0.028   | 0.008 | 0.007  | 0.003   | ...     | ...    | ...       | 40 x 15      |   |
| 71 A 192g               | 0.0007  | ...    | 0.00003 | 0.0007  | 0.00007 | 0.0002  | <0.0001 | ...      | ...    | 0.00006 | ...     | ...   | ...    | ...     | ...     | ...    | 99.997    | 300g block   | c |
| <b>W D H</b>            |         |        |         |         |         |         |         |          |        |         |         |       |        |         |         |        |           |              |   |
| CRM 71 B 1727           | (0.004) | <0.01  | ...     | 0.00333 | ...     | (0.002) | ...     | ...      | ...    | ...     | (0.002) | ...   | ...    | ...     | ...     | ...    | ...       | 30 x 30 x 30 |   |
| <b>Ø H</b>              |         |        |         |         |         |         |         |          |        |         |         |       |        |         |         |        |           |              |   |
| 71 MF NF54-1            | 0.0065  | 0.0105 | 0.0026  | 0.023   | 0.0107  | 0.003   | 0.0018  | (0.0003) | 0.0003 | ...     | 0.0053  | ...   | 0.006  | ...     | (0.002) | ...    | ...       | 37 x 12      | c |
| 71 MF NF54-2            | 0.011   | 0.082  | 0.0046  | 0.148   | 0.047   | 0.014   | 0.0033  | (0.008)  | 0.0006 | ...     | 0.013   | ...   | 0.010  | ...     | 0.002   | ...    | ...       | 37 x 12      |   |
| 71 MF NF54-3            | 0.020   | 0.13   | 0.010   | 0.41    | 0.15    | (0.018) | 0.012   | (0.018)  | 0.0009 | (0.001) | 0.02    | ...   | 0.032  | ...     | 0.008   | ...    | ...       | 37 x 12      |   |
| 71 MF NF54-4            | 0.045   | 0.27   | 0.022   | 0.72    | 0.29    | (0.023) | 0.024   | ...      | 0.005  | ...     | 0.043   | ...   | 0.063  | ...     | 0.02    | ...    | ...       | 37 x 12      |   |
| 71 MF NF54-5            | 0.095   | 0.47   | 0.038   | 1.0     | 0.52    | ...     | ...     | ...      | 0.01   | (0.016) | 0.098   | ...   | 0.10   | ...     | ...     | ...    | ...       | 37 x 12      |   |

| 7.2 Tin/Antimony |     |      |       |       |       |       |       |       |   |  |  |  |  |  |  |  | Size (mm) |         |   |
|------------------|-----|------|-------|-------|-------|-------|-------|-------|---|--|--|--|--|--|--|--|-----------|---------|---|
|                  | Sb  | As   | Bi    | Pb    | Cu    | Fe    | Cd    | Zn    |   |  |  |  |  |  |  |  |           | Ø       | H |
| 72 X SA4RB       | 4.0 | 0.03 | 0.10  | 0.08  | 0.02  | 0.10  | 0.003 | 0.007 |   |  |  |  |  |  |  |  |           | 40 x 15 | c |
| 72 X SA5RB       | 5.0 | 0.02 | 0.005 | 0.025 | 0.005 | 0.003 | 0.02  | 0.001 | A set of Sn/Sb binaries is also available, with certified levels of Sb in the range from 1% to 12%. Please enquire for details. |  |  |  |  |  |  |  |           | 40 x 15 |   |
| 72 X SA6RB       | 6.0 | 0.05 | 0.25  | 0.25  | 0.10  | 0.05  | 0.01  | 0.02  |   |  |  |  |  |  |  |  |           | 40 x 15 |   |

| 7.3 Tin White Metals (Pewter/Babbitt) |       |       |       |       |       |        |        |         |        |         |         |          |        |         |           |  | Size (mm) |  |
|---------------------------------------|-------|-------|-------|-------|-------|--------|--------|---------|--------|---------|---------|----------|--------|---------|-----------|--|-----------|--|
|                                       | Sb    | As    | Bi    | Pb    | Cu    | Fe     | Ni     | Al      | Cd     | Zn      | In      | Ag       | Co     | S       |           |  |           |  |
| CRM 73 X SC1A                         | 1.48  | 0.008 | 0.084 | 0.067 | 2.02  | 0.0025 | 0.0041 | 0.0025  | 0.006  | 0.003   | 0.008   | 0.010    | <0.001 | <0.002  | 40 x 15 c |  |           |  |
| CRM 73 X SC2A                         | 3.07  | 0.035 | 0.62  | 0.029 | 1.06  | 0.030  | 0.0048 | (0.002) | 0.036  | 0.003   | (0.002) | 0.006    | 0.021  | <0.001  | 40 x 15   |  |           |  |
| CRM 73 X SC3A                         | 4.60  | 0.029 | 0.020 | 0.040 | 0.222 | 0.017  | 0.0136 | 0.001   | 0.024  | 0.0014  | 0.031   | 0.013    | 0.006  | (0.002) | 40 x 15   |  |           |  |
| CRM 73 X SC4A                         | 6.02  | 0.005 | 0.218 | 0.514 | 3.05  | 0.011  | 0.017  | 0.005   | 0.052  | 0.008   | 0.011   | 0.042    | 0.0035 | (0.003) | 40 x 15   |  |           |  |
| CRM 73 X SC5A                         | 7.03  | 0.013 | 0.43  | 0.136 | 0.57  | 0.004  | 0.0058 | 0.003   | 0.008  | 0.001   | 0.036   | 0.063    | 0.011  | (0.001) | 40 x 15   |  |           |  |
| CRM 73 X SC6A                         | 0.092 | 0.204 | 0.115 | 0.100 | 5.17  | 0.007  | 0.013  | (0.003) | 0.0125 | 0.01    | 0.058   | 0.08     | 0.0050 | (0.004) | 40 x 15   |  |           |  |
| CRM 73 X SC7A                         | 14.01 | 0.047 | 0.009 | 0.356 | 6.51  | 0.046  | 0.008  | 0.001   | 0.0018 | (0.003) | 0.014   | 0.006    | 0.0160 | <0.001  | 40 x 15   |  |           |  |
| CRM 73 X SC8A                         | 9.65  | 0.121 | 0.037 | 0.037 | 3.89  | 0.073  | 0.014  | 0.004   | 0.133  | (0.008) | 0.017   | (0.0015) | 0.017  | (0.011) | 40 x 15   |  |           |  |
| CRM 73 X SC9A                         | 8.18  | 0.53  | 0.066 | 0.20  | 8.47  | 0.037  | 0.008  | <0.001  | 0.078  | (0.003) | 0.010   | 0.004    | 0.0030 | (0.008) | 40 x 15   |  |           |  |
| CRM 73 X SC11A                        | 11.63 | 0.31  | 0.537 | 0.040 | 10.54 | 0.072  | 0.49   | <0.002  | 1.63   | 0.065   | ...     | 0.060    | ...    | ...     | 40 x 15   |  |           |  |
| CRM 73 X SC12A                        | 8.05  | 0.024 | 0.020 | 0.024 | 7.72  | 0.051  | 0.384  | <0.002  | 0.625  | 0.020   | ...     | 0.83     | ...    | ...     | 40 x 15   |  |           |  |
| CRM 73 PN LA1                         | 6.79  | 0.012 | 0.014 | 3.18  | 2.45  | 0.012  | 0.011  | ...     | 1.41   | 0.0016  | ...     | ...      | ...    | ...     | 40 x 25   |  |           |  |
| CRM 73 PN LA2                         | 7.81  | 0.092 | 0.033 | 2.17  | 3.84  | 0.018  | 0.094  | ...     | 0.88   | ...     | ...     | ...      | ...    | ...     | each      |  |           |  |
| CRM 73 PN LA3                         | 10.22 | 0.24  | 0.059 | 1.19  | 8.13  | 0.059  | 0.28   | ...     | 0.50   | 0.0095  | ...     | ...      | ...    | ...     | Set Only  |  |           |  |
| CRM 73 PN LA4                         | 11.66 | 0.43  | 0.085 | 0.41  | 6.35  | 0.080  | 0.45   | ...     | 0.096  | ...     | ...     | ...      | ...    | ...     | Set Only  |  |           |  |
| CRM 73 PN LA5                         | 13.58 | 0.54  | 0.099 | 0.070 | 5.45  | 0.096  | 0.53   | ...     | 0.011  | 0.020   | ...     | ...      | ...    | ...     | Set Only  |  |           |  |

| 7.4 Tin-base (Lead-Free) Solders |       |       |        |        |        |        |        |       |        |        |        |         |        |        |           |  | Size (mm) |  |
|----------------------------------|-------|-------|--------|--------|--------|--------|--------|-------|--------|--------|--------|---------|--------|--------|-----------|--|-----------|--|
|                                  | Cu    | Ag    | Pb     | Sb     | Bi     | Zn     | Ni     | Fe    | As     | Cd     | Se     | Au      | Al     | Sn     |           |  |           |  |
| CRM 74 X E A                     | 3.00  | 0.744 | 0.0262 | 0.028  | 0.0097 | <0.001 | 0.011  | 0.052 | 0.088  | 0.0022 | 0.0025 | ...     | ...    | rem    | 40 x 15 c |  |           |  |
| CRM 74 X HN A                    | 3.98  | 0.156 | 0.082  | 0.0256 | 0.141  | 0.0011 | 0.0083 | 0.028 | 0.0009 | 0.0045 | 0.0057 | ...     | ...    | (95.6) | 40 x 15   |  |           |  |
| CRM 74 X TC A                    | 4.88  | 0.013 | 0.183  | 0.056  | 0.040  | 0.011  | 0.0134 | 0.062 | 0.016  | 0.0112 | 0.069  | ...     | ...    | (94.6) | 40 x 15   |  |           |  |
| CRM 74 X AM A                    | 3.00  | 0.55  | 0.174  | 1.05   | 0.196  | 0.0024 | 0.028  | 0.054 | 0.064  | 0.0065 | ...    | ...     | ...    | rem    | 40 x 15 c |  |           |  |
| CRM 74 X HA A                    | 0.604 | 2.69  | 0.025  | 1.98   | 0.057  | 2.59   | 0.016  | 0.052 | 0.0076 | 0.0025 | ...    | ...     | ...    | rem    | 40 x 15   |  |           |  |
| CRM 74 X HB A                    | 4.76  | 0.069 | 0.059  | 4.97   | 0.0087 | 0.018  | 1.10   | 0.116 | 0.027  | 0.0106 | ...    | ...     | ...    | rem    | 40 x 15   |  |           |  |
| CRM 74 X CA1A                    | 0.696 | 0.406 | 0.077  | 0.016  | 0.013  | ...    | ...    | ...   | ...    | ...    | ...    | 0.0069  | 0.0101 | ...    | 40 x 15 c |  |           |  |
| CRM 74 X CA3A                    | 0.055 | 3.11  | 0.036  | 0.027  | 0.017  | ...    | ...    | ...   | ...    | ...    | ...    | 0.0100  | <0.001 | ...    | 40 x 15   |  |           |  |
| 74 MF NF46-3X                    | 0.19  | 3.1   | 0.043  | 0.205  | 0.05   | ...    | ...    | ...   | ...    | ...    | ...    | (0.015) | ...    | ...    | 37 x 12 c |  |           |  |
| 74 MF NF46-4X                    | 0.096 | 4.1   | 0.059  | 0.11   | 0.095  | ...    | ...    | ...   | ...    | ...    | ...    | (0.007) | ...    | ...    | 37 x 12   |  |           |  |
| 74 MF NF46-5X                    | 0.030 | 5.0   | 0.21   | 0.059  | 0.25   | ...    | ...    | ...   | ...    | ...    | ...    | (0.017) | ...    | ...    | 37 x 12   |  |           |  |

# 8. Lead Base

Blocks/Discs

| 8.1 Binaries. Lead-Antimony, Lead-Arsenic |       |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Size (mm) |   |
|---|-------|------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|-----------|---|
|   | Sb    | As   |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Ø         | H |
| CRM 81 X PA0.5C                           | 0.481 | ...  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 40 x 15   | c |
| CRM 81 X PA1.0C                           | 0.989 | ...  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 40 x 15   |   |
| CRM 81 X PA2.0D                           | 1.996 | ...  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 40 x 15   |   |
| CRM 81 X PA3.5D                           | 3.53  | ...  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 40 x 15   |   |
| CRM 81 X PA7.0D                           | 7.02  | ...  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 40 x 15   |   |
| CRM 81 X PA10.0C                          | 9.60  | ...  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 40 x 15   |   |
| CRM 81 X PA12.5D                          | 12.72 | ...  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 40 x 15   |   |
| 81 X PA5A                                 | ...   | 1.25 |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 40 x 15   | c |

# 8. Lead Base

Blocks/Discs

| 8.2 Lead/Silver                       |                 | Sn               | Sb       | Bi      | Cu       | As        | Ag      | Zn        | Cd       | Fe       | Al       | In       | Size (mm) |              |           |           |         |          |           |   |   |
|---------------------------------------|-----------------|------------------|----------|---------|----------|-----------|---------|-----------|----------|----------|----------|----------|-----------|--------------|-----------|-----------|---------|----------|-----------|---|---|
|                                       |                 |                  |          |         |          |           |         |           |          |          |          |          | Ø         | H            |           |           |         |          |           |   |   |
| CRM                                   | 82 X PAg 1.5R E | 0.036            | 0.386    | 0.065   | 0.27     | 0.005     | 1.55    | (0.004)   | ...      | ...      | ...      | ...      | 40 x 15   |              | c         |           |         |          |           |   |   |
| CRM                                   | 82 X PAg 2.5R D | 0.082            | 0.246    | 0.13    | 0.26     | 0.009     | 2.21    | (0.0024)  | ...      | ...      | ...      | ...      | 40 x 15   |              |           |           |         |          |           |   |   |
| CRM                                   | 82 X PAg 3.5R D | 0.25             | 0.106    | 0.290   | 0.073    | 0.020     | 3.54    | (0.0004)  | 0.0027   | <0.001   | 0.0015   | 0.037    | 40 x 15   |              |           |           |         |          |           |   |   |
| CRM                                   | 82 X PAg 6.0R A | 0.50             | 0.48     | 0.52    | 0.18     | 0.021     | 5.93    | 0.007     | 0.010    | <0.001   | <0.001   | 0.008    | 40 x 15   |              |           |           |         |          |           |   |   |
|                                       | 82 MF NF32-30X  | 0.63             | 0.43     | 0.045   | 0.22     | (0.005)   | 1.96    | (0.001)   | ...      | ...      | ...      | ...      | 37 x 12   |              | c         |           |         |          |           |   |   |
|                                       | 82 MF NF32-31X  | 1.04             | 0.24     | 0.10    | 0.067    | 0.016     | 1.57    | (0.0025)  | ...      | ...      | ...      | ...      | 37 x 12   |              |           |           |         |          |           |   |   |
|                                       | 82 MF NF32-32X  | 1.25             | 0.11     | 0.30    | 0.52     | 0.023     | 0.55    | (0.005)   | ...      | ...      | ...      | ...      | 37 x 12   |              |           |           |         |          |           |   |   |
|                                       | 82 MF NF34-4.5X | 0.049            | 0.42     | 0.051   | 0.25     | (0.005)   | 4.54    | (0.001)   | ...      | ...      | ...      | ...      | 37 x 12   |              | c         |           |         |          |           |   |   |
|                                       | 82 MF NF34-5.5X | 0.081            | 0.28     | 0.10    | 0.14     | (0.01)    | 5.43    | (0.0025)  | ...      | ...      | ...      | ...      | 37 x 12   |              |           |           |         |          |           |   |   |
|                                       | 82 MF NF34-6.5X | 0.19             | 0.11     | 0.22    | 0.81     | (0.02)    | 6.65    | (0.005)   | ...      | ...      | ...      | ...      | 37 x 12   |              |           |           |         |          |           |   |   |
| 8.3 Lead with Impurities              |                 | Sn               | Sb       | Bi      | Cu       | As        | Ag      | Zn        | Cd       | Ni       | Fe       | Te       | Al        | In           | Ca        | Na        | Se      | Au       | Size (mm) |   |   |
|                                       |                 |                  |          |         |          |           |         |           |          |          |          |          |           |              |           |           |         |          | Ø         | H |   |
|                                       | 83 X PR1G       | 0.004            | 0.005    | 0.080   | 0.006    | 0.050     | 0.088   | 0.002     | 0.075    | 0.001    | 0.001    | 0.003    | 0.001     | 0.045        | 0.004     | 0.01      | <0.002  | 0.008    | 40 x 15   |   | c |
| CRM                                   | 83 X PR2E       | 0.095            | 0.053    | 0.0177  | 0.039    | 0.018     | 0.053   | (0.0004)  | 0.0021   | 0.0010   | <0.0005  | 0.0064   | ...       | 0.0015       | (0.001)   | ...       | 0.004   | (0.0011) | 40 x 15   |   |   |
| CRM                                   | 83 X PR3E       | 0.048            | 0.09     | 0.193   | 0.057    | (0.001)   | 0.003   | 0.0017    | 0.050    | 0.0024   | <0.001   | 0.004    | <0.001    | 0.002        | 0.001     | (0.003)   | (0.01)  | (0.005)  | 40 x 15   |   |   |
|                                       | 83 X PR4F       | 0.009            | 0.012    | 0.014   | 0.015    | (0.002)   | 0.014   | 0.005     | 0.010    | 0.013    | <0.005   | 0.025    | 0.001     | 0.005        | 0.0026    | 0.001     | 0.003   | 0.002    | 40 x 15   |   |   |
|                                       | 83 X PR5B       | <0.0002          | <0.0001  | 0.0028  | 0.0007   | (0.0001)  | 0.0005  | <0.0001   | 0.00009  | <0.0001  | <0.0001  | <0.0001  | ...       | ...          | <0.0001   | ...       | <0.0001 | ...      | 52 x 14   |   |   |
| CRM                                   | 83 X PR7A       | 0.21             | 0.84     | 0.50    | 0.22     | 0.049     | 0.30    | 0.002     | 0.49     | 0.005    | (0.001)  | 0.002    | (0.001)   | 0.077        | (0.001)   | 0.004     | (0.01)  | (0.001)  | 40 x 15   |   |   |
| CRM                                   | 83 X PR8A       | 0.59             | 0.25     | 1.13    | 0.083    | 0.17      | 0.55    | 0.007     | 0.260    | 0.003    | (0.001)  | (0.002)  | (0.001)   | 0.74         | <0.002    | 0.019     | (0.012) | (0.011)  | 40 x 15   |   |   |
|                                       | 83 MF NF44-A    | <0.003           | <0.003   | 0.00086 | 0.00088  | 0.00072   | 0.0013  | 0.0005    | 0.0021   | 0.00072  | <0.005   | ...      | ...       | <0.001       | 0.00037   | ...       | ...     | ...      | 37 x 12   |   | c |
|                                       | 83 MF NF44-B    | 0.0030           | 0.0054   | 0.0051  | 0.0058   | 0.0059    | 0.0050  | ...       | 0.00070  | 0.0036   | <0.005   | ...      | ...       | 0.0014       | ...       | ...       | ...     | ...      | 37 x 12   |   |   |
|                                       | 83 MF NF44-C    | 0.059            | 0.018    | 0.021   | 0.016    | 0.015     | 0.015   | ...       | 0.016    | 0.0013   | <0.005   | ...      | ...       | 0.0026       | 0.0009    | ...       | ...     | ...      | 37 x 12   |   |   |
|                                       | 83 MF NF44-D    | 0.13             | 0.059    | 0.053   | 0.027    | 0.055     | 0.033   | ...       | 0.036    | ...      | ...      | ...      | ...       | 0.021        | ...       | ...       | ...     | ...      | 37 x 12   |   |   |
|                                       | 83 MF NF44-E    | 0.56             | 0.60     | 0.49    | 0.042    | 0.53      | 0.19    | 0.0025    | 0.12     | ...      | ...      | ...      | ...       | ...          | ...       | ...       | ...     | ...      | 37 x 12   |   |   |
|                                       | 83 MF NF44-F    | 1.05             | 0.89     | 0.77    | 0.064    | ...       | 0.65    | 0.0015    | 0.53     | ...      | ...      | ...      | ...       | 0.30         | ...       | ...       | ...     | ...      | 37 x 12   |   |   |
|                                       | 83 X PBTE2 B    | <0.001           | <0.001   | <0.001  | <0.001   | <0.001    | <0.001  | <0.001    | ...      | ...      | <0.001   | 0.060    | ...       | ...          | ...       | ...       | ...     | ...      | 40 x 15   |   | c |
|                                       |                 | All Elements ppm |          |         |          |           |         |           |          |          |          |          | Size (mm) |              |           |           |         |          |           |   |   |
|                                       |                 | Sn               | Sb       | Bi      | Cu       | As        | Ag      | Zn        | Cd       | Ni       | Te       | Ti       | Se        | W            | D         | H         |         |          |           |   |   |
| CRM                                   | 83 F 286 A      | <0.05            | 0.10     | 21.5    | 1.49     | <0.002    | 0.015   | <0.1      | 0.125    | 0.041    | <0.1     | 2.5      | <0.05     | 60 x 60 x 12 |           |           | c       |          |           |   |   |
| CRM                                   | 83 F 287 A      | <0.05            | 0.040    | 67.3    | 0.98     | <0.003    | 15.2    | <0.1      | 0.36     | 0.024    | <0.2     | 0.73     | <0.05     | 60 x 60 x 12 |           |           |         |          |           |   |   |
| CRM                                   | 83 F 288 A      | 30.6             | 32.5     | 215.8   | 19.3     | 55.7      | 30.5    | 8.2       | 33.3     | 4.57     | 32.8     | 2.3      | <0.2      | 60 x 60 x 12 |           |           |         |          |           |   |   |
| 8.4 Lead/Tin/Calcium (Battery Alloys) |                 | Sn               | Sb       | Bi      | Cu       | As        | Ag      | Zn        | Cd       | Te       | Al       | Ca       | Ni        | Fe           | Mn        | Mg        | Se      | S        | Size (mm) |   |   |
|                                       |                 |                  |          |         |          |           |         |           |          |          |          |          |           |              |           |           |         |          | Ø         | H |   |
| CRM                                   | 84 X BA1E       | 1.054            | 0.0018   | 0.0148  | 0.0019   | (0.0004)  | 0.0099  | 0.0031    | 0.0026   | (0.0004) | 0.0135   | 0.099    | 0.0002    | ...          | ...       | ...       | ...     | ...      | 40 x 15   |   | c |
| CRM                                   | 84 X BA2B       | 0.51             | 0.002    | 0.024   | 0.003    | <0.0005   | 0.008   | 0.019     | 0.0052   | <0.002   | ...      | 0.062    | (0.0002)  | ...          | ...       | ...       | ...     | ...      | 40 x 15   |   |   |
| CRM                                   | 84 X BA3B       | 0.233            | 0.0049   | 0.034   | 0.0042   | (0.0007)  | 0.0044  | 0.0069    | 0.0032   | (0.0003) | 0.0051   | 0.017    | ...       | ...          | ...       | ...       | ...     | ...      | 40 x 15   |   |   |
| CRM                                   | 84 X BA4B       | 0.108            | 0.061    | 0.074   | 0.031    | (0.0008)  | 0.003   | (0.0003)  | 0.010    | 0.030    | ...      | (0.0014) | 0.0007    | ...          | ...       | ...       | ...     | ...      | 40 x 15   |   |   |
|                                       | 84 X BA5A       | 1.18             | <0.001   | 0.01    | (0.0007) | <0.001    | 0.002   | <0.0005   | (0.0002) | <0.001   | ...      | 0.093    | ...       | ...          | ...       | ...       | ...     | ...      | 52 x 14   |   |   |
|                                       | 84 X BA6A       | 0.73             | 0.001    | 0.008   | 0.0010   | <0.001    | 0.002   | <0.001    | (0.0002) | <0.001   | ...      | 0.095    | ...       | ...          | ...       | ...       | ...     | ...      | 52 x 14   |   |   |
|                                       | 84 X BA7A       | 0.61             | 0.002    | 0.009   | 0.0009   | <0.001    | 0.002   | <0.0005   | <0.0002  | <0.001   | ...      | 0.036    | ...       | ...          | ...       | ...       | ...     | ...      | 52 x 14   |   |   |
| CRM                                   | 84 X BA8A       | 0.293            | 0.0009   | 0.019   | 0.0007   | (0.0004)  | 0.0043  | 0.0013    | 0.0010   | <0.002   | 0.021    | 0.156    | ...       | ...          | ...       | ...       | ...     | ...      | 40 x 15   |   |   |
| CRM                                   | 84 X BA9A       | 2.97             | 0.0008   | 0.0160  | 0.0009   | (0.0008)  | 0.0018  | (0.0002)  | <0.0005  | <0.0005  | 0.0189   | 0.098    | ...       | ...          | ...       | ...       | ...     | ...      | 40 x 15   |   |   |
| CRM                                   | 84 X BACMD      | 0.645            | (0.0003) | 0.0022  | 0.0004   | (0.0001)  | 0.0004  | 0.0002    | <0.0001  | (0.0002) | 0.0123   | 0.101    | <0.0001   | <0.0005      | <0.0001   | (0.00008) | <0.0001 | <0.0001  | 55 x 12   |   | c |
| CRM                                   | 84 X BAHCE      | <0.0005          | (0.0001) | 0.0130  | 0.0005   | (0.00015) | 0.0005  | (0.00017) | <0.0001  | (0.0001) | 0.0304   | 0.139    | <0.0001   | <0.0001      | <0.0001   | (0.0001)  | <0.0001 | <0.0001  | 55 x 12   |   |   |
| CRM                                   | 84 DB 101       | 0.293            | ...      | 0.0167  | 0.00173  | ...       | 0.00288 | ...       | ...      | ...      | 0.0257   | 0.1436   | ...       | ...          | ...       | ...       | ...     | ...      | 50 x 30   |   | c |
| CRM                                   | 84 DB 102       | 0.895            | ...      | 0.0148  | 0.00109  | ...       | 0.00248 | ...       | ...      | ...      | 0.0124   | 0.0705   | ...       | ...          | ...       | ...       | ...     | ...      | ...       |   |   |
| 8.5 Various Lead Alloys               |                 | Sn               | Sb       | Bi      | Cu       | As        | Ag      | Ni        | Cd       | Zn       | Te       | Se       | Fe        | S            | Size (mm) |           |         |          |           |   |   |
|                                       |                 |                  |          |         |          |           |         |           |          |          |          |          |           |              | Ø         | H         |         |          |           |   |   |
|                                       | 85 X PSn2A      | 1.87             | 0.023    | 0.0093  | 0.035    | <0.005    | 0.002   | <0.001    | <0.001   | <0.001   | <0.001   | 0.0058   | <0.001    | ...          | 52 x 14   |           | c       |          |           |   |   |
| CRM                                   | 85 X PSb3B      | 0.242            | 2.67     | 0.017   | 0.039    | 0.150     | 0.002   | 0.0011    | 0.0012   | (0.0003) | 0.0030   | 0.022    | (0.0005)  | (0.003)      | 40 x 15   |           |         |          |           |   |   |
| CRM                                   | 85 X PSb3C      | 0.226            | 3.24     | 0.0150  | 0.041    | 0.125     | 0.0020  | 0.0005    | (0.0002) | <0.0005  | (0.0007) | 0.011    | <0.0005   | (0.0034)     | 40 x 15   |           |         |          |           |   |   |
|                                       | 85 X PSb5A      | 0.057            | 5.14     | 0.022   | 0.007    | 0.12      | 0.0017  | 0.0025    | <0.001   | <0.001   | <0.001   | 0.0008   | <0.001    | (0.0070)     | 52 x 14   |           |         |          |           |   |   |
|                                       | 85 X PSb8A      | 0.085            | 8.43     | 0.010   | 0.032    | 0.02      | 0.0016  | 0.0014    | <0.001   | (0.0002) | <0.005   | 0.0007   | <0.001    | (0.0011)     | 52 x 14   |           |         |          |           |   |   |
|                                       | 85 X PSb10A     | 0.080            | 10.2     | 0.007   | 0.14     | 0.11      | 0.0015  | 0.0013    | <0.001   | 0.014    | <0.002   | <0.001   | <0.005    | ...          | 52 x 14   |           |         |          |           |   |   |
|                                       | 85 X PSb12A     | 0.21             | 11.4     | 0.007   | 0.30     | 0.11      | 0.0015  | 0.0016    | <0.001   | 0.087    | <0.005   | <0.001   | <0.001    | ...          | 52 x 14   |           |         |          |           |   |   |
| CRM                                   | 85 X ANTH D     | 1.32             | 6.32     | 0.059   | 0.0234   | 0.487     | 0.0058  | 0.0035    | 0.0052   | 0.0004   | 0.010    | 0.017    | 0.0041    | (0.0030)     | 40 x 15   |           | c       |          |           |   |   |
| CRM                                   | 85 X HRH G      | 0.87             | 1.14     | 0.090   | 0.080    | 0.73      | 0.247   | 0.001     | 0.0002   | ...      | 0.002    | 0.035    | ...       | (0.0008)     | 55 x 12   |           |         |          |           |   |   |
| CRM                                   | 85 X CADH A     | 0.196            | 2.03     | 0.0174  | 0.029    | 0.191     | 0.0043  | 0.0023    | 2.06     | 0.0035   | 0.0021   | 0.004    | 0.0003    | <0.001       | 40 x 15   |           |         |          |           |   |   |
| CRM                                   | 85 X 0494Pb1A   | 0.051            | 0.95     | 0.0017  | 0.012    | 0.049     | ...     | ...       | ...      | ...      | ...      | 0.004    | ...       | ...          | 40 x 15   |           | c       |          |           |   |   |
| CRM                                   | 85 X 0494Pb2A   | 0.155            | 2.07     | 0.0018  | 0.054    | 0.128     | ...     | ...       | ...      | ...      | ...      | 0.023    | ...       | ...          | 40 x 15   |           |         |          |           |   |   |
| CRM                                   | 85 X 0494Pb3A   | 0.294            | 3.02     | 0.038   | 0.100    | 0.277     | ...     | ...       | ...      | ...      | ...      | (0.05)   | ...       | ...          | 40 x 15   |           |         |          |           |   |   |
| CRM                                   | 85 X 0616Pb1A   | 0.070            | 1.76     | 0.026   | 0.047    | 0.068     | 0.0023  | 0.0010    | 0.0022   | 0.0009   | (0.0016) | 0.017    | <0.001    | ...          | 40 x 15   |           | c       |          |           |   |   |
| 8.6 Lead Babbitts                     |                 | Sn               | Sb       | Bi      | Cu       | As        | Ag      | Ni        | Cd       | Zn       | Fe       | Al       | In        | Pd           | Size (mm) |           |         |          |           |   |   |
|                                       |                 |                  |          |         |          |           |         |           |          |          |          |          |           |              | Ø         | H         |         |          |           |   |   |
| CRM                                   | 86 X PSS1A      | 4.42             | 12.11    | 0.21    | 0.028    | 0.59      | 0.003   | 0.0014    | 0.006    | <0.001   | (0.0005) | <0.001   | 0.008     | <0.0005      | 40 x 15   |           | c       |          |           |   |   |
| CRM                                   | 86 X PSS2A      | 6.33             | 8.16     | 0.054   | 0.118    | 1.42      | 0.004   | 0.0080    | 0.069    | <0.002   | <0.001   | <0.0005  | (0.002)   | (0.001)      | 40 x 15   |           |         |          |           |   |   |
| CRM                                   | 86 X PSS3A      | 9.01             | 14.02    | 0.031   | 0.608    | 0.10      | 0.006   | 0.0040    | 0.020    | <0.001   | (0.0016) | <0.001   | 0.004     | (0.003)      | 40 x 15   |           |         |          |           |   |   |



# 9. Solders

Blocks/Discs

| 9.1 Tin/Lead Solders |       |        |         |        |         |        |          |          |        |          |         |        |          |          |     | Size (mm) |   |
|----------------------|-------|--------|---------|--------|---------|--------|----------|----------|--------|----------|---------|--------|----------|----------|-----|-----------|---|
|                      | Sn    | Sb     | Bi      | Cu     | As      | Ag     | Fe       | Zn       | Cd     | Ni       | Au      | In     | Te       | Al       | Pb  | Ø         | H |
|                      | 8.81  | 0.04   | 0.03    | 0.015  | 0.006   | 0.005  | 0.003    | 0.008    | 0.003  | 0.009    | ...     | ...    | ...      | ...      | rem | 40 x 15   | c |
|                      | 10.38 | 0.51   | 0.15    | 0.05   | 0.04    | 0.050  | 0.003    | 0.030    | 0.007  | 0.003    | ...     | ...    | ...      | ...      | rem | 40 x 15   |   |
|                      | 11.97 | 0.26   | 0.23    | 0.12   | 0.02    | 0.030  | 0.002    | 0.003    | 0.011  | (0.02)   | ...     | ...    | ...      | ...      | rem | 40 x 15   |   |
|                      | 10.14 | <0.001 | <0.001  | <0.001 | <0.001  | <0.001 | <0.001   | <0.001   | <0.002 | <0.001   | ...     | ...    | ...      | ...      | rem | 40 x 15   | c |
|                      | 9.5   | 0.015  | 0.011   | 0.001  | 0.0009  | 0.002  | (0.0002) | (0.0002) | 0.0007 | (0.0002) | 0.005   | 0.005  | ...      | (0.0005) | rem | 37 x 12   | c |
|                      | 10.0  | 0.11   | 0.012   | 0.002  | 0.003   | 0.004  | (0.0003) | (0.0001) | 0.002  | (0.0003) | 0.009   | 0.011  | ...      | (0.002)  | rem | 37 x 12   |   |
|                      | 11.3  | 0.20   | 0.040   | 0.003  | 0.004   | 0.010  | (0.010)  | (0.010)  | 0.009  | (0.0004) | 0.012   | 0.036  | ...      | (0.004)  | rem | 37 x 12   |   |
|                      | 8.6   | 0.20   | 0.0079  | 0.02   | ...     | 2.50   | ...      | ...      | ...    | ...      | ...     | ...    | ...      | ...      | rem | 37 x 12   | c |
|                      | 10.0  | 0.085  | 0.010   | 0.014  | ...     | 2.15   | ...      | ...      | ...    | ...      | ...     | ...    | ...      | ...      | rem | 37 x 12   |   |
|                      | 10.7  | 0.048  | 0.032   | 0.0045 | ...     | 1.10   | ...      | ...      | ...    | ...      | ...     | ...    | ...      | ...      | rem | 37 x 12   |   |
|                      | 29.3  | 0.047  | 0.057   | 0.19   | 0.006   | 0.007  | (0.08)   | 0.0013   | 0.0024 | 0.0023   | ...     | ...    | ...      | ...      | rem | 40 x 15   | c |
|                      | 30.2  | 0.60   | 0.15    | 0.076  | 0.028   | 0.044  | 0.04     | 0.031    | 0.0070 | 0.007    | ...     | ...    | ...      | ...      | rem | 40 x 15   |   |
| CRM                  | 30.88 | 0.269  | 0.294   | 0.102  | 0.0126  | 0.024  | 0.0016   | (0.003)  | 0.0115 | 0.0269   | 0.0063  | 0.0085 | ...      | ...      | rem | 40 x 15   |   |
|                      | 30.1  | <0.001 | <0.001  | <0.001 | <0.001  | <0.001 | <0.001   | <0.001   | <0.001 | <0.001   | ...     | ...    | ...      | ...      | rem | 40 x 15   | c |
|                      | 39.1  | 0.059  | 0.060   | 0.20   | 0.006   | 0.005  | <0.005   | 0.008    | 0.001  | 0.002    | ...     | ...    | ...      | ...      | rem | 40 x 15   | c |
|                      | 40.4  | 0.60   | 0.15    | 0.050  | 0.026   | 0.050  | (0.003)  | 0.028    | 0.0057 | 0.007    | ...     | ...    | ...      | ...      | rem | 40 x 15   |   |
|                      | 41.8  | 0.25   | 0.25    | 0.094  | 0.018   | 0.022  | 0.01     | 0.002    | 0.010  | 0.016    | ...     | ...    | ...      | ...      | rem | 40 x 15   |   |
|                      | 40.3  | <0.001 | <0.001  | <0.001 | <0.001  | <0.001 | <0.001   | <0.001   | <0.001 | <0.001   | ...     | ...    | ...      | ...      | rem | 40 x 15   | c |
|                      | 49.5  | 0.062  | 0.060   | 0.214  | 0.008   | 0.006  | 0.01     | 0.004    | 0.006  | 0.007    | ...     | ...    | ...      | ...      | rem | 40 x 15   | c |
|                      | 50.5  | 0.56   | 0.16    | 0.059  | 0.026   | 0.053  | 0.01     | 0.023    | 0.011  | 0.003    | ...     | ...    | ...      | ...      | rem | 40 x 15   |   |
|                      | 51.4  | 0.26   | 0.25    | 0.10   | 0.015   | 0.020  | 0.009    | 0.008    | 0.002  | 0.016    | ...     | ...    | ...      | ...      | rem | 40 x 15   |   |
| CRM                  | 54.6  | 0.098  | 0.097   | 1.58   | 0.044   | 0.045  | (0.0034) | 0.0105   | 0.0118 | 0.0114   | 0.029   | 0.052  | ...      | ...      | rem | 40 x 15   |   |
|                      | 50.1  | <0.001 | <0.001  | <0.001 | <0.001  | <0.001 | <0.001   | <0.001   | <0.001 | <0.001   | ...     | ...    | ...      | ...      | rem | 40 x 15   | c |
| CRM                  | 59.8  | 0.013  | 0.007   | 0.023  | 0.008   | 0.010  | (0.0026) | <0.001   | 0.012  | <0.005   | 0.018   | 0.01   | <0.001   | ...      | rem | 40 x 15   | c |
| CRM                  | 61.30 | 0.075  | 0.062   | 0.252  | (0.001) | 0.0065 | 0.012    | 0.0032   | 0.0057 | 0.0010   | 0.040   | 0.028  | 0.0008   | ...      | rem | 40 x 15   |   |
| CRM                  | 62.6  | 0.614  | 0.162   | 0.052  | 0.080   | 0.057  | 0.030    | 0.007    | 0.0168 | 0.0073   | 0.090   | 0.019  | 0.009    | ...      | rem | 40 x 15   |   |
| CRM                  | 64.27 | 0.253  | 0.255   | 0.133  | 0.0190  | 0.0222 | 0.0054   | (0.002)  | 0.0015 | 0.0196   | 0.175   | 0.0087 | (0.0002) | ...      | rem | 40 x 15   |   |
| CRM                  | 66.8  | 0.093  | 0.030   | 0.021  | <0.002  | 0.030  | <0.005   | <0.001   | 0.021  | <0.005   | 0.05    | 0.014  | 0.006    | ...      | rem | 40 x 15   |   |
|                      | 62.6  | <0.001 | <0.001  | <0.001 | <0.001  | <0.001 | <0.001   | <0.001   | <0.001 | <0.001   | <0.001  | ...    | ...      | ...      | rem | 40 x 15   | c |
|                      | 60.0  | 0.0034 | <0.0005 | 0.0006 | <0.0005 | 0.0006 | 0.0031   | 0.006    | 0.0006 | <0.0005  | 0.00096 | <0.001 | ...      | <0.0005  | rem | 37 x 12   | c |
|                      | 62.3  | 0.021  | 0.0057  | 0.0012 | 0.00084 | 0.0012 | 0.012    | 0.0095   | 0.0020 | 0.0006   | 0.0056  | 0.0010 | ...      | <0.001   | rem | 37 x 12   |   |
|                      | 63.4  | 0.050  | 0.0095  | 0.0045 | 0.0065  | 0.0050 | 0.0052   | 0.015    | 0.0049 | 0.0085   | 0.0090  | 0.0091 | ...      | <0.001   | rem | 37 x 12   |   |
|                      | 64.5  | 0.095  | 0.019   | 0.0090 | 0.010   | 0.0085 | 0.010    | 0.065    | 0.010  | 0.0042   | 0.019   | 0.040  | ...      | <0.001   | rem | 37 x 12   |   |
|                      | 63.1  | 0.11   | 0.040   | 0.047  | 0.009   | 0.015  | (0.005)  | <0.003   | 0.004  | 0.001    | 0.047   | 0.005  | ...      | <0.002   | rem | 37 x 12   | c |
|                      | 62.6  | 0.31   | 0.098   | 0.091  | 0.028   | 0.031  | (0.012)  | <0.003   | 0.011  | 0.006    | 0.11    | 0.018  | ...      | <0.002   | rem | 37 x 12   |   |
|                      | 63.4  | 0.45   | 0.22    | 0.28   | 0.032   | 0.12   | (0.021)  | (0.015)  | 0.018  | 0.015    | 0.23    | 0.030  | ...      | <0.002   | rem | 37 x 12   |   |
| CRM                  | 56.06 | 0.52   | 0.17    | 0.11   | 0.051   | ...    | ...      | 0.00093  | 0.0020 | ...      | ...     | ...    | ...      | ...      | rem | 40 x 30   | c |
| CRM                  | 59.09 | 0.35   | 0.11    | 0.075  | 0.034   | ...    | (0.011)  | 0.0019   | 0.0043 | ...      | ...     | ...    | ...      | ...      | rem | each      |   |
| CRM                  | 60.18 | 0.14   | 0.22    | 0.034  | 0.092   | ...    | (0.023)  | 0.0064   | 0.0065 | ...      | ...     | ...    | ...      | ...      | rem |           |   |
| CRM                  | 62.81 | 0.079  | 0.055   | 0.013  | 0.017   | ...    | (0.0085) | 0.0011   | 0.0080 | ...      | ...     | ...    | ...      | ...      | rem | Set only  |   |
| CRM                  | 64.96 | 0.011  | 0.014   | 0.0037 | 0.0035  | ...    | ...      | 0.0056   | 0.0097 | ...      | ...     | ...    | ...      | ...      | rem |           |   |

| 9.3 Tin/Lead/Antimony Solders |       |      |       |       |        |        |         |          |        |        |        |        |     |  |  | Size (mm) |   |
|-------------------------------|-------|------|-------|-------|--------|--------|---------|----------|--------|--------|--------|--------|-----|--|--|-----------|---|
|                               | Sn    | Sb   | Bi    | Cu    | As     | Ag     | Fe      | Zn       | Cd     | Ni     | In     | Te     | Pb  |  |  | Ø         | H |
| CRM                           | 28.58 | 2.54 | 0.059 | 0.192 | 0.010  | 0.0144 | (0.012) | (0.0004) | 0.0014 | 0.0010 | 0.0094 | 0.0024 | rem |  |  | 40 x 15   | c |
| CRM                           | 30.68 | 1.80 | 0.168 | 0.062 | 0.0178 | 0.049  | 0.0026  | 0.028    | 0.0061 | 0.042  | 0.0199 | 0.0102 | rem |  |  | 40 x 15   |   |
| CRM                           | 33.0  | 0.96 | 0.28  | 0.008 | 0.018  | 0.021  | 0.0026  | 0.005    | 0.009  | 0.010  | ...    | ...    | rem |  |  | 40 x 15   |   |
|                               | 38.5  | 2.70 | 0.06  | 0.23  | 0.011  | 0.007  | (0.01)  | 0.002    | 0.002  | 0.003  | ...    | ...    | rem |  |  | 40 x 15   | c |
|                               | 39.6  | 2.10 | 0.19  | 0.07  | 0.030  | 0.052  | (0.02)  | 0.04     | 0.006  | 0.006  | ...    | ...    | rem |  |  | 40 x 15   |   |
|                               | 41.4  | 1.70 | 0.26  | 0.12  | 0.024  | 0.021  | (0.03)  | 0.022    | 0.011  | 0.014  | ...    | ...    | rem |  |  | 40 x 15   |   |
|                               | 48.4  | 3.2  | 0.052 | 0.18  | 0.007  | 0.010  | (0.01)  | 0.002    | 0.002  | 0.002  | ...    | ...    | rem |  |  | 40 x 15   | c |
|                               | 49.6  | 2.8  | 0.15  | 0.049 | 0.027  | 0.055  | 0.01    | 0.042    | 0.006  | 0.014  | ...    | ...    | rem |  |  | 40 x 15   |   |
|                               | 51.2  | 2.3  | 0.25  | 0.093 | 0.023  | 0.025  | (0.02)  | 0.013    | 0.010  | 0.010  | ...    | ...    | rem |  |  | 40 x 15   |   |

| 9.5 Fusible Alloys |       |       |      |        |       |        |          |        |        |          |        |       |     | Nominal Melting Temperature °C |         | Size (mm) |  |
|--------------------|-------|-------|------|--------|-------|--------|----------|--------|--------|----------|--------|-------|-----|--------------------------------|---------|-----------|--|
|                    | Sn    | Sb    | Bi   | Cu     | As    | Ag     | Fe       | Zn     | Cd     | Al       | In     | Pb    |     |                                | Ø       | H         |  |
|                    | 8.02  | 0.010 | 45.3 | 0.010  | ...   | 0.0043 | ...      | 0.0056 | 4.95   | ...      | 18.72  | 23.1  | 47  |                                | 40 x 15 | c         |  |
|                    | 12.05 | 0.022 | 48.8 | 0.0028 | ...   | 0.0056 | ...      | 0.031  | 0.0092 | ...      | 21.49  | 18.0  | 58  |                                | 40 x 15 |           |  |
|                    | 13.38 | 0.056 | 50.1 | 0.049  | ...   | 0.0021 | ...      | 0.043  | 9.50   | ...      | 0.0058 | 26.9  | 70  |                                | 40 x 15 |           |  |
|                    | 16.70 | 0.086 | 57.1 | 0.0030 | ...   | 0.0075 | ...      | 0.037  | 0.0089 | ...      | 26.08  | 0.082 | 79  |                                | 40 x 15 |           |  |
|                    | 0.220 | 0.312 | 55.7 | 0.041  | ...   | 0.0020 | ...      | 0.035  | 0.0065 | ...      | 0.010  | 43.7  | 124 |                                | 40 x 15 |           |  |
|                    | 42.9  | 0.10  | 56.5 | 0.106  | 0.005 | 0.033  | 0.002    | 0.011  | 0.011  | (0.0009) | 0.051  | 0.085 | 138 |                                | 40 x 15 |           |  |
|                    | 50.1  | 0.113 | 0.13 | 0.26   | 0.027 | 0.030  | (0.0022) | 0.007  | 18.1   | <0.002   | 0.092  | 31.0  | 145 |                                | 40 x 15 |           |  |

# 10. Titanium Base

# 11. Cobalt Base

# 12. Zirconium Base

| 10.1 Various Ti Alloys                        |                                     |        |        |         |          |        |         | 10.1 Various Ti Alloys (continued)            |            |          |         |          |          |          |          | Size (mm)          |                   |             |   |
|---|-------------------------------------|--------|--------|---------|----------|--------|---------|---|------------|----------|---------|----------|----------|----------|----------|--------------------|-------------------|-------------|---|
|   | Al                                  | Mo     | Sn     | Fe      | Mn       | Cu     | V       |   |            | Al       | Mo      | Si       | Sn       | Zr       | Fe       | V                  | Nb                | Ø           | H |
| 101 P 205                                     | ...                                 | 15.0   | ...    | 0.03    | ...      | ...    | ...     |   | 101 P 550  | 4.0      | 4.0     | 0.5      | 2.0      | 0.05     | 0.05     | ...                | ...               | All this    |   |
| 101 P 230                                     | ...                                 | ...    | ...    | 0.05    | ...      | 2.5    | ...     |   | 101 P 551  | 4.0      | 4.0     | 0.5      | 4.0      | ...      | 0.05     | ...                | ...               | 10.1 Series |   |
| 101 P 260                                     | ...                                 | ...    | ...    | 0.05    | ...      | ...    | ...     |   | 101 P 679  | 2.25     | 1.0     | 0.2      | 11.0     | 5.0      | 0.05     | ...                | ...               | are         |   |
| 101 P 315                                     | 1.5                                 | ...    | ...    | 0.05    | 1.5      | ...    | ...     |   | 101 P 685  | 6.0      | 0.5     | 0.3      | <0.02    | 5.0      | 0.03     | ...                | ...               | Cast Discs  |   |
| 101 P 317                                     | 5.0                                 | ...    | 2.5    | 0.2     | ...      | ...    | ...     |   | 101 P 811  | 8.0      | 1.0     | ...      | ...      | ...      | 0.03     | 10.0               | ...               | of size     |   |
| 101 P 318                                     | 6.0                                 | ...    | ...    | 0.2     | ...      | ...    | 4.0     |   | 101 P 829  | 5.5      | 0.3     | 0.3      | 3.5      | 3.0      | 0.03     | ...                | 1.0               | 32 x 8      |   |
| 101 P 367                                     | 6.0                                 | ...    | ...    | 0.1     | ...      | ...    | ...     |   | 101 P 6242 | 6.0      | 2.0     | 0.1      | 2.0      | 4.0      | 0.07     | ...                | ...               | ...         |   |
|   |                                     |        |        |         |          |        |         |   | 101 P 6246 | 6.0      | 6.0     | 0.05     | 2.0      | 4.0      | 0.05     | ...                | ...               | ...         |   |
| Suitable for use with XRF Spectrometers only. |                                     |        |        |         |          |        |         | Suitable for use with XRF Spectrometers only. |            |          |         |          |          |          |          |                    |                   |             |   |
|   |                                     |        |        |         |          |        |         |   |            |          |         |          |          |          |          |                    |                   | Size (mm)   |   |
|   | Al                                  | Mo     | Si     | Sn      | Zr       | Mn     | Cu      | V   | Fe         | Nb       | Cr      | W        | Ni       | C        | N        | O                  | H                 | Ø           | H |
| CRM 101 M BS T-2a                             | 0.005                               | 0.002  | 0.002  | 0.006   | <0.003   | 0.003  | (0.001) | <0.002  | 0.156      | ...      | 0.018   | <0.002   | 0.021    | (0.007)  | (0.0044) | (0.12)             | (0.0020)          | 32 x 12     | w |
| CRM 101 M BS T-4a                             | 0.040                               | 0.0006 | 0.011  | 0.005   | <0.002   | 0.003  | (0.001) | (0.001)                                       | 0.19       | ...      | 0.026   | <0.002   | 0.014    | 0.014    | 0.005    | (0.37)             | (0.0027)          | 32 x 12     |   |
| CRM 101 M BS T-5a                             | 6.33                                | 0.004  | 0.02   | 0.009   | 0.003    | <0.002 | 0.0025  | 4.10  | 0.170      | ...      | 0.013   | <0.01    | 0.012    | 0.011    | 0.008    | 0.190              | (0.0025)          | 32 x 12     |   |
| 101 MBS T-13                                  | 3.7                                 | 1.23   | 0.03   | 0.020   | (0.001)  | 0.04   | 0.021   | 0.11  | 2.21       | ...      | 3.59    | 0.38     | 0.018    | 0.008    | (0.012)  | ...                | ...               | 32 x 12     |   |
| 101 MBS T-14                                  | 4.94                                | 1.72   | 0.04   | 0.03    | <0.01    | 0.02   | 0.022   | 0.013   | 1.9        | <0.002   | 1.98    | 0.48     | 0.012    | (0.01)   | 0.006    | ...                | ...               | 32 x 12     |   |
| 101 MBS T-15                                  | 6.23                                | 3.1    | 0.02   | 0.015   | <0.002   | 0.02   | 0.03    | (0.01)  | 1.02       | ...      | 1.02    | (0.52)   | 0.007    | 0.007    | (0.007)  | ...                | ...               | 32 x 12     |   |
| 101 MBS T-22                                  | 0.004                               | 1.15   | (0.02) | 0.019   | <0.01    | 2.02   | 0.04    | 0.50  | 1.19       | ...      | 1.22    | 0.51     | 0.008    | 0.005    | (0.01)   | ...                | ...               | 32 x 12     |   |
| 101 MBS T-23                                  | 0.003                               | 0.91   | <0.01  | 0.025   | (0.002)  | 3.70   | 0.012   | 0.93  | 0.93       | ...      | 0.91    | 0.87     | 0.004    | 0.006    | (0.007)  | ...                | ...               | 32 x 12     |   |
| 101 MBS T-24                                  | 0.002                               | 0.51   | (0.01) | 0.019   | (0.001)  | 4.7    | 0.02    | 1.22  | 0.54       | ...      | 0.54    | 0.37     | (0.007)  | 0.005    | 0.006    | ...                | ...               | 32 x 12     |   |
| 101 MBS T-26                                  | 0.002                               | 0.028  | (0.01) | 0.025   | 0.005    | 0.006  | 0.037   | 0.02  | 0.055      | ...      | 0.037   | 0.57     | 0.002    | 0.005    | (0.005)  | ...                | ...               | 32 x 12     |   |
| CRM 101 MI 174A                               | 0.013                               | <0.01  | <0.01  | <0.01   | <0.01    | <0.01  | <0.01   | ...   | 0.15       | ...      | <0.01   | ...      | ...      | 0.009    | 0.0089   | 0.30               | 0.0057            | 31 x 18     | w |
| CRM 101 F 089                                 | 5.97                                | ...    | ...    | ...     | ...      | ...    | ...     | 3.976   | ...        | ...      | ...     | ...      | ...      | ...      | ...      | ...                | ...               | 40 x 20     |   |
| CRM 101 F 090A                                | (0.074)                             | 0.0488 | ...    | (0.071) | (0.0436) | 0.0314 | 0.0513  | (0.057)                                       | 0.0563     | (0.0492) | 0.0533  | (0.050)  | 0.0667   | ...      | ...      | ...                | Co 0.0501         | 40 x 20     |   |
|   |                                     |        |        |         |          |        |         |   |            |          |         |          |          |          |          |                    |                   | Size (mm)   |   |
|   |                                     |        |        |         |          |        |         |   |            |          |         |          |          |          |          |                    |                   | Ø           | H |
| 11.1 Cobalt/Cr/W                              | Alloy Type WI 52                    |        |        |         |          |        |         |   |            |          |         |          |          |          |          |                    |                   |             |   |
|   | C                                   | Si     | Mn     | Ni      | Cr       | W      | Nb      | Ta  | Fe         | Cu       | Pb      | Sn       | Mo       | Al       | S        | N                  | Others            | Ø           | H |
| 111 X 12667L                                  | ...                                 | 0.63   | 0.50   | 0.60    | 20.8     | 10.7   | 1.56    | 0.14  | 1.41       | 0.11     | (0.013) | 0.14     | 0.16     | 0.02     | ...      | ...                | ...               | 40 x 15     | c |
| 111 X 12669J                                  | ...                                 | 0.71   | 0.57   | 0.62    | 22.04    | 10.65  | 2.06    | ...   | 1.41       | ...      | ...     | ...      | ...      | ...      | ...      | ...                | ...               | 40 x 15     |   |
| 111 X 12670M                                  | 0.01                                | 0.60   | 0.46   | 1.13    | 19.6     | 10.7   | 2.36    | 0.07  | 1.32       | 0.06     | (0.005) | 0.042    | 0.08     | (0.003)  | (0.027)  | 0.008              | P (0.012)         | 40 x 15     |   |
| 111 X 12671J                                  | ...                                 | 0.51   | 0.61   | 0.88    | 20.5     | 11.8   | 1.95    | ...   | 1.45       | ...      | ...     | ...      | ...      | ...      | ...      | ...                | ...               | 40 x 15     |   |
| 111 X 12672J                                  | 0.126                               | 0.78   | 0.72   | 0.71    | 21.8     | 9.3    | 1.87    | 0.09  | 1.87       | 0.14     | 0.01    | 0.034    | 0.29     | 0.27     | 0.014    | ...                | ...               | 40 x 15     |   |
| CRM 111 X 12673A                              | (0.005)                             | 0.82   | 0.52   | 1.69    | 19.0     | 9.75   | 2.35    | 0.06  | 1.70       | 0.104    | (0.003) | 0.074    | 0.086    | <0.005   | 0.022    | 0.031              | P 0.010           | 40 x 15     |   |
|   |                                     |        |        |         |          |        |         |   |            |          |         |          |          |          |          |                    |                   | Size (mm)   |   |
|   |                                     |        |        |         |          |        |         |   |            |          |         |          |          |          |          |                    |                   | Ø           | H |
| 11.2 Cobalt/Cr/Mo                             | Alloy Type Stellite 8, BS 3531, etc |        |        |         |          |        |         |   |            |          |         |          |          |          |          |                    |                   |             |   |
|   | C                                   | Si     | Mn     | Ni      | Cr       | W      | Mo      | Fe  | Al         | Cu       | Nb      | Zr       | P        | S        | B        | N                  | Others            | Ø           | H |
| CRM 112 X 14936N                              | 0.45                                | 0.23   | 0.77   | 1.67    | 23.00    | 1.12   | 4.65    | 0.39  | 0.48       | ...      | ...     | ...      | ...      | ...      | ...      | ...                | ...               | 40 x 15     | c |
| CRM 112 X 14937Q                              | 0.238                               | 1.48   | 0.85   | 3.47    | 24.37    | 3.17   | 7.1     | 1.84  | 1.20       | 0.164    | 0.058   | (0.015)  | 0.0095   | 0.0069   | 0.0061   | 0.11               | Sn 0.011          | 43 x 20     |   |
| 112 X 14941M                                  | 0.38                                | 0.45   | 0.14   | 1.17    | 26.85    | 0.54   | 4.16    | 0.76  | 0.03       | ...      | ...     | ...      | ...      | ...      | ...      | ...                | ...               | 40 x 15     |   |
| 112 X 14942M                                  | 0.090                               | 1.02   | 0.46   | 0.29    | 28.47    | 1.67   | 6.22    | 1.09  | 0.18       | ...      | ...     | ...      | ...      | ...      | ...      | ...                | ...               | 40 x 15     |   |
| CRM 112 X 14943E                              | 0.233                               | 0.53   | 1.18   | 0.12    | 32.5     | (0.09) | 7.53    | 0.85  | <0.01      | 0.116    | (0.063) | ...      | 0.006    | 0.0137   | (0.0034) | 0.115              | Pb (0.0067)       | 43 x 20     |   |
| CRM 112 X 14944A                              | 0.225                               | 0.71   | 0.744  | 0.128   | 29.24    | <0.02  | 6.29    | 0.14  | <0.01      | 0.006    | <0.01   | ...      | 0.0017   | 0.0040   | (0.0004) | 0.148              | ...               | 38 x 19     | w |
| CRM 112 MT 074A                               | 0.089                               | 0.59   | 0.78   | 0.150   | 27.12    | <0.01  | 5.47    | (0.93)  | ...        | 0.005    | ...     | ...      | 0.002    | 0.002    | (-0.001) | 0.17               | ...               | 38 x 14     |   |
|   |                                     |        |        |         |          |        |         |   |            |          |         |          |          |          |          |                    |                   | Size (mm)   |   |
|   |                                     |        |        |         |          |        |         |   |            |          |         |          |          |          |          |                    |                   | Ø           | H |
| 11.3 Cobalt/Cr/Ni/W                           | Alloy Type Stellite 31              |        |        |         |          |        |         |   |            |          |         |          |          |          |          |                    |                   |             |   |
|   | C                                   | Si     | Mn     | Ni      | Cr       | W      | Fe      | B   | S          | P        |         |          |          |          |          |                    |                   | Ø           | H |
| 113 X X401G                                   | 0.56                                | 1.22   | 0.20   | 11.74   | 25.24    | 7.09   | 0.73    | 0.008   | ...        | ...      |         |          |          |          |          |                    |                   | 40 x 15     | c |
| 113 X X402H                                   | 0.38                                | 0.32   | 1.26   | 9.41    | 24.86    | 7.96   | 2.15    | ...   | 0.036      | 0.045    |         |          |          |          |          |                    |                   | 40 x 15     |   |
| 113 X X403G                                   | 0.52                                | 0.85   | 0.69   | 10.40   | 25.03    | 7.82   | 1.06    | 0.006   | 0.022      | 0.021    |         |          |          |          |          |                    |                   | 40 x 15     |   |
| 113 X X404D                                   | 0.51                                | 0.75   | 0.69   | 10.76   | 23.7     | 7.71   | 1.28    | 0.001   | 0.006      | 0.002    |         |          |          |          |          |                    |                   | 40 x 15     |   |
| 113 X X405E                                   | 0.48                                | 0.76   | 0.68   | 10.79   | 26.7     | 7.65   | 1.30    | 0.001   | 0.005      | 0.002    |         |          |          |          |          |                    |                   | 40 x 15     |   |
|   |                                     |        |        |         |          |        |         |   |            |          |         |          |          |          |          |                    |                   | Size (mm)   |   |
|   |                                     |        |        |         |          |        |         |   |            |          |         |          |          |          |          |                    |                   | Ø           | H |
| 11.9 Various Cobalt alloys                    |                                     |        |        |         |          |        |         |   |            |          |         |          |          |          |          | Typical Alloy Type |                   | Size (mm)   |   |
|   | C                                   | Si     | Mn     | Ni      | Cr       | W      | Mo      | Nb  | Cu         | Fe       | Ti      | Mg       | S        | P        | N        | Others             | Alloy Type        | Ø           | H |
| 119 MBS 171B                                  | 0.087                               | 0.29   | 1.90   | 10.68   | 20.5     | 15.1   | 0.65    | 0.046   | 0.035      | 1.82     | ...     | ...      | <0.001   | 0.008    | ...      | ...                | ...               | 35 x 12     | w |
| 119 MBS 172A                                  | 0.098                               | 0.37   | 0.77   | 23.7    | 21.85    | 14.0   | 0.3     | 0.09  | 0.027      | 1.76     | ...     | ...      | <0.0005  | (0.011)  | ...      | La 0.045           | ...               | 35 x 12     |   |
| 119 MBS 173                                   | 0.046                               | 0.61   | 0.76   | 0.14    | 27.5     | ...    | 5.62    | (0.002)                                       | (0.008)    | 0.19     | ...     | ...      | 0.001    | (0.003)  | 0.190    | ...                | ...               | 35 x 12     |   |
| CRM 119 TI E378-1(D)                          | 1.181                               | 1.172  | 0.0579 | 0.617   | 28.22    | 4.43   | 0.0503  | ...   | ...        | 0.606    | ...     | ...      | 0.0055   | (0.0023) | ...      | Co 63.52           | ...               | 40 x 20     | w |
| CRM 119 MI 64B                                | 0.062                               | 0.27   | 0.78   | 9.06    | 25.26    | 2.12   | 4.77    | ...   | 0.020      | 3.02     | 0.011   | 0.005    | (0.0004) | 0.005    | 0.12     | ...                | Ultimet 1233      | 31 x 18     | w |
| CRM 119 MI 95B                                | 0.946                               | 0.46   | 0.99   | 2.25    | 28.8     | 3.42   | 0.83    | (0.002)                                       | 0.008      | 1.10     | 0.004   | (0.0004) | 0.0006   | 0.010    | 0.0027   | ...                | Stellite 6B       | 31 x 18     |   |
| CRM 119 MI 95C                                | 1.10                                | 0.54   | 1.55   | 2.88    | 29.0     | 3.96   | 1.37    | (0.008)                                       | 0.014      | 2.47     | 0.004   | (0.0004) | 0.001    | 0.009    | 0.033    | ...                | Stellite 6B       | 31 x 18     |   |
| CRM 119 MI 96B                                | 0.132                               | 0.16   | 1.39   | 10.04   | 20.54    | 14.52  | 1.17    | 0.046   | 0.047      | 2.29     | 0.007   | (0.0005) | 0.0005   | 0.0063   | 0.007    | ...                | Stellite 25       | 31 x 18     |   |
| CRM 119 MI 96C                                | 0.132                               | 0.31   | 1.91   | 10.36   | 19.95    | 15.4   | 1.88    | 0.047   | 0.08       | 2.93     | 0.007   | (0.0002) | 0.001    | 0.008    | 0.031    | ...                | Stellite 25       | 31 x 18     |   |
| CRM 119 MI 96D                                | 0.079                               | 0.23   | 1.40   | 10.66   | 19.97    | 14.71  | 0.35    | 0.08  | 0.038      | 2.17     | 0.046   | (0.004)  | 0.0005   | 0.006    | 0.0084   | ...                | Stellite 25       | 31 x 18     |   |
| CRM 119 MI 97C                                | 0.130                               | 0.47   | 0.82   | 22.8    | 22.2     | 14.6   | 0.36    | 0.023   | 0.027      | 2.37     | 0.011   | 0.0010   | 0.0004   | 0.011    | 0.075    | ...                | Stellite 188      | 31 x 18     |   |
| CRM 119 MI 208C                               | 0.052                               | 0.62   | 0.53   | 0.63    | 27.55    | 0.02   | 6.12    | 0.011   | 0.01       | 0.29     | 0.012   | 0.0002   | 0.0004   | 0.010    | 0.169    | ...                | Stellite 21 - F75 | 31 x 18     |   |
| 119 X COB 1E                                  | 0.009                               | 0.41   | 0.52   | 22.8    | 24.3     | 11.1   | ...     | ...   | <0.005     | 16.4     | ...     | ...      | 0.0015   | (0.001)  | 0.188    | Al 0.39            | ...               | 44 x 20     | c |
| 119 X COB 2A                                  | ...                                 | ...    | 0.50   | 22.3    | 24.7     | 11.5   | ...     | ...   | ...        | 9.6      | ...     | ...      | ...      | ...      | ...      | ...                | ...               | 40 x 15     |   |
| 119 X 81601A                                  | 0.29                                | 1.17   | 1.55   | 19.6    | 14.2     | 3.75   | 3.85    | 3.9   | ...        | 12.6     | ...     | 0.042    | 0.03     | ...      | ...      | ...                | ...               | 40 x 15     |   |
| CRM 119 X ST3H                                | 2.19                                | 0.82   | 0.51   | 2.5     | 30.4     | 11.6   | 0.345   | 0.02  | 0.065      | 2.58     | ...     | ...      | 0.013    | 0.005    | 0.094    | B 0.012            | ...               | 43 x 20     |   |
|   |                                     |        |        |         |          |        |         |   |            |          |         |          |          |          |          |                    |                   | Size (mm)   |   |
|   |                                     |        |        |         |          |        |         |   |            |          |         |          |          |          |          |                    |                   | Ø           | H |
| 12.1 Various Zr Alloys                        |                                     |        |        |         |          |        |         |   |            |          |         |          |          |          |          |                    |                   | Size (mm)   |   |
|   | Sn                                  | Ni     | Cr     | Cu      | Fe       | Mo     |         |   |            |          |         |          |          |          |          |                    |                   |             |   |

# 13. Noble Metals

Blocks/Discs

| 13.1.1 High Purity Gold  |   | All Elements ppm  |   |                  |                  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
|--|---|---|---|------------------|------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|
|  |   | Au  | Ag  | Cu               | Zn               | Pb  | Sb  | Bi  | Se  | Pt  | Pd  | Rh  | Fe  | Mn  | Co  | Cr  | As  |     |     |     |  |
| 131 SI RAuHP1  | 99.99(5)                                      | 6   | 3   | 3                | 2                | 1   | <1  | <2  | <2  | <2  | <1  | 2   | 2   | <1  | <2  | <2  |     |     |     |     |  |
| 131 SI RAuHP2  | 99.99   | 20  | 10  | 10               | 6                | 3   | 2   | 6   | 6   | 6   | 2   | 6   | 6   | 2   | 5   | 6   |     |     |     |     |  |
| 131 SI RAuHP3  | 99.9(7)                                       | 60  | 30  | 30               | 20               | 10  | 5   | 20  | 20  | 20  | 5   | 20  | 20  | 5   | 15  | 20  |     |     |     |     |  |
| Certified values will be supplied for Ag and all impurities present - the above values are only examples of typical impurity levels. Other impurities may be present and, where possible, will be reported.  |   |   |   |                  |                  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
| 13.1.2 Refined Gold  |   | All Elements ppm  |   |                  |                  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
|  |   | Ag  | Cu  | Zn               | Pb               | Sb  | Bi  | Se  | Pt  | Pd  | Rh  | Fe  | Mn  | Co  | Cr  | Ti  |     |     |     |     |  |
| 131 SI RAuP1   | 5   | 5   | 5   | 5                | 5                | 5   | 5   | 5   | 5   | 5   | 5   | 5   | 5   | 5   | 5   | 5   |     |     |     |     |  |
| 131 SI RAuP2   | 10  | 10  | 10  | 10               | 10               | 10  | 10  | 10  | 10  | 10  | 10  | 10  | 10  | 10  | 10  | 10  |     |     |     |     |  |
| 131 SI RAuP3   | 25  | 25  | 25  | 25               | 25               | 25  | 25  | 25  | 25  | 25  | 25  | 25  | 25  | 25  | 25  | 25  |     |     |     |     |  |
| 131 SI RAuP4   | 50  | 50  | 50  | 50               | 50               | 50  | 50  | 50  | 50  | 50  | 50  | 50  | 50  | 50  | 50  | 50  |     |     |     |     |  |
| 131 SI RAuP5   | 100   | 100   | 100   | 100              | 100              | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |     |     |     |     |  |
| 131 SI RAuP6   | 150   | 150   | 150   | 159              | 150              | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 |     |     |     |     |  |
| 131 SI RAuP7   | 200   | 200   | 200   | 200              | 200              | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 |     |     |     |     |  |
| The impurity concentrations will be certified and will fall within 20% of the specified values. Products can be prepared to customers' own specifications.   |   |   |   |                  |                  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
| 13.1.3 Au/Ag/Cu Jewellery alloys   |   | %   |   |                  | All Elements ppm |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
|  |   | Au  | Ag  | Cu               | Au               | Ag  | Cu  | Zn  | Pb  | Sb  | Bi  | Se  | Pt  | Pd  | Rh  | Fe  | Mn  | Co  | Cr  | Ti  |  |
| 131 SI RAuA1   | 98.0  | 2.0   | ...   | ...              | ...              | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |  |
| 131 SI RAuA2   | 96.0  | 2.0   | 2.0   | ...              | ...              | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |  |
| 131 SI RAuA3   | 91.5  | ...   | 8.5   | ...              | ...              | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |  |
| 131 SI RAuA4   | 88.0  | 8.0   | 4.0   | ...              | ...              | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |  |
| 131 SI RAuA5   | 75.0  | 18.0  | 7.0   | ...              | ...              | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |  |
| 131 SI RAuA6   | 50.0  | 20.0  | 30.0  | ...              | ...              | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |  |
| 131 SI RAuA7   | 37.0  | 10.0  | 53.0  | ...              | ...              | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |  |
| The concentrations of major elements Au, Ag and Cu in each alloy will fall within 1% of the values specified. Minor elements are present within the range 1 - 150 ppm. Please specify if values for these are required. Products can be prepared to customers' own specifications. |   |   |   |                  |                  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
| 13.2.1 High purity Silver  |   | All Elements ppm  |   |                  |                  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
|  |   | Ag  | Au  | Cu               | Zn               | Pb  | Sb  | Bi  | Cd  | Pt  | Pd  | Rh  | Fe  | Mn  | Co  | Cr  | Ti  |     |     |     |  |
| 133 SI RAgHP1  | 99.99(5)+                                     | 10  | 10  | 5                | 5                | 5   | 1   | 1   | 2   | 1   | 1   | 1   | 5   | 2   | 2   | 1   | 1   |     |     |     |  |
| 133 SI RAgHP2  | 99.99   | 30  | 30  | 15               | 15               | 15  | 3   | 3   | 6   | 3   | 3   | 3   | 15  | 6   | 6   | 3   | 3   |     |     |     |  |
| Certified values will be supplied for Ag and all impurities present - the above values are only examples of typical impurity levels. Other impurities may be present and, where possible, will be reported.  |   |   |   |                  |                  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
| 13.2.2 Refined Silver  |   | All Elements ppm  |   |                  |                  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
|  |   | Au  | Rh  | Pd               | Pt               | Te  | Sn  | Pb  | Sb  | Bi  | Zn  | Cu  | Fe  | Ni  |     |     |     |     |     |     |  |
| 133 SI RAgP1   | 5   | 5   | 5   | 5                | 5                | 5   | 5   | 5   | 5   | 5   | 5   | 5   | 5   | 5   |     |     |     |     |     |     |  |
| 133 SI RAgP2   | 10  | 10  | 10  | 10               | 10               | 10  | 10  | 10  | 10  | 10  | 10  | 10  | 10  | 10  |     |     |     |     |     |     |  |
| 133 SI RAgP3   | 25  | 25  | 25  | 25               | 25               | 25  | 25  | 25  | 25  | 25  | 25  | 25  | 25  | 25  |     |     |     |     |     |     |  |
| 133 SI RAgP4   | 50  | 50  | 50  | 50               | 50               | 50  | 50  | 50  | 50  | 50  | 50  | 50  | 50  | 50  |     |     |     |     |     |     |  |
| 133 SI RAgP5   | 100   | 100   | 100   | 100              | 100              | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |     |     |     |     |     |     |  |
| 133 SI RAgP6   | 150   | 150   | 150   | 159              | 150              | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 |     |     |     |     |     |     |  |
| 133 SI RAgP7   | 200   | 200   | 200   | 200              | 200              | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 |     |     |     |     |     |     |  |
| The impurity concentrations will be certified and will fall within 20% of the specified values. Products can be prepared to customers' own specifications.   |   |   |   |                  |                  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
| 13.2.3 Ag/Cu Alloys  |   | %   |   | All Elements ppm |                  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
|  |   | Ag  | Cu  | Au               | Ag               | Cu  | Zn  | Pb  | Sb  | Bi  | Zn  | Cu  | Fe  | Ni  |     |     |     |     |     |     |  |
| 133 SI RAgA1   | 97.0  | 3.0   | ...   | ...              | ...              | ... | ... | ... | ... | ... | ... | ... | ... | ... |     |     |     |     |     |     |  |
| 133 SI RAgA2   | 94.0  | 6.0   | ...   | ...              | ...              | ... | ... | ... | ... | ... | ... | ... | ... | ... |     |     |     |     |     |     |  |
| 133 SI RAgA3   | 91.5  | 8.5   | ...   | ...              | ...              | ... | ... | ... | ... | ... | ... | ... | ... | ... |     |     |     |     |     |     |  |
| 133 SI RAgA4   | 80.0  | 20.0  | ...   | ...              | ...              | ... | ... | ... | ... | ... | ... | ... | ... | ... |     |     |     |     |     |     |  |
| 133 SI RAgA5   | 60.0  | 40.0  | ...   | ...              | ...              | ... | ... | ... | ... | ... | ... | ... | ... | ... |     |     |     |     |     |     |  |
| The concentrations of major elements Ag and Cu in each alloy will fall within 1% of the values specified. Minor elements are present within the range 1 - 150 ppm - please specify if values for these are required. Products can be prepared to customers' own specifications.    |   |   |   |                  |                  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
| 13.3.1 Ternary / Jewellery Alloys  |   | %   |   |                  | All Elements ppm |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
|  |   | Au  | Ag  | Cu               | Bi               | Fe  | Mn  | Ni  | Pb  | Pd  | Pt  | Sb  | Sn  | Zn  |     |     |     |     |     |     |  |
| 135 SI RTA1  | 98.0  | 1.5   | 0.5   | ...              | ...              | ... | ... | ... | ... | ... | ... | ... | ... | ... |     |     |     |     |     |     |  |
| 135 SI RTA2  | 96.0  | 3.0   | 1.0   | ...              | ...              | ... | ... | ... | ... | ... | ... | ... | ... | ... |     |     |     |     |     |     |  |
| 135 SI RTA3  | 95.0  | 2.5   | 2.5   | ...              | ...              | ... | ... | ... | ... | ... | ... | ... | ... | ... |     |     |     |     |     |     |  |
| 135 SI RTA4  | 93.0  | 4.5   | 2.5   | ...              | ...              | ... | ... | ... | ... | ... | ... | ... | ... | ... |     |     |     |     |     |     |  |
| 135 SI RTA5  | 90.0  | 4.0   | 6.0   | ...              | ...              | ... | ... | ... | ... | ... | ... | ... | ... | ... |     |     |     |     |     |     |  |
| 135 SI RTA6  | 83.3  | 4.0   | 12.7  | ...              | ...              | ... | ... | ... | ... | ... | ... | ... | ... | ... |     |     |     |     |     |     |  |
| 135 SI RTA7  | 81.7  | 7.2   | 11.1  | ...              | ...              | ... | ... | ... | ... | ... | ... | ... | ... | ... |     |     |     |     |     |     |  |
| 135 SI RTA8  | 80.0  | 12.5  | 7.5   | ...              | ...              | ... | ... | ... | ... | ... | ... | ... | ... | ... |     |     |     |     |     |     |  |
| 135 SI RTA9  | 58.3  | 8.0   | 33.7  | ...              | ...              | ... | ... | ... | ... | ... | ... | ... | ... | ... |     |     |     |     |     |     |  |
| 135 SI RTA10   | 58.3  | 20.0  | 21.7  | ...              | ...              | ... | ... | ... | ... | ... | ... | ... | ... | ... |     |     |     |     |     |     |  |
| 135 SI RTA11   | 58.3  | 30.0  | 11.7  | ...              | ...              | ... | ... | ... | ... | ... | ... | ... | ... | ... |     |     |     |     |     |     |  |
| 135 SI RTA12   | 50.0  | 20.0  | 30.0  | ...              | ...              | ... | ... | ... | ... | ... | ... | ... | ... | ... |     |     |     |     |     |     |  |
| 135 SI RTA13   | 37.5  | 2.0   | 60.5  | ...              | ...              | ... | ... | ... | ... | ... | ... | ... | ... | ... |     |     |     |     |     |     |  |
| 135 SI RTA14   | 37.5  | 10.0  | 52.5  | ...              | ...              | ... | ... | ... | ... | ... | ... | ... | ... | ... |     |     |     |     |     |     |  |
| 135 SI RTA15   | 37.5  | 16.0  | 46.5  | ...              | ...              | ... | ... | ... | ... | ... | ... | ... | ... | ... |     |     |     |     |     |     |  |
| The concentrations of major elements Au, Ag and Cu in each alloy will fall within 1% of the values specified. Minor elements are all present within the range 1 - 150 ppm, and all will be certified. Products can be prepared to customers' own specifications.                   |   |   |   |                  |                  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
| 13.4.1 High Purity Precious metals   |   | %   |   | All Elements ppm |                  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
|  |   | Pt  | Pd  | Pt               | Pd               | Pt  | Pd  | Pt  | Pd  | Pt  | Pd  | Pt  | Pd  |     |     |     |     |     |     |     |  |
| Platinum:  | 99.99+  | traces  | ...   | ...              | ...              | ... | ... | ... | ... | ... | ... | ... | ... |     |     |     |     |     |     |     |  |
| Rhodium:   | Powder standards. Please enquire for details. | ...   | ...   | ...              | ...              | ... | ... | ... | ... | ... | ... | ... | ... |     |     |     |     |     |     |     |  |
| Palladium:   | traces  | 99.99+  | Trace impurities present in the range 1 to 50 ug/g will be given. |                  |                  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
| Ruthenium:   | Powder standards. Please enquire for details. | ...   | ...   |                  |                  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
| 13.4.2 Precious Metal Calibration Standards  |   | A range of standards for calibration purposes can be prepared. Please enquire |   |                  |                  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
| <b>Note: Sizes &amp; Shapes for all the above precious metals.</b>   |   |   |   |                  |                  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
| The sizes and shapes depend on the analytical method to be used. Generally the following are available   |   |   |   |                  |                  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
| XRF Spectrometry: 24 mm Dia. x 4mm discs mounted in 31 mm Dia. Bakelite TSP.   |   |   |   |                  |                  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
| ICP, AAS, others solution methods: Globules 200mg +/- 5mg each, quantity will determine unit size  |   |   |   |                  |                  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
| OES spark (time resolved): 25mm dia. discs with minimum thickness 4mm  |   |   |   |                  |                  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
| OES DC Arc: globules as above. Other forms: wire, rods, plate (+1mm)   |   |   |   |                  |                  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |

| 15.1.1 Fe Binary |    |       |      |       |       |       |       |       |        |        | Size (mm) |    |
|------------------|----|-------|------|-------|-------|-------|-------|-------|--------|--------|-----------|----|
|                  |    | C     | Si   | S     | P     | Mn    | Ni    | Cr    | Mo     | Al     | Ø         | H  |
| 151 X FC1A       | Cr | 0.013 | 0.02 | 0.008 | 0.020 | 0.06  | 0.018 | 0.45  | <0.005 | 0.067  | 40        | 15 |
| 151 X FC2A       |    | 0.017 | 0.02 | 0.007 | 0.020 | 0.069 | 0.020 | 1.00  | <0.005 | 0.045  | 40        | 15 |
| 151 X FM1A       | Mn | 0.019 | 0.01 | 0.008 | 0.011 | 0.53  | 0.015 | 0.015 | <0.005 | <0.005 | 40        | 15 |
| 151 X FM2A       |    | 0.019 | 0.02 | 0.008 | 0.012 | 1.11  | 0.015 | 0.015 | <0.005 | <0.005 | 40        | 15 |
| 151 X FM3A       |    | 0.025 | 0.04 | 0.009 | 0.012 | 4.60  | 0.01  | 0.01  | <0.005 | <0.005 | 40        | 15 |
| 151 X FN1A       | Ni | 0.018 | 0.01 | 0.009 | 0.003 | 0.06  | 0.515 | 0.015 | <0.005 | 0.12   | 40        | 15 |
| 151 X FS1B       | S  | 0.07  | 0.10 | 0.058 | 0.013 | 0.26  | 0.015 | 0.03  | 0.01   | 0.02   | 40        | 15 |

| 15.1.2 Fe Binary |    |            |       | Size (mm) |    | Fe Binary (continued) |  |              |    |          |       | Size (mm) |    |   |
|------------------|----|------------|-------|-----------|----|-----------------------|--|--------------|----|----------|-------|-----------|----|---|
|                  |    | Element    | %     | Ø         | H  |                       |  | Element      | %  | Ø        | H     |           |    |   |
| 151 X 14930D     | Al | Aluminium  | 14.30 | 40        | 15 |                       |  | 151 X 13672E | Ni | Nickel   | 5.00  | 40        | 15 | c |
| 151 X 14931D     | Al | Aluminium  | 19.7  | 40        | 15 |                       |  | 151 X 13763F | Ni | Nickel   | 10.01 | 40        | 15 |   |
|                  |    |            |       |           |    |                       |  | 151 X 13673F | Ni | Nickel   | 19.72 | 40        | 15 |   |
| CRM 151 US 57    | Ce | Cerium     | 0.011 | 40        | 27 |                       |  | 151 X 13589J | Ni | Nickel   | 49.6  | 40        | 15 |   |
| CRM 151 US 58    | Ce | Cerium     | 0.020 | 40        | 27 |                       |  |              |    |          |       |           |    |   |
| CRM 151 US 59    | Ce | Cerium     | 0.050 | 40        | 27 |                       |  | 151 X 13767E | Nb | Niobium  | 0.65  | 40        | 15 | c |
|                  |    |            |       |           |    |                       |  | 151 X 13664E | Nb | Niobium  | 1.11  | 40        | 15 |   |
| 151 US 601       | Ce | Cerium     | 0.002 | 40        | 27 |                       |  |              |    |          |       |           |    |   |
| 151 US 602       | Ce | Cerium     | 0.005 | 40        | 27 |                       |  | 151 X 13604E | Si | Silicon  | 0.57  | 40        | 15 | c |
| 151 US 603       | Ce | Cerium     | 0.198 | 40        | 27 |                       |  | 151 X 13607E | Si | Silicon  | 1.01  | 40        | 15 |   |
| 151 US 604       | Ce | Cerium     | 0.496 | 40        | 27 |                       |  | 151 X 13605E | Si | Silicon  | 2.04  | 40        | 15 |   |
|                  |    |            |       |           |    |                       |  | 151 X 13606F | Si | Silicon  | 3.12  | 40        | 15 |   |
| 151 X 13765G     | Cr | Chromium   | 19.9  | 40        | 15 |                       |  |              |    |          |       |           |    |   |
| 151 X 13593G     | Cr | Chromium   | 39.6  | 40        | 15 |                       |  | 151 X 13759E | Ti | Titanium | 0.23  | 40        | 15 | c |
|                  |    |            |       |           |    |                       |  | 151 X 13762E | Ti | Titanium | 0.41  | 40        | 15 |   |
| 151 X 13584D     | Co | Cobalt     | 1.00  | 40        | 15 |                       |  |              |    |          |       |           |    |   |
| 151 X 13603E     | Co | Cobalt     | 3.51  | 40        | 15 |                       |  | 151 X 13674D | W  | Tungsten | 1.81  | 40        | 15 | c |
| 151 X 13601D     | Co | Cobalt     | 5.59  | 40        | 15 |                       |  | 151 X 13669D | W  | Tungsten | 5.04  | 40        | 15 |   |
| 151 X 13602D     | Co | Cobalt     | 7.71  | 40        | 15 |                       |  | 151 X 13670D | W  | Tungsten | 14.66 | 40        | 15 |   |
| 151 X 13764C     | Co | Cobalt     | 11.5  | 40        | 15 |                       |  | 151 X 13699D | W  | Tungsten | 24.6  | 40        | 15 |   |
| 151 X 13600D     | Co | Cobalt     | 20.95 | 40        | 15 |                       |  |              |    |          |       |           |    |   |
|                  |    |            |       |           |    |                       |  | 151 A 421    | W  | Tungsten | 0.52  | 38        | 19 | c |
| 151 X 13668E     | Cu | Copper     | 1.08  | 40        | 15 |                       |  | 151 A 422    | W  | Tungsten | 1.28  | each      |    |   |
|                  |    |            |       |           |    |                       |  | 151 A 423    | W  | Tungsten | 2.06  |           |    |   |
| 151 X 14045E     | Mn | Manganese  | 0.49  | 40        | 15 |                       |  | 151 A 424    | W  | Tungsten | 3.02  | Set Only  |    |   |
| 151 X 14046D     | Mn | Manganese  | 0.89  | 40        | 15 |                       |  |              |    |          |       |           |    |   |
| 151 X 13937G     | Mn | Manganese  | 1.14  | 40        | 15 |                       |  | 151 X 13700D | V  | Vanadium | 0.59  | 40        | 15 | c |
| 151 X 13599G     | Mn | Manganese  | 4.16  | 40        | 15 |                       |  | 151 X 13703D | V  | Vanadium | 5.45  | 40        | 15 |   |
| 151 X 13595E     | Mn | Manganese  | 7.61  | 40        | 15 |                       |  |              |    |          |       |           |    |   |
| 151 X 13757G     | Mo | Molybdenum | 4.96  | 40        | 15 |                       |  |              |    |          |       |           |    |   |
| 151 X 13754G     | Mo | Molybdenum | 11.10 | 40        | 15 |                       |  |              |    |          |       |           |    |   |

These binary materials are available until stocks are exhausted.

These binary materials are certified only for the element detailed but will also include elements which have not been analysed

# 16. Setting Up Samples

Blocks/Discs

All of these samples have been prepared to meet the daily setting up requirements of laboratories using Direct Reading Spectrometers. The Analytical Data are supplied with each sample but are not certified as accurate as these are not intended to be used as Primary Reference Materials.

| 16.1 Cast Iron  |      |      |       |       |      |       |       |        |       |        |        |       |       | Size (mm)    |   |   |    |
|-----------------|------|------|-------|-------|------|-------|-------|--------|-------|--------|--------|-------|-------|--------------|---|---|----|
|                 | C    | Si   | S     | P     | Mn   | Ni    | Cr    | Mo     | Cu    | Sn     | Al     | Ti    | V     | W            | D | H |    |
| 161 A 1/17      | 3.0  | 2.6  | 0.06  | 0.06  | 0.38 | 0.20  | 0.51  | 0.30   | 0.48  | 0.05   | 0.02   | 0.01  | 0.04  | 60 x 35 x 18 |   |   | CC |
| 161 A 2/37      | 3.4  | 1.8  | 0.11  | 0.21  | 0.72 | 0.46  | 0.05  | 0.10   | 0.17  | 0.10   | <0.005 | 0.04  | 0.57  | 60 x 35 x 18 |   |   |    |
| 161 A 3/19      | 3.2  | 2.1  | 0.09  | 1.0   | 0.89 | 0.02  | 0.25  | <0.005 | 0.01  | <0.005 | <0.005 | 0.07  | 0.31  | 60 x 35 x 18 |   |   |    |
| 161 A 4/20      | 3.2  | 2.7  | 0.01  | ...   | 0.12 | 0.10  | 0.08  | ...    | 0.75  | <0.005 | 0.01   | 0.05  | 0.49  | 60 x 35 x 18 |   |   |    |
| 161 A 5/37      | 3.8  | 2.0  | 0.01  | ...   | 0.58 | 1.1   | 0.01  | ...    | 0.02  | 0.07   | 0.03   | 0.005 | 0.50  | 60 x 35 x 18 |   |   |    |
| 161 A 6/6       | 2.5  | 1.8  | 0.12  | 0.05  | 0.65 | ...   | 0.10  | ...    | 0.02  | 0.05   | <0.005 | 0.02  | 0.02  | 60 x 35 x 18 |   |   |    |
| 161 A 7/8       | 2.8  | 0.94 | 0.18  | 0.09  | 0.29 | ...   | 0.07  | ...    | 0.21  | <0.01  | 0.02   | ...   | 0.06  | 60 x 35 x 18 |   |   |    |
|                 |      |      |       |       |      |       |       |        |       |        |        |       |       |              |   |   |    |
|                 |      |      |       |       |      |       |       |        |       |        |        |       |       |              |   |   |    |
| 161 U RG13      | 3    | 2    | 0.04  | 0.3   | 1.0  | 0.6   | 1.0   | 0.3    | 0.5   | 0.2    | 0.06   | 0.05  | 0.3   | 40 x 40      |   |   |    |
| 161 U RG14      | 3    | 2    | 0.01  | 0.04  | 0.2  | 0.01  | 0.9   | ...    | 0.07  | 0.2    | 0.09   | 0.02  | 0.1   | 40 x 40      |   |   |    |
| 161 U RG15      | 2    | 4    | 0.07  | 0.1   | 0.8  | 0.5   | 0.5   | 0.9    | 0.5   | 0.1    | 0.07   | ...   | ...   | 40 x 40      |   |   |    |
| 161 U RN15      | 3.3  | 0.4  | 0.01  | 0.006 | 1.4  | 3     | ...   | ...    | ...   | 0.05   | 0.06   | 0.009 | ...   | 40 x 40      |   |   |    |
| 161 MI 215A     | 3.6  | 2.0  | 0.13  | 0.3   | 1.0  | 0.8   | 0.5   | 0.5    | 0.5   | 0.2    | 0.02   | 0.04  | 0.5   | 36 x 38      |   |   | HP |
| 161 MI 216A     | 3.0  | 3.0  | 0.005 | 0.02  | 0.2  | ...   | 1.5   | ...    | 0.05  | 0.2    | 0.1    | ...   | 0.03  | 36 x 38      |   |   |    |
| 161 M BS SU CCA | 3.53 | 1.99 | 0.012 | 0.020 | 0.64 | 0.048 | 0.045 | 0.005  | 0.13  | 0.003  | 0.011  | 0.003 | 0.010 | 34 x 17      |   |   |    |
| 161 M BS SU CCB | 3.45 | 2.05 | 0.011 | 0.021 | 0.60 | 0.059 | 0.069 | 0.006  | 0.098 | 0.003  | 0.013  | 0.003 | 0.010 | 34 x 17      |   |   |    |

| 16.2 Steels      |        |       |        |        |         |         |         |        |         |        |        |        |        |         |           |
|------------------|--------|-------|--------|--------|---------|---------|---------|--------|---------|--------|--------|--------|--------|---------|-----------|
|                  | C      | Si    | S      | P      | Mn      | Ni      | Cr      | Mo     | Cu      | Co     | Sn     | Al     | Nb     | W       |           |
| 162 A A/10       | 0.03   | 0.01  | <0.005 | <0.005 | 0.17    | 0.04    | 0.03    | <0.005 | <0.005  | 0.01   | <0.005 | 0.03   | <0.005 | <0.005  |           |
| 162 A B/6        | 0.39   | 0.29  | <0.005 | 0.005  | 0.44    | 1.5     | 1.2     | 0.20   | 0.15    | 0.02   | 0.01   | 0.01   | 0.005  | 0.005   |           |
| 162 A C/17       | 0.15   | 0.17  | 0.06   | 0.07   | 1.2     | 3.4     | 0.19    | 0.11   | 0.47    | 0.06   | 0.05   | 0.05   | 0.02   | 0.25    |           |
| 162 A D/11       | 0.80   | 0.80  | 0.03   | 0.01   | 0.40    | 0.10    | 3.0     | 1.3    | 0.11    | 0.29   | 0.01   | 0.19   | 0.05   | 0.16    | continued |
| 162 A E/5        | 0.07   | 0.29  | <0.001 | 0.005  | 0.53    | 31.0    | 19.7    | 0.005  | 0.005   | 0.04   | ...    | 0.55   | <0.005 | 0.02    |           |
| 162 A F/4        | 0.02   | 0.19  | <0.005 | 0.02   | 0.46    | 7.4     | 25.5    | 3.5    | 0.58    | ...    | 0.01   | <0.005 | <0.005 | 0.63    |           |
| 162 A F/5        | 0.02   | 0.26  | <0.005 | 0.02   | 0.50    | 7.0     | 24.7    | 3.5    | 0.59    | 0.01   | <0.001 | <0.005 | <0.005 | 0.62    |           |
| 162 A G/5        | 0.03   | 0.33  | 0.03   | 0.03   | 1.6     | 11.4    | 16.5    | 2.2    | 0.43    | 0.12   | <0.01  | <0.005 | <0.005 | 0.04    |           |
| 162 A G/6        | 0.02   | 0.22  | 0.03   | 0.03   | 1.5     | 11.0    | 16.9    | 2.1    | 0.35    | 0.11   | 0.008  | 0.003  | <0.001 | 0.06    |           |
| 162 A H/6        | 0.52   | 1.0   | 0.03   | 0.04   | 1.6     | 1.1     | 1.3     | 0.42   | 0.39    | ...    | 0.03   | 0.20   | 0.11   | ...     |           |
| 162 M BS SU CP1A | 0.008  | 0.015 | 0.0036 | 0.005  | 0.060   | 0.020   | 0.020   | 0.0015 | 0.010   | 0.0030 | 0.0059 | <0.002 | <0.001 | (0.001) | continued |
| 162 U RE12       | 30ppm  | 30ppm | <20ppm | <50ppm | <100ppm | <100ppm | <100ppm | <50ppm | <100ppm | 20ppm  | 10ppm  | <50ppm | 20ppm  | <100ppm |           |
| 162 U RE13       | <0.005 | <0.01 | <0.005 | <0.005 | 0.03    | 0.02    | 0.01    | <0.01  | 0.01    | <0.005 | <0.001 | <0.003 | 0.01   | <0.001  |           |
| 162 U RH12       | 0.5    | 0.4   | <0.01  | 0.01   | 17      | 0.3     | 3.4     | 0.1    | 0.05    | 0.03   | <0.01  | 0.02   | <0.01  | 0.02    | continued |
| 162 U RH13       | 1      | 0.3   | <0.01  | <0.01  | 0.4     | 0.3     | 3.5     | 4.5    | 0.14    | 4      | 0.01   | 0.01   | 0.03   | 7       |           |
| 162 U RH18       | 1      | 0.3   | <0.01  | 0.02   | 0.3     | 0.3     | 4       | 3      | 0.2     | 9.5    | 0.02   | 0.02   | 0.02   | 9       |           |
| 162 U RH31       | 0.03   | 0.3   | <0.01  | 0.02   | 1       | 20      | 17      | 2      | 1.8     | 0.1    | <0.01  | 0.01   | 0.3    | 0.08    |           |
| 162 U RH32       | 0.1    | 0.5   | <0.002 | <0.005 | 1       | 20      | 22      | 3      | ...     | 18     | ...    | 0.3    | ...    | 2.4     |           |
| 162 U RN13       | 1      | 1     | <0.01  | <0.01  | 2       | 2.5     | 0.01    | 0.01   | <0.01   | 0.01   | 0.05   | 0.2    | 0.005  | <0.001  | continued |
| 162 U RN14       | 0.05   | 1.3   | 0.07   | 0.08   | 0.07    | 0.02    | 3       | 0.5    | 0.4     | 0.4    | 0.002  | 0.01   | 0.4    | 0.4     |           |
| 162 U RN16       | 0.9    | 0.01  | <0.01  | <0.01  | 1.8     | 2.9     | 0.005   | <0.01  | 0.01    | 0.01   | 0.05   | 0.5    | 0.006  | <0.01   |           |
| 162 U RN17       | 0.05   | 1.5   | 0.08   | 0.08   | 0.1     | 0.07    | 3       | 0.5    | 0.4     | 0.4    | 0.002  | <0.01  | 0.4    | 0.4     | continued |
| 162 U RN18       | 1      | ...   | 0.3    | ...    | 1       | 9       | ...     | ...    | 8       | ...    | 0.6    | 0.05   | ...    | ...     |           |
| 162 U RN19       | 0.9    | 1.3   | 0.08   | 0.1    | 1.6     | 3.1     | 2.7     | 0.9    | 0.5     | 0.8    | 0.1    | 0.3    | 0.5    | 0.7     |           |

| Continuation from above |        |         |         |        |         |          |        |       |         |        |        |        |          |     | Size (mm)      |   |   |
|-------------------------|--------|---------|---------|--------|---------|----------|--------|-------|---------|--------|--------|--------|----------|-----|----------------|---|---|
|                         | As     | Ti      | V       | Zr     | B       | Ca       | Pb     | N     | Ta      | Bi     | Sb     | Te     | Others   | W   | Ø              | D | H |
| 162 A A/10              | ...    | <0.001  | <0.005  | ...    | ...     | ...      | ...    | ...   | ...     | ...    | ...    | ...    | ...      | ... | 44 x 25/75/150 |   |   |
| 162 A B/6               | 0.005  | 0.01    | 0.01    | ...    | 0.001   | <0.001   | <0.001 | ...   | ...     | ...    | ...    | ...    | ...      | ... | 44 x 25/75/150 |   |   |
| 162 A C/17              | ...    | 0.04    | 0.4     | 0.05   | 0.008   | <0.001   | ...    | 0.004 | ...     | ...    | ...    | ...    | ...      | ... | 44 x 25/75/150 |   |   |
| 162 A D/11              | ...    | 0.1     | 0.12    | ...    | <0.001  | ...      | ...    | 0.01  | ...     | ...    | ...    | ...    | ...      | ... | 44 x 25/75/150 |   |   |
| 162 A E/5               | ...    | 0.48    | 0.08    | ...    | <0.001  | ...      | ...    | 0.01  | ...     | ...    | ...    | ...    | Ce 0.02  | ... | 44 x 25/75/150 |   |   |
| 162 A F/4               | ...    | 0.01    | 0.05    | ...    | <0.001  | ...      | ...    | 0.2   | ...     | ...    | ...    | ...    | ...      | ... | 44 x 25/75/150 |   |   |
| 162 A F/5               | 0.005  | <0.005  | 0.03    | ...    | 0.002   | ...      | ...    | 0.23  | ...     | ...    | ...    | ...    | ...      | ... | 44 x 25/75/150 |   |   |
| 162 A G/5               | ...    | <0.005  | 0.06    | <0.005 | ...     | <0.005   | ...    | 0.03  | <0.005  | ...    | ...    | ...    | ...      | ... | 44 x 25/75/150 |   |   |
| 162 A G/6               | ...    | 0.003   | 0.05    | <0.001 | ...     | 0.002    | ...    | 0.04  | <0.002  | ...    | ...    | ...    | ...      | ... | 44 x 25/75/150 |   |   |
| 162 A H/6               | 0.01   | 0.34    | 0.33    | 0.03   | 0.01    | <0.005   | ...    | ...   | ...     | ...    | ...    | ...    | ...      | ... | 44 x 25/75/150 |   |   |
|                         |        |         |         |        |         |          |        |       |         |        |        |        |          |     |                |   |   |
|                         |        |         |         |        |         |          |        |       |         |        |        |        |          |     |                |   |   |
| 162 M BS SU CP1A        | 0.002  | <0.0005 | <0.0005 | <0.002 | <0.0002 | (0.0002) | <0.001 | ...   | (0.002) | ...    | <0.001 | ...    | Fe 99.98 | ... | 51 x 51 x 30   |   |   |
|                         |        |         |         |        |         |          |        |       |         |        |        |        |          |     |                |   |   |
|                         |        |         |         |        |         |          |        |       |         |        |        |        |          |     |                |   |   |
| 162 U RE12              | <10ppm | 3ppm    | <10ppm  | <10ppm | <1ppm   | <1ppm    | <20ppm | ...   | ...     | ...    | ...    | ...    | ...      | ... | 40 x 40        |   |   |
| 162 U RE13              | <0.003 | <0.001  | <0.001  | <0.001 | <0.0002 | <0.0002  | <0.001 | ...   | 0.001   | ...    | ...    | ...    | ...      | ... | 40 x 40        |   |   |
| 162 U RH12              | ...    | <0.01   | 0.1     | <0.005 | ...     | ...      | ...    | ...   | ...     | ...    | ...    | ...    | ...      | ... | 40 x 40        |   |   |
| 162 U RH13              | ...    | 0.002   | 1.5     | ...    | ...     | ...      | ...    | ...   | ...     | ...    | ...    | ...    | ...      | ... | 40 x 40        |   |   |
| 162 U RH18              | ...    | 0.005   | 3       | ...    | ...     | ...      | ...    | ...   | ...     | ...    | ...    | ...    | ...      | ... | 40 x 40        |   |   |
| 162 U RH31              | <0.01  | 0.01    | 0.05    | <0.01  | ...     | ...      | ...    | ...   | ...     | ...    | ...    | ...    | ...      | ... | 40 x 40        |   |   |
| 162 U RH32              | ...    | ...     | ...     | 0.01   | <0.002  | ...      | ...    | 0.15  | ...     | ...    | ...    | ...    | ...      | ... | 40 x 40        |   |   |
| 162 U RN13              | 0.002  | 0.05    | 0.07    | 0.03   | 0.001   | <0.0005  | 0.001  | 0.01  | ...     | ...    | 0.08   | 0.004  | ...      | ... | 40 x 40        |   |   |
| 162 U RN14              | 0.05   | 0.09    | 0.5     | 0.006  | 0.004   | 0.003    | 0.05   | 0.04  | 0.2     | ...    | <0.005 | 0.01   | ...      | ... | 40 x 40        |   |   |
| 162 U RN16              | 0.002  | 0.003   | 0.01    | 0.2    | 0.0005  | <0.0005  | <0.001 | 0.002 | ...     | ...    | 0.06   | ...    | ...      | ... | 40 x 40        |   |   |
| 162 U RN17              | 0.05   | 0.09    | 0.5     | 0.003  | 0.006   | 0.003    | 0.03   | 0.04  | ...     | ...    | 0.005  | ...    | ...      | ... | 40 x 40        |   |   |
| 162 U RN18              | ...    | ...     | ...     | ...    | ...     | ...      | 0.4    | ...   | ...     | ...    | 0.07   | ...    | 0.04     | ... | 40 x 30        |   |   |
| 162 U RN19              | 0.06   | 0.1     | 0.5     | 0.06   | 0.008   | 0.005    | 0.04   | 0.03  | 0.5     | (0.03) | 0.08   | (0.03) | ...      | ... | 40 x 40        |   |   |

# 16. Setting Up Samples

All of these samples have been prepared to meet the daily setting up requirements of laboratories using Direct Reading Spectrometers. The Analytical Data are supplied with each sample but are not certified as accurate as these are not intended to be used as Primary Reference Materials.

| 16.2 Steels (continued)                                   |        |        |        |        |         |         |         |          |          |         |           |         |         |           |              |           |           |             |   |
|---|--------|--------|--------|--------|---------|---------|---------|----------|----------|---------|-----------|---------|---------|-----------|--------------|-----------|-----------|-------------|---|
|   | C      | Si     | S      | P      | Mn      | Ni      | Cr      | Mo       | Cu       | Co      | Sn        | Al      | Nb      | W         |              |           |           |             |   |
| 162 MI 217A   | 0.01   | 0.01   | 0.001  | 0.002  | 0.003   | 0.01    | 0.01    | 0.01     | 0.001    | 0.004   | 0.0005    | 0.0002  | 0.001   | 0.005     |              |           |           |             |   |
| 162 MI 218A   | 0.05   | 0.1    | 0.07   | 0.1    | 2       | 5       | 0.1     | 0.1      | 0.6      | 0.01    | 0.1       | 0.003   | <0.0001 | 0.7       | continued    |           |           |             |   |
| 162 MI 219A   | 0.9    | 2      | 0.002  | 0.003  | 0.02    | 2.8     | 5       | 1.5      | 0.6      | 1       | 0.06      | 0.2     | 0.4     | 0.01      |              |           |           |             |   |
| 162 MI 194A *   | 0.51   | 0.49   | 0.025  | 0.039  | 1.03    | 0.78    | 0.70    | 0.40     | 0.26     | 0.054   | 0.017     | 0.10    | 0.058   | 0.13      | continued    |           |           |             |   |
| 162 MI 195A *   | 0.25   | 1.16   | 0.008  | 0.018  | 1.85    | 1.01    | 0.21    | 0.052    | 0.52     | 0.10    | 0.085     | 0.014   | 0.008   | 0.38      |              |           |           |             |   |
| 162 MI 196A *   | 1.08   | 0.35   | 0.015  | 0.040  | 2.42    | 0.61    | 2.35    | 0.13     | 0.25     | 0.014   | 0.034     | 0.016   | 0.088   | 0.19      |              |           |           |             |   |
| * most of these values are certified                      |        |        |        |        |         |         |         |          |          |         |           |         |         |           |              |           |           |             |   |
| Continuation from above                                   |        |        |        |        |         |         |         |          |          |         |           |         |         |           |              |           |           |             |   |
|   | As     | Ti     | V      | Zr     | B       | Ca      | Pb      | N        | Ta       | Sb      | Size (mm) |         |         |           |              |           |           |             |   |
|   |        |        |        |        |         |         |         |          |          |         | Ø         | H       |         |           |              |           |           |             |   |
| 162 MI 217A   | 0.003  | 0.0001 | 0.002  | 0.005  | <0.0001 | 0.0001  | 0.004   | 0.0005   | 0.01     | 0.006   |           |         |         |           | QA A         | 36 x 38   |           |             |   |
| 162 MI 218A   | 0.1    | 0.01   | 1      | <0.001 | 0.0004  | <0.0001 | <0.001  | 0.007    | 0.02     | 0.02    |           |         |         |           | QA C         | 38 x 38   |           |             |   |
| 162 MI 219A   | 0.01   | 1.7    | 0.3    | 0.002  | 0.01    | <0.0001 | 0.003   | 0.002    | 0.01     | 0.1     |           |         |         |           | QA D         | 38 x 38   |           |             |   |
| 162 MI 194A   | 0.033  | 0.078  | 0.34   | 0.027  | 0.006   | ...     | (0.003) | 0.0053   | ...      | 0.016   |           |         |         |           |              | 45 x 25   | W         |             |   |
| 162 MI 195A   | 0.023  | 0.0023 | 0.085  | 0.003  | 0.004   | ...     | (0.002) | 0.0076   | ...      | 0.007   |           |         |         |           |              | 45 x 25   |           |             |   |
| 162 MI 196A   | 0.030  | 0.013  | 0.16   | 0.006  | 0.002   | ...     | (0.002) | 0.0099   | ...      | 0.002   |           |         |         |           |              | 45 x 25   |           |             |   |
| Continuation from above                                   |        |        |        |        |         |         |         |          |          |         |           |         |         |           |              |           |           |             |   |
|   | C      | Si     | S      | P      | Mn      | Ni      | Cr      | Mo       | Cu       | Co      | Al        | Nb      | As      | Ti        | Pb           | Ta        | Size (mm) |             |   |
|   |        |        |        |        |         |         |         |          |          |         |           |         |         |           |              |           | Ø         | H           |   |
| 162 JH STD  | 0.13   | 0.19   | 0.028  | 0.009  | 0.48    | 4.17    | 26.05   | 0.049    | 0.012    | 0.012   | 0.079     | 0.10    | 0.10    | 0.070     | 0.023        | 0.010     |           | 34 x 20     |   |
| 162 JH STE  | 0.44   | 1.42   | 0.009  | 0.008  | 1.60    | 14.53   | 15.21   | 2.47     | 0.054    | 0.20    | 0.040     | 0.46    | 0.049   | 0.19      | 0.017        | 0.37      |           | each        |   |
| 162 JH STF  | 0.024  | 0.58   | 0.003  | 0.032  | 0.21    | 29.21   | 1.0     | 0.94     | 0.017    | 0.053   | 0.007     | 1.56    | 0.005   | 0.50      | 0.046        | 0.13      |           | Set Only    |   |
| 162 JH STG  | 0.034  | 1.25   | 0.006  | 0.025  | 1.41    | 3.96    | 11.29   | 1.21     | 0.20     | 0.20    | 0.085     | 1.03    | 0.088   | 0.32      | ...          | ...       |           | 35 x 18     |   |
| 162 JH STH  | 0.086  | 0.50   | 0.001  | 0.007  | 0.51    | 0.47    | 17.90   | 0.53     | 0.052    | 0.054   | 0.045     | 0.10    | 0.010   | 0.11      | ...          | ...       |           | each        |   |
| 162 JH STI  | 0.26   | 0.19   | 0.028  | 0.004  | 0.20    | 0.019   | 27.06   | 0.056    | 0.012    | 0.003   | 0.013     | 0.016   | 0.001   | 0.015     | ...          | ...       |           | Set Only    |   |
| Continuation from above                                   |        |        |        |        |         |         |         |          |          |         |           |         |         |           |              |           |           |             |   |
|   | C      | Si     | S      | P      | Mn      | Ni      | Cr      | Mo       | Cu       | Co      | Sn        | Al      | V       | N         | O            | Others    | Size (mm) |             |   |
|   |        |        |        |        |         |         |         |          |          |         |           |         |         |           |              |           | Ø         | H           |   |
| 162M BS 01C   | 0.19   | 0.042  | 0.018  | 0.004  | 0.46    | 0.010   | 0.012   | 0.005    | 0.017    | ...     | <0.002    | 0.006   | ...     | 0.003     | 0.014        |           |           | 38-44 x 150 | W |
| 162 M BS 02E  | 0.454  | 0.278  | 0.019  | 0.008  | 0.73    | 0.076   | 0.090   | 0.022    | 0.17     | 0.006   | 0.007     | 0.004   | <0.002  | (0.007)   | (0.004)      |           |           | 38-44 x 150 |   |
| 162 M BS 03D  | 0.18   | 0.28   | 0.10   | 0.025  | 1.15    | 0.11    | 0.18    | 0.04     | 0.27     | 0.02    | <0.001    | ...     | 0.011   | 0.005     |              |           |           | 38-44 x 150 |   |
| 162 M BS 04D  | 0.39   | 0.17   | 0.072  | 0.016  | 1.02    | 0.12    | 0.20    | 0.09     | 0.09     | ...     | 0.006     | 0.028   | ...     | 0.003     | 0.002        |           |           | 38-44 x 150 |   |
| 162 M BS 05E  | 1.06   | 0.23   | 0.025  | 0.010  | 0.33    | 0.11    | 1.55    | 0.024    | 0.18     | 0.01    | 0.010     | 0.009   | 0.008   | 0.006     | 0.003        |           |           | 38-44 x 150 |   |
| 162 M BS 06J  | 0.192  | 0.22   | 0.030  | 0.009  | 0.801   | 0.42    | 0.502   | 0.157    | 0.14     | 0.010   | 0.008     | 0.029   | 0.005   | (0.008)   | (0.002)      |           |           | 38-44 x 150 |   |
| 162 M BS 10B  | 0.02   | 0.43   | 0.026  | 0.024  | 1.75    | 8.3     | 18.5    | 0.4      | 0.27     | 0.090   | 0.009     | 0.003   | 0.06    | 0.07      | ...          | W 0.04    |           | 38-44 x 150 |   |
|   |        |        |        |        |         |         |         |          |          |         |           |         |         |           |              |           |           | Ø           | H |
| 162M BSSULF-2   | 0.17   | 0.24   | 0.008  | 0.007  | 1.13    | 0.115   | 0.12    | 0.035    | 0.19     | 0.014   | ...       | 0.040   | ...     | 0.0074    | 0.002        |           |           | 38 x 40     | W |
| 162M BSSULF-3   | 0.17   | 0.22   | 0.011  | 0.008  | 0.83    | 3.25    | 0.11    | 0.017    | 0.07     | 0.010   | 0.005     | 0.021   | 0.0024  | 0.0067    | 0.002        |           |           | 38 x 40     |   |
| 162M BSSU4130   | 0.29   | 0.25   | 0.020  | 0.015  | 0.55    | 0.090   | 0.97    | 0.16     | 0.104    | 0.006   | ...       | 0.030   | ...     | 0.0057    | 0.002        |           |           | 38 x 40     |   |
| 162M BSSU4620   | 0.21   | 0.23   | 0.023  | 0.010  | 0.58    | 1.69    | 0.15    | 0.26     | 0.14     | 0.009   | 0.008     | 0.022   | 0.002   | 0.0090    | 0.002        |           |           | 38 x 40     |   |
| 162M BSSU8620   | 0.21   | 0.29   | 0.0216 | 0.011  | 0.836   | 0.485   | 0.547   | 0.185    | 0.084    | 0.005   | 0.006     | 0.033   | ...     | 0.0072    | 0.0017       | Ca 0.0008 |           | 38 x 40     |   |
| 162M BSSU9310   | 0.125  | 0.23   | 0.016  | 0.010  | 0.57    | 3.25    | 1.29    | 0.127    | 0.19     | 0.016   | 0.014     | 0.026   | 0.005   | 0.0102    | 0.002        |           |           | 38 x 40     |   |
| 162M BSSUP-20   | 0.38   | 0.64   | 0.005  | 0.011  | 0.84    | 0.116   | 1.76    | 0.46     | 0.21     | 0.011   | 0.011     | 0.018   | 0.010   | 0.0093    | 0.002        | Ca 0.0016 |           | 38 x 40     |   |
| 162M BSSU8740   | 0.41   | 0.24   | 0.014  | 0.014  | 0.92    | 0.44    | 0.51    | 0.225    | 0.14     | 0.012   | 0.007     | 0.019   | ...     | 0.0085    | 0.0016       |           |           | 38 x 40     |   |
| 162 U RFe C   | 0.1    | 0.2    | 0.07   | 0.09   | 1.4     | 3       | 0.8     | 0.1      | 0.6      | 0.07    | 0.05      | 0.003   | 0.6     | 0.01      | ...          |           |           | continued   |   |
| 162 U RFe D   | 0.8    | 1.2    | 0.02   | 0.01   | 0.2     | 0.1     | 3       | 1.3      | 0.05     | 0.3     | 0.009     | 0.1     | 0.1     | 0.03      | ...          |           |           | continued   |   |
| 162 M BS SS-1   | 0.122  | 0.215  | 0.027  | 0.009  | 1.08    | 3.97    | 27.87   | 0.05     | 0.094    | 0.02    | 0.044     | 0.042   | 0.017   | 0.0046    | ...          |           |           | continued   |   |
| 162 M BS SS-2   | 0.329  | 1.36   | 0.01   | 0.018  | 1.7     | 15.32   | 15.12   | 2.01     | 0.199    | 0.2     | 0.012     | 0.034   | 0.1     | 0.0027    | ...          |           |           | continued   |   |
| 162 M BS SS-3   | 0.073  | 0.64   | 0.002  | 0.031  | 0.21    | 31.45   | 4.37    | 0.8      | 0.026    | 0.1     | 0.0008    | 0.034   | 0.06    | 0.0017    | ...          |           |           | continued   |   |
| 162 M BS SU 309   | 0.077  | 0.50   | 0.0009 | 0.027  | 1.68    | 13.68   | 22.50   | 0.30     | 0.26     | 0.13    | 0.007     | 0.006   | 0.065   | 0.095     | 0.005        |           |           | continued   |   |
| 162 M BS SU 316L  | 0.021  | 0.39   | 0.025  | 0.035  | 1.70    | 12.27   | 17.58   | 2.09     | 0.405    | 0.21    | ...       | 0.005   | 0.044   | 0.091     | 0.005        |           |           | continued   |   |
| 162 M BS SU 321   | 0.055  | 0.63   | 0.023  | 0.016  | 1.67    | 10.15   | 17.18   | 0.22     | 0.21     | 0.16    | 0.004     | 0.19    | 0.13    | 0.012     | 0.002        |           |           | continued   |   |
| 162 M BS SU 347   | 0.056  | 0.51   | 0.027  | 0.030  | 1.61    | 9.43    | 17.26   | 0.39     | 0.16     | 0.05    | 0.007     | 0.005   | ...     | 0.060     | 0.004        |           |           | continued   |   |
| 162 X FESUS1  | 1.1    | 1.8    | 0.35   | 0.15   | 0.8     | 0.5     | 25.0    | 0.45     | 0.3      | 1.1     | 0.05      | 0.6     | 0.4     | ...       | ...          |           |           | continued   |   |
| Continuation from above                                   |        |        |        |        |         |         |         |          |          |         |           |         |         |           |              |           |           |             |   |
|   | As     | B      | Nb     | Pb     | Ti      | W       | Zr      | Ca       | Sb       | Ta      | Bi        | Te      | Zn      | Size (mm) |              |           |           |             |   |
|   |        |        |        |        |         |         |         |          |          |         |           |         |         | Ø         | H            |           |           |             |   |
| 162 U RFe C   | 0.06   | 0.0025 | 0.1    | 0.016  | 0.005   | 0.6     | 0.002   | 0.0001   | 0.015    | 0.1     | 0.01      | 0.02    | ...     |           | 40 x 40      |           |           |             |   |
| 162 U RFe D   | 0.01   | 0.01   | 0.3    | 0.007  | 0.17    | 0.1     | 0.02    | 0.003    | 0.09     | (0.01)  | (0.02)    | (0.005) | ...     |           | 40 x 40      |           |           |             |   |
|   |        |        |        |        |         |         |         |          |          |         |           |         |         |           |              | W         | D         | H           |   |
| 162 M BS SS-1   | 0.024  | 0.0032 | 0.1    | 0.004  | 0.044   | (0.014) | 0.028   | 0.0016   | 0.02     | (0.002) | ...       | ...     | ...     |           | 44 x 44 x 13 | W         |           |             |   |
| 162 M BS SS-2   | 0.048  | 0.0022 | 0.52   | 0.011  | 0.15    | 0.1     | 0.012   | 0.0055   | 0.011    | 0.24    | ...       | ...     | ...     |           | each         |           |           |             |   |
| 162 M BS SS-3   | 0.0012 | 0.001  | 1.31*  | 0.003  | 0.5*    | 0.052   | <0.002  | (0.0004) | (0.0003) | 0.12    | ...       | ...     | ...     |           | Set Only     |           |           |             |   |
| * Segregation of these elements is evident in this sample |        |        |        |        |         |         |         |          |          |         |           |         |         |           |              |           |           |             |   |
|   |        |        |        |        |         |         |         |          |          |         |           |         |         |           |              | Ø         | H         |             |   |
| 162 M BS SU 309   | ...    | 0.0030 | 0.027  | ...    | ...     | ...     | ...     | ...      | ...      | ...     | ...       | ...     | ...     |           | 44 x 40      |           |           |             |   |
| 162 M BS SU 316L  | ...    | ...    | ...    | ...    | ...     | ...     | ...     | ...      | ...      | ...     | ...       | ...     | ...     |           | 38 x 40      |           |           |             |   |
| 162 M BS SU 321   | ...    | ...    | ...    | ...    | 0.45    | ...     | ...     | ...      | ...      | ...     | ...       | ...     | ...     |           | 39 x 40      |           |           |             |   |
| 162 M BS SU 347   | ...    | 0.0040 | 0.79   | ...    | ...     | ...     | ...     | ...      | ...      | ...     | ...       | ...     | ...     |           | 38 x 40      |           |           |             |   |
| 162 X FESUS1  | 0.005  | ...    | 0.05   | 0.005  | 0.4     | 0.2     | 0.04    | ...      | 0.015    | ...     | 0.005     | ...     | 0.002   |           | 43 x 20      | C         |           |             |   |

# 16. Setting Up Samples

All of these samples have been prepared to meet the daily setting up requirements of laboratories using Direct Reading Spectrometers. The Analytical Data are supplied with each sample but are not certified as accurate as these are not intended to be used as Primary Reference Materials.

| 16.4 Pure Aluminium       |        |        |        |         |         |        |        |        |        |         |        |         |        |                         |                  |         |
|---------------------------|--------|--------|--------|---------|---------|--------|--------|--------|--------|---------|--------|---------|--------|-------------------------|------------------|---------|
| All Elements ppm          |        |        |        |         |         |        |        |        |        |         |        |         |        |                         |                  |         |
|                           | Si     | Fe     | Cu     | Mn      | Mg      | Cr     | Zn     | Ti     | B      | Be      | Na     | Li      | Ca     | Ni                      |                  |         |
| 164 X ALSUS 1             | <2     | <2     | <2     | <0.3    | <2      | <0.4   | <0.7   | <0.5   | <0.2   | <0.1    | <0.5   | <0.1    | <1     | <0.5                    | continued        |         |
| 164 U RA10                | ~30    | ~5     | ~2     | <1      | <1      | <1     | <3     | <1     | <2     | <1      | <0.01  | <0.02   | <0.1   | <2                      | continued        |         |
| 164 MI 220B               | <1     | 0.6    | 0.4    | 0.3     | 1       | <1     | 3      | 0.4    | <1     | <1      | <1     | <1      | <1     | <1                      | continued        |         |
| 164 HY AL4N               | 13     | 18     | 25     | 2       | 15      | 0.6    | 3      | 0.6    | 0.6    | 0.1     | 1      | 0.2     | 0.2    | 0.4                     |                  |         |
| 164 V E0                  | <0.8   | <0.5   | <0.4   | <0.2    | <0.6    | <0.3   | <0.5   | <0.5   | <0.4   | <0.1    | <0.2   | <0.1    | <0.4   | <0.1                    |                  |         |
| 164 V E1                  | 5      | <3     | <4     | <0.5    | <3      | <0.5   | <2     | <1     | <2     | <2      | <1     | <0.1    | <1     | <0.3                    | continued        |         |
| 164 V E10                 | <10    | <5     | <4     | <1      | <3      | <1     | <3     | <1     | <2     | <0.2    | <1     | <0.2    | <1     | <1                      |                  |         |
| Continuation from above   |        |        |        |         |         |        |        |        |        |         |        |         |        |                         |                  |         |
| All Elements ppm          |        |        |        |         |         |        |        |        |        |         |        |         |        |                         |                  |         |
|                           | Pb     | Sn     | Zr     | Bi      | Ag      | Ba     | In     | Co     | V      | Ga      | Sb     | Sr      | Cd     | Others                  | Size (mm)<br>Ø H |         |
| 164 X ALSUS 1             | <0.5   | <0.5   | <0.3   | <1      | <0.5    | <0.2   | <1     | <0.1   | <1     | <0.2    | <1     | ...     | ...    | 20 other each at <1 ppm | 60 x 75          | HIP     |
| 164 U RA10                | <3     | <3     | <1     | <3      | <1      | ...    | ...    | <1     | <2     | <1      | <3     | <0.3    | <1     |                         | 50 x 50          | HIP     |
| 164 MI 220B               | <1     | <2     | <1     | <5      | <1      | <2     | ...    | <2     | <1     | <1      | <5     | ...     | ...    | QA 10                   | 57 x 40          | CC      |
| 164 HY AL4N               | 1      | 0.5    | 0.5    | 0.1     | ...     | ...    | ...    | ...    | 1      | 0.5     | 2      | 1       | ...    |                         | 50 x 35          |         |
| 164V E0                   | <0.1   | <0.2   | <0.3   | <0.2    | <0.1    | <0.1   | <0.1   | <0.1   | <0.3   | <0.1    | <0.2   | <0.2    | <0.2   |                         | 60 x 40          |         |
| 164 V E1                  | <0.5   | <0.2   | <0.5   | <0.5    | <0.1    | <0.1   | <0.1   | <0.1   | <0.2   | <0.2    | <1     | ...     | <0.2   |                         | 60 x 40/75       |         |
| 164 V E10                 | <2     | <3     | <1     | <3      | <2      | ...    | ...    | <1     | <0.5   | <1      | ...    | ...     | <1     |                         | 60 x 40/75       |         |
| 16.4 Aluminium            |        |        |        |         |         |        |        |        |        |         |        |         |        |                         |                  |         |
|                           | Si     | Fe     | Cu     | Mn      | Mg      | Cr     | Zn     | Ti     | B      | Be      | Na     | Li      | Ca     | Ni                      |                  |         |
| 164 V E2                  | 0.9    | 0.9    | 0.20   | 0.15    | 0.20    | 0.05   | 0.10   | 0.20   | ...    | 0.004   | 0.007  | ...     | 0.007  | 0.2                     |                  |         |
| 164 V E3                  | 10.0   | 0.35   | 4.0    | ...     | ...     | ...    | ...    | ...    | ...    | ...     | ...    | ...     | 0.01   | 1.0                     |                  |         |
| 164 V E4                  | ...    | ...    | ...    | 0.7     | 1.1     | 0.2    | 5.2    | ...    | ...    | ...     | ...    | ...     | ...    | ...                     | continued        |         |
| 164 V E5                  | ...    | ...    | ...    | 1.4     | 4.9     | ...    | ...    | ...    | 0.007  | ...     | ...    | 0.008   | ...    | ...                     |                  |         |
| 164 V E8                  | 0.01   | 0.012  | 0.02   | 0.005   | 0.005   | 0.005  | 0.005  | 0.003  | ...    | 0.001   | ...    | ...     | 0.005  | 0.003                   |                  |         |
| 164 V E13                 | ...    | 4.8    | ...    | ...     | ...     | ...    | ...    | ...    | ...    | ...     | ...    | ...     | ...    | ...                     | 60 x 25/40/75    |         |
| 164 V P2                  | 2.2    | 1.8    | 0.5    | 1.5     | 2.8     | 0.34   | 0.54   | 0.24   | 0.002  | 0.002   | 0.002  | 0.007   | 0.018  | 0.03                    | continued        |         |
| 164 V P3                  | 0.07   | 5.8    | 0.02   | 0.04    | 0.003   | 0.001  | 0.008  | 0.004  | 0.0002 | ...     | ...    | ...     | 0.0002 | 0.003                   |                  |         |
| 164 U RA13                | 14.5   | 0.3    | 4      | 0.02    | 0.2     | 0.006  | 0.4    | 0.001  | 0.007  | <0.001  | 0.004  | 0.0001  | 0.01   | 2.8                     |                  |         |
| 164 U RA14                | 1      | 1.2    | 0.5    | 0.6     | 5       | 0.5    | 4      | 0.2    | 0.001  | 0.002   | 0.0002 | 0.003   | 0.005  | 0.5                     |                  |         |
| 164 U RA16                | 15     | ...    | 4      | ...     | 0.2     | ...    | 0.3    | ...    | ...    | ...     | ...    | ...     | ...    | 3                       | continued        |         |
| 164 U RA17                | 1      | 1.2    | 0.5    | 0.6     | 5       | 0.2    | 4      | 0.2    | 0.001  | 0.002   | 0.0002 | 0.003   | 0.005  | 0.5                     |                  |         |
| 164 U RA18                | 15     | 0.2    | 8.3    | 0.34    | 0.2     | 0.005  | 0.3    | <0.001 | 0.0078 | <0.0001 | 0.0045 | <0.0001 | 0.012  | 3                       |                  |         |
| 164 U RA19                | 1.4    | 1      | 0.58   | 1.4     | 8.2     | 0.23   | 6.9    | 0.22   | 0.002  | 0.006   | 0.0003 | 0.0045  | 0.003  | 0.6                     |                  |         |
| 164 MI 221A               | 0.2    | 0.2    | 0.6    | 0.4     | 4.8     | 0.22   | 6.8    | 0.1    | ...    | 0.005   | ...    | ...     | 0.03   | ...                     | continued        |         |
| 164 MI 222A               | 1.1    | 0.9    | 4.9    | 1.1     | 0.2     | ...    | 0.3    | 0.2    | ...    | 0.003   | ...    | ...     | ...    | 0.3                     |                  |         |
| 164 MI 223A               | 12.0   | 0.5    | 1.0    | 0.2     | 1.5     | 0.1    | 0.013  | 0.1    | ...    | ...     | ...    | ...     | 0.001  | 2.4                     |                  |         |
| 164 HY AMS-1              | 1.2    | 0.8    | 0.6    | 0.5     | 1.3     | 0.2    | 0.4    | 0.2    | 0.004  | 0.002   | 0.005  | 0.01    | 0.01   | 0.02                    | continued        |         |
| 164 HY ASC-1              | 14.0   | 1.6    | 6.0    | 0.4     | 1.2     | 0.2    | 0.5    | 0.5    | ...    | 0.003   | ...    | ...     | 0.02   | 0.6                     |                  |         |
| 164 X ALSUS 5             | 0.05   | 0.05   | 1.1    | 0.002   | 2.6     | 0.005  | 12.0   | 0.025  | <0.005 | <0.005  | ...    | ...     | 0.0005 | 0.005                   |                  |         |
| 164 X ALSUS 6             | 0.5    | 0.2    | 12.0   | 0.1     | 0.03    | 0.02   | 0.05   | 0.05   | ...    | 0.005   | ...    | ...     | ...    | 0.1                     | continued        |         |
| 164 X ALSUS 7A            | 0.9    | 0.55   | 4.0    | 0.06    | 0.15    | 0.01   | 0.12   | 0.3    | ...    | 0.1     | <0.001 | <0.001  | <0.001 | 1.1                     |                  |         |
| 164 X ALSUS 8A            | 9.5    | 0.25   | 0.75   | 0.45    | 0.9     | 0.06   | 0.25   | 0.02   | ...    | 0.015   | <0.001 | <0.001  | <0.001 | 0.12                    |                  |         |
| 164 X ALSUS 25            | 27.15* | 0.26   | 0.035  | 0.1     | 0.03    | 0.005  | 0.05   | 0.025  | ...    | ...     | ...    | ...     | 0.007  | 0.005                   |                  |         |
| * This value is certified |        |        |        |         |         |        |        |        |        |         |        |         |        |                         |                  |         |
| Continuation from above   |        |        |        |         |         |        |        |        |        |         |        |         |        |                         |                  |         |
|                           | Pb     | Sn     | Zr     | Bi      | Sr      | Cd     | Sb     | Co     | Ga     | V       | Ag     | Ba      | In     | P                       | Size (mm)<br>Ø H |         |
| 164 V E2                  | 0.1    | 0.18   | ...    | ...     | 0.12    | ...    | ...    | 0.04   | 0.06   | 0.1     | 0.22   | ...     | ...    | ...                     | 60 x 25/40/75    | C       |
| 164 V E3                  | 0.4    | ...    | ...    | ...     | ...     | ...    | 0.3    | ...    | ...    | ...     | ...    | ...     | ...    | ...                     | 60 x 25/40/75    |         |
| 164 V E4                  | ...    | ...    | 0.2    | ...     | ...     | 0.06   | ...    | 0.3    | ...    | ...     | 0.2    | ...     | ...    | ...                     | 60 x 25/40/75    |         |
| 164 V E5                  | ...    | ...    | ...    | 0.1     | ...     | ...    | ...    | ...    | ...    | ...     | ...    | ...     | ...    | ...                     | 60 x 25/40/75    |         |
| 164 V E8                  | 0.003  | 0.003  | 0.003  | 0.005   | 0.002   | 0.003  | 0.01   | 0.002  | 0.005  | 0.003   | 0.005  | 0.004   | 0.005  | ...                     | 60 x 25/40/75    |         |
| 164 V P2                  | 0.06   | 0.03   | 0.09   | 0.022   | <0.0002 | 0.004  | ...    | 0.007  | 0.037  | 0.017   | 0.0006 | ...     | ...    | ...                     | 52 x 40          | HIP     |
| 164 V P3                  | 0.03   | 0.007  | 0.001  | ...     | ...     | 0.001  | 0.0002 | 0.0005 | 0.02   | ...     | ...    | ...     | ...    | ...                     | 52 x 40          |         |
| 164 U RA13                | 0.27   | 0.1    | 0.001  | 0.02    | 0.02    | 0.01   | 0.13   | 0.009  | 0.01   | <0.0005 | 0.003  | ...     | ...    | ~0.01                   | 50 x 50          |         |
| 164 U RA14                | 0.002  | 0.004  | 0.09   | 0.2     | <0.002  | -0.012 | 0.001  | 0.1    | 0.01   | 0.1     | 0.05   | ...     | (0.01) | 0.001                   | 50 x 50          |         |
| 164 U RA16                | 0.3    | 0.1    | ...    | ...     | 0.03    | ...    | ...    | ...    | ...    | ...     | (0.06) | ...     | (0.01) | ...                     | 50 x 40          |         |
| 164 U RA17                | 0.002  | 0.004  | 0.09   | 0.2     | <0.002  | -0.012 | 0.001  | 0.1    | 0.01   | 0.1     | 0.05   | ...     | (0.01) | 0.001                   | 50 x 40          |         |
| 164 U RA18                | 0.26   | 0.32   | <0.001 | <0.0005 | 0.04    | -0.012 | 0.36   | 0.002  | 0.01   | 0.0005  | 0.001  | ...     | (0.01) | >0.012                  | 50 x 40          |         |
| 164 U RA19                | 0.008  | 0.005  | 0.16   | 0.24    | <0.001  | 0.044  | 0.004  | 0.27   | 0.06   | 0.15    | 0.06   | ...     | 0.01   | <0.001                  | 50 x 40          |         |
| 164 MI 221A               | ...    | ...    | ...    | ...     | ...     | ...    | 0.01   | 0.2    | 0.03   | ...     | ...    | ...     | ...    | ...                     | 62 x 40          |         |
| 164 MI 222A               | 0.1    | 0.1    | 0.2    | ...     | ...     | 0.2    | ...    | 0.02   | 0.06   | 0.1     | 0.2    | ...     | ...    | 0.0025                  | QA 11            | 62 x 40 |
| 164 MI 223A               | ...    | ...    | ...    | ...     | 0.035   | ...    | ...    | ...    | ...    | ...     | ...    | ...     | ...    | ...                     | QA 12            | 62 x 40 |
| 164 HY AMS-1              | 0.05   | 0.03   | ...    | 0.01    | ...     | 0.03   | 0.02   | ...    | 0.01   | 0.03    | ...    | ...     | ...    | ...                     | QA 15            | 62 x 40 |
| 164 HY ASC-1              | 0.1    | 0.1    | 0.01   | 0.1     | 0.03    | 0.05   | 0.02   | ...    | 0.04   | 0.02    | ...    | ...     | ...    | ...                     | ...              | 45 x 35 |
| 164 X ALSUS 5             | 0.005  | 0.005  | 0.3    | <0.005  | <0.005  | ...    | <0.005 | ...    | 0.005  | 0.003   | ...    | ...     | ...    | ...                     | 45 x 35          |         |
| 164 X ALSUS 6             | 0.05   | 0.1    | 0.05   | ...     | ...     | 0.03   | 0.05   | 0.05   | 0.02   | 0.03    | ...    | ...     | ...    | ...                     | 50 x 25          | W       |
| 164 X ALSUS 7A            | 0.11   | 0.01   | 0.18   | ...     | 0.003   | ...    | 0.12   | 0.2    | ...    | ...     | 0.09   | ...     | ...    | <0.01                   | 50 x 20          | C       |
| 164 X ALSUS 8A            | 0.001  | 0.13   | 0.025  | ...     | 0.07    | ...    | 0.03   | 0.025  | ...    | ...     | 1.0    | ...     | ...    | <0.01                   | 50 x 20          |         |
| 164 X ALSUS 25            | 0.01   | <0.001 | ...    | ...     | 0.04    | ...    | ...    | ...    | ...    | ...     | ...    | ...     | ...    | ...                     | 65 x 30          | SC      |

# 16. Setting Up Samples

Blocks/Discs

All of these samples have been prepared to meet the daily setting up requirements of laboratories using Direct Reading Spectrometers. The Analytical Data are supplied with each sample but are not certified as accurate as these are not intended to be used as Primary Reference Materials.

| 16.5.1 Pure Copper      |        |        |        |       |        |        |         |        |        |        |        |        |        |        |           | All Elements ppm |      |      |           |         |    |  |  |  |  |           |  |           |  |
|-------------------------|--------|--------|--------|-------|--------|--------|---------|--------|--------|--------|--------|--------|--------|--------|-----------|------------------|------|------|-----------|---------|----|--|--|--|--|-----------|--|-----------|--|
|                         | Sn     | Pb     | Zn     | Fe    | Ni     | Al     | Si      | As     | Mn     | Bi     | Sb     | Mg     | P      | S      |           |                  |      |      |           |         |    |  |  |  |  |           |  |           |  |
| 165 X CUSUS1            | 0.7    | 11     | 0.4    | 8     | 1      | 0.05   | 0.05    | 0.05   | 0.01   | 0.05   | 0.1    | 0.01   | 1      | 11     | continued |                  |      |      |           |         |    |  |  |  |  |           |  |           |  |
| 165 U RC11              | 1      | 2      | 2      | 2     | 1      | 1      | 1       | 1      | 2      | 1      | 1      | 1      | 2      | 8      | continued |                  |      |      |           |         |    |  |  |  |  |           |  |           |  |
| 165 U RC20              | ...    | ...    | ...    | ...   | ...    | ...    | ...     | ...    | ...    | ...    | ...    | ...    | ...    | ...    |           |                  |      |      |           |         |    |  |  |  |  |           |  |           |  |
| Continuation from above |        |        |        |       |        |        |         |        |        |        |        |        |        |        |           | All Elements ppm |      |      |           |         |    |  |  |  |  | %         |  | Size (mm) |  |
|                         | Cr     | Ag     | Be     | Cd    | Co     | Se     | Te      | Au     | Zr     | C      | O      | N      | Cu     |        |           | Ø                | H    |      |           |         |    |  |  |  |  |           |  |           |  |
| 165 X CUSUS1            | 0.01   | 0.05   | <0.01  | <0.01 | 0.1    | 0.05   | <0.05   | <0.05  | <0.01  | (0.5)  | (370)  | (6)    | 99.96  |        |           | 50               | x 45 | w    |           |         |    |  |  |  |  |           |  |           |  |
| 165 U RC11              | 1      | 10     | ...    | 1     | 1      | 1      | 1       | ...    | ...    | ...    | ~10    | ...    | 99.99  |        |           | 40               | x 40 |      |           |         |    |  |  |  |  |           |  |           |  |
| 165 U RC20              | ...    | ...    | ...    | ...   | ...    | ...    | ...     | ...    | ...    | ...    | 300    | ...    | 99.96  |        |           | 40               | x 40 |      |           |         |    |  |  |  |  |           |  |           |  |
| 16.5.2 Copper           |        |        |        |       |        |        |         |        |        |        |        |        |        |        |           |                  |      |      |           |         |    |  |  |  |  | Size (mm) |  |           |  |
|                         | Sn     | Pb     | Zn     | Fe    | Ni     | Al     | Si      | As     | Mn     | Bi     | Sb     | Mg     | P      | S      | Cu        | Others           | Ø    | H    |           |         |    |  |  |  |  |           |  |           |  |
| 165 U RC110             | 0.006  | 0.005  | 0.005  | 0.005 | 0.003  | 0.003  | 0.003   | 0.003  | 0.004  | 0.003  | 0.006  | 0.004  | 0.003  | 0.004  | rem       |                  |      |      |           |         |    |  |  |  |  |           |  |           |  |
| 165 U RC12              | 0.2    | 0.09   | 0.2    | 0.1   | 0.06   | 0.1    | 0.06    | 0.09   | 0.04   | 0.009  | 0.05   | 0.003  | 0.1    | 0.1    | rem       |                  |      |      |           |         |    |  |  |  |  |           |  |           |  |
| 165 U RC14              | 0.03   | <0.01  | 0.03   | 0.02  | <0.02  | <0.01  | <0.02   | <0.01  | <0.02  | <0.01  | <0.01  | ...    | ...    | <0.01  | rem       |                  |      |      |           |         |    |  |  |  |  |           |  |           |  |
| 165 U RC32              | 0.2    | 0.7    | 37     | 0.5   | 0.1    | 1.1    | 0.6     | 0.005  | 1.7    | 0.001  | ...    | ...    | 0.004  | 0.002  | 57        |                  |      |      | continued |         |    |  |  |  |  |           |  |           |  |
| 165 U RC33              | <0.01  | 0.01   | <0.01  | 4     | 4.5    | 10     | 0.03    | 0.05   | 0.1    | 0.01   | ...    | <0.001 | <0.02  | ...    | rem       |                  |      |      |           |         |    |  |  |  |  |           |  |           |  |
| 165 U RC36              | 8      | 12     | 0.8    | 0.03  | 1.5    | <0.005 | <0.005  | 0.02   | <0.002 | 0.01   | 0.5    | <0.001 | 0.02   | 0.03   | rem       |                  |      |      |           |         |    |  |  |  |  |           |  |           |  |
| 165 U RC38              | <0.01  | 0.02   | 0.01   | 0.5   | 30     | ...    | 0.01    | ...    | 0.9    | ...    | ...    | <0.01  | 0.01   | <0.001 | rem       |                  |      |      |           |         |    |  |  |  |  |           |  |           |  |
| 165 U RC40              | <0.01  | <0.01  | 0.01   | 1.5   | 2      | 8      | 0.02    | <0.01  | 4      | ...    | ...    | <0.01  | <0.01  | ...    | rem       |                  |      |      |           |         |    |  |  |  |  |           |  |           |  |
| 165 X CC102             | <0.005 | <0.005 | <0.01  | 0.01  | <0.01  | 0.1    | 0.01    | <0.01  | <0.01  | <0.01  | <0.01  | <0.01  | <0.01  | <0.01  | 98        |                  |      |      | continued |         |    |  |  |  |  |           |  |           |  |
| 165 X CA104             | 0.01   | 0.01   | ...    | 4.3   | 4.7    | 9.5    | 0.05    | <0.005 | 0.4    | <0.005 | 0.01   | <0.005 | <0.005 | ...    | 80        |                  |      |      |           |         |    |  |  |  |  |           |  |           |  |
| 165 X MNB5SUS           | 1.8    | 0.2    | 37.0   | 0.6   | 1.3    | 3.1    | 0.5     | <0.001 | 0.25   | ...    | <0.001 | <0.001 | <0.001 | ...    | 55        |                  |      |      | 45 x 20   | cc      |    |  |  |  |  |           |  |           |  |
| 165 X PB10SUS           | 12.7   | 0.015  | 0.015  | 0.001 | 0.01   | <0.001 | 0.001   | 0.001  | <0.001 | ...    | 0.005  | <0.001 | 0.02   | 0.002  | 87        |                  |      |      |           | 45 x 20 | cc |  |  |  |  |           |  |           |  |
| 165 X ALB1SUS           | 0.02   | 0.20   | 0.005  | 3.0   | 5.8    | 9.3    | 0.10    | 0.002  | 0.08   | ...    | ...    | <0.002 | 0.01   | ...    | 81.5      | Cr 0.01          |      |      |           | 45 x 20 | c  |  |  |  |  |           |  |           |  |
| 165 X WSB4SUS           | 0.9    | 0.25   | 5.3    | 0.9   | 0.3    | 0.6    | 4.4     | 0.04   | 1.9    | ...    | 0.08   | 0.001  | 0.05   | 0.005  | ...       | Cr 0.05          |      |      |           | 45 x 20 | c  |  |  |  |  |           |  |           |  |
| 165 X GM4SUS            | 2.5    | 5.3    | 7.4    | 0.06  | 2.0    | 0.001  | 0.001   | 0.02   | 0.005  | 0.02   | 0.04   | ...    | 0.01   | 0.35   | 82.0      | Ag 0.005         |      |      |           | 40 x 15 | cc |  |  |  |  |           |  |           |  |
| 165 T EA1               | 0.20   | 2.95   | 38.5   | 0.14  | 0.065  | ...    | <0.01   | 0.090  | ...    | ...    | ...    | ...    | ...    | ...    | 57.8      |                  |      |      |           | 40 x 18 | c  |  |  |  |  |           |  |           |  |
| Continuation from above |        |        |        |       |        |        |         |        |        |        |        |        |        |        |           |                  |      |      |           |         |    |  |  |  |  | Size (mm) |  |           |  |
|                         | Cr     | Ag     | Be     | C     | Cd     | Co     | Se      | Te     | Ti     | Zr     | O      | Au     |        |        | Ø         | H                |      |      |           |         |    |  |  |  |  |           |  |           |  |
| 165 U RC12              | 0.05   | 0.05   | 0.001  | ...   | 0.04   | 0.04   | 0.01    | 0.05   | 0.001  | 0.002  | ...    | ...    |        |        | 40        | x 40             |      |      |           |         |    |  |  |  |  |           |  |           |  |
| 165 U RC14              | 0.9    | ...    | ...    | ...   | ...    | ...    | ...     | ...    | ...    | 0.06   | ...    | ...    |        |        | 40        | x 40             |      |      |           |         |    |  |  |  |  |           |  |           |  |
| 165 U RC32              | <0.01  | ...    | ...    | ...   | ...    | ...    | <0.001  | <0.01  | ...    | ...    | ...    | ...    |        |        | 40        | x 40             |      |      |           |         |    |  |  |  |  |           |  |           |  |
| 165 U RC33              | <0.005 | ...    | <0.001 | ...   | ...    | <0.005 | ...     | ...    | <0.001 | <0.001 | ...    | ...    |        |        | 40        | x 40             |      |      |           |         |    |  |  |  |  |           |  |           |  |
| 165 U RC36              | <0.005 | <0.01  | <0.001 | ...   | <0.001 | <0.002 | ...     | ...    | <0.001 | <0.005 | ...    | ...    |        |        | 40        | x 40             |      |      |           |         |    |  |  |  |  |           |  |           |  |
| 165 U RC38              | <0.01  | ...    | ...    | 0.05  | ...    | ...    | ...     | ...    | ...    | 0.01   | ...    | ...    |        |        | 40        | x 40             |      |      |           |         |    |  |  |  |  |           |  |           |  |
| 165 U RC40              | <0.01  | ...    | ...    | ...   | ...    | ...    | ...     | ...    | ...    | ...    | ...    | ...    |        |        | 40        | x 40             |      |      |           |         |    |  |  |  |  |           |  |           |  |
| 165 U RC110             | 0.004  | 0.006  | 0.0003 | ...   | 0.004  | 0.003  | 0.004   | 0.007  | 0.001  | <0.002 | ...    | 0.003  |        |        | 40        | x 40             |      |      |           |         |    |  |  |  |  |           |  |           |  |
| 165 X CC102             | 0.9    | <0.01  | ...    | ...   | <0.01  | ...    | ...     | ...    | ...    | 0.1    | ...    | ...    |        |        | 50        | x 45             |      |      |           | w       |    |  |  |  |  |           |  |           |  |
| 165 X CA104             | <0.005 | ...    | ...    | ...   | ...    | ...    | ...     | ...    | ...    | ...    | ...    | ...    |        |        | 45        | x 45             |      |      |           |         |    |  |  |  |  |           |  |           |  |
| 16.6 Magnesium          |        |        |        |       |        |        |         |        |        |        |        |        |        |        |           |                  |      |      |           |         |    |  |  |  |  | Size (mm) |  |           |  |
|                         | Mn     | Cu     | Si     | Fe    | Ni     | Al     | Zn      | Pb     | Sn     | Zr     | Cd     | Na     | Be     | Ag     | Sr        | Ca               | Ø    | H    |           |         |    |  |  |  |  |           |  |           |  |
| 166 X MGSUS1            | 0.17   | 0.002  | 0.06   | 0.005 | 0.001  | 0.04   | 6.8     | 0.003  | 0.02   | <0.001 | ...    | ...    | 0.0001 | 0.007  | 0.0001    | <0.001           | 45   | x 50 |           | c       |    |  |  |  |  |           |  |           |  |
| 166 X MGSUS2            | 0.4    | 0.02   | 0.12   | 0.005 | 0.02   | 8.0    | 0.4     | 0.04   | 0.01   | ...    | 0.004  | ...    | 0.0015 | 0.005  | 0.0003    | 0.015            | 45   | x 50 |           |         |    |  |  |  |  |           |  |           |  |
| 166 U RMg11             | <0.01  | 0.001  | 0.041  | 0.005 | 0.002  | 0.011  | 0.015   | ...    | ...    | ...    | ...    | ...    | ...    | ...    | ...       | ...              | 40   | x 40 |           |         |    |  |  |  |  |           |  |           |  |
| 166 U RMg13             | 0.2    | 0.006  | 0.01   | 0.001 | 0.001  | 5.7    | 0.8     | 0.001  | 0.001  | 0.004  | 0.0001 | 0.001  | ...    | ...    | ...       | ...              | 40   | x 40 |           |         |    |  |  |  |  |           |  |           |  |
| 166 U RMg14             | 0.4    | 0.3    | 0.08   | 0.003 | 0.04   | 7.9    | 1       | 0.08   | 0.08   | <0.01  | ...    | ...    | 0.002  | ...    | ...       | <0.01            | 40   | x 40 |           |         |    |  |  |  |  |           |  |           |  |
| 16.7 Nickel             |        |        |        |       |        |        |         |        |        |        |        |        |        |        |           |                  |      |      |           |         |    |  |  |  |  | Size (mm) |  |           |  |
|                         | C      | Si     | S      | P     | Mn     | Cu     | Fe      | Cr     | Mo     | Co     | Ti     | Al     | W      |        |           | Ø                | H    |      |           |         |    |  |  |  |  |           |  |           |  |
| 167 U RNi10             | <8ppm  | <10ppm | <2ppm  | ...   | ...    | <1ppm  | <5ppm   | ...    | ...    | 3ppm   | ...    | <4ppm  | ...    |        |           |                  |      |      |           |         |    |  |  |  |  |           |  |           |  |
| 167 U RNi11             | 0.02   | 0.05   | <0.01  | <0.01 | 0.1    | <0.02  | <0.06   | <0.02  | 0.03   | <0.01  | 0.001  | <0.02  | <0.03  |        |           |                  |      |      |           |         |    |  |  |  |  |           |  |           |  |
| 167 U RNi12             | 0.1    | 0.15   | <0.01  | <0.01 | 0.6    | 31     | 0.7     | <0.01  | 0.08   | 0.01   | 0.6    | 2.8    | 0.02   |        |           |                  |      |      | continued |         |    |  |  |  |  |           |  |           |  |
| 167 U RNi13             | <0.01  | <0.02  | <0.01  | <0.01 | 1      | 0.6    | 6       | 14     | 16     | 0.2    | <0.01  | 0.4    | 3      |        |           |                  |      |      |           |         |    |  |  |  |  |           |  |           |  |
| 167 U RNi14             | 0.05   | 0.1    | <0.01  | <0.01 | 0.1    | <0.1   | 0.1     | 20     | 6      | 20     | ...    | 0.5    | <0.1   |        |           |                  |      |      |           |         |    |  |  |  |  |           |  |           |  |
| 167 U RNi15             | 0.02   | 0.08   | <0.01  | <0.01 | 0.1    | 0.05   | 17.5    | 19.5   | 2.8    | 0.3    | 1      | 0.5    | 0.04   |        |           |                  |      |      |           |         |    |  |  |  |  |           |  |           |  |
| Continuation from above |        |        |        |       |        |        |         |        |        |        |        |        |        |        |           |                  |      |      |           |         |    |  |  |  |  | Size (mm) |  |           |  |
|                         | Nb     | V      | B      | Zn    | Pb     | Ag     | As      | Mg     | Ta     | Zr     |        |        |        |        |           | Ø                | H    |      |           |         |    |  |  |  |  |           |  |           |  |
| 167 U RNi10             | ...    | ...    | ...    | 2ppm  | 0.8ppm | 0.3ppm | <0.5ppm | ...    | ...    | ...    |        |        |        |        |           | 40               | x 40 |      |           |         |    |  |  |  |  |           |  |           |  |
| 167 U RNi11             | <0.01  | <0.03  | <0.005 | ...   | ...    | ...    | ...     | 0.02   | ...    | <0.003 |        |        |        |        |           | 40               | x 40 |      |           |         |    |  |  |  |  |           |  |           |  |
| 167 U RNi12             | <0.01  | <0.03  | 0.005  | ...   | <0.01  | ...    | ...     | ...    | 0.04   | 0.01   |        |        |        |        |           | 40               | x 40 |      |           |         |    |  |  |  |  |           |  |           |  |
| 167 U RNi13             | 0.1    | 0.4    | <0.005 | ...   | <0.01  | ...    | ...     | ...    | 0.01   | <0.01  |        |        |        |        |           | 40               | x 40 |      |           |         |    |  |  |  |  |           |  |           |  |
| 167 U RNi14             | 0.03   | 0.04   | ...    | ...   | <0.01  | ...    | ...     | ...    | 0.3    | ...    |        |        |        |        |           | 40               | x 40 |      |           |         |    |  |  |  |  |           |  |           |  |
| 167 U RNi15             | 5      | 0.03   | 0.003  | ...   | <0.01  | ...    | ...     | ...    | 0.03   | 0.02   |        |        |        |        |           | 40               | x 40 |      |           |         |    |  |  |  |  |           |  |           |  |



# 16. Setting Up Samples

All of these samples have been prepared to meet the daily setting up requirements of laboratories using Direct Reading Spectrometers. The Analytical Data are supplied with each sample but are not certified as accurate as these are not intended to be used as Primary Reference Materials.

| 16.8 Lead                        |  | Sn      | Sb      | Bi     | Cu     | As     | Ag     | Zn      | Cd      | Ni      | Te     | Fe      | Tl     | Se      | S      | In      | Ca    | Au     | Size (mm) |           |           |   |
|----------------------------------|--|---------|---------|--------|--------|--------|--------|---------|---------|---------|--------|---------|--------|---------|--------|---------|-------|--------|-----------|-----------|-----------|---|
|                                  |  |         |         |        |        |        |        |         |         |         |        |         |        |         |        |         |       |        |           | Ø         | H         |   |
| 168 X PBSUS1                     |  | 1.4     | 6.2     | 0.04   | 0.02   | 0.4    | 0.01   | 0.002   | 0.005   | 0.005   | 0.01   | 0.005   | ...    | 0.005   | 0.002  | 0.005   | ...   | 0.001  | ...       | 44 x 40   | c         |   |
| 168 X PBSUS5                     |  | 0.85    | 0.5     | 0.35   | 0.1    | 0.25   | 0.2    | 0.003   | 0.12    | 0.001   | 0.006  | 0.0001  | 0.005  | 0.0002  | 0.0005 | 0.3     | 0.001 | 0.002  | ...       | 40 x 40   |           |   |
| 168 X PBSUS6                     |  | 0.15    | 0.1     | 0.2    | 0.1    | 0.025  | 0.04   | 0.005   | 0.025   | 0.001   | 0.005  | 0.0005  | 0.03   | 0.003   | 0.001  | 0.015   | 0.01  | 0.001  | ...       | 43 x 45   |           |   |
| 168 X PBSUS7                     |  | 0.05    | 10      | 0.02   | 0.04   | 0.7    | 0.005  | 0.001   | 0.002   | 0.01    | 0.025  | ...     | 0.005  | 0.015   | 0.005  | 0.001   | 0.001 | 0.005  | ...       | 43 x 45   |           |   |
| 168 U Rpb11                      |  | <3ppm   | <3ppm   | 53ppm  | <1ppm  | <2ppm  | 7ppm   | <5ppm   | <3ppm   | <2ppm   | ...    | <10ppm  | <3ppm  | ...     | ...    | ...     | ...   | ...    | ...       | 40 x 40   |           |   |
| 168 U Rpb13                      |  | 0.2     | 0.1     | 0.2    | 0.1    | 0.03   | 0.04   | 0.02    | 0.04    | 0.001   | (0.01) | 0.0002  | 0.03   | (0.005) | ...    | <0.0001 | ...   | ...    | ...       | 40 x 40   |           |   |
| 168 U Rpb14                      |  | 0.005   | 10      | 0.01   | 0.05   | 1      | 0.01   | <0.01   | 0.01    | <0.001  | (0.01) | <0.001  | 0.01   | (0.005) | 0.01   | <0.0001 | ...   | ...    | ...       | 40 x 40   |           |   |
| 168 U Rpb15                      |  | 30.0    | 2.0     | 0.1    | 2.0    | 0.02   | 3.0    | 0.2     | 0.01    | 0.003   | ...    | ...     | 0.01   | ...     | ...    | ...     | ...   | ...    | ...       | 40 x 40   |           |   |
| 168 U Rpb16                      |  | 0.18    | 0.001   | 0.006  | 0.0015 | 0.0001 | 0.0025 | 0.001   | 0.0001  | 0.00006 | 0.0001 | 0.00008 | 0.0008 | 0.0001  | 0.0001 | 0.0002  | 0.34  | 0.0001 | ...       | continued |           |   |
| 168 U Rpb17                      |  | 3.6     | 9.9     | 0.1    | 1.5    | 0.3    | 0.3    | 0.001   | ...     | 0.001   | 0.003  | 0.007   | 0.002  | ...     | ...    | ...     | 0.01  | 0.0001 | ...       | continued |           |   |
| 168 U Rpb18                      |  | 0.03    | 1.2     | 0.3    | 0.06   | 7.6    | 0.09   | ...     | 0.03    | ...     | 0.03   | ...     | 0.02   | 0.02    | ...    | 0.01    | ...   | ...    | ...       | continued |           |   |
| Continuation from above          |  | Cr      | Co      | K      | Ge     | Ba     | Rh     | Mn      | Al      | Pt      | Na     | Mg      | Pd     | Ru      |        |         |       |        |           |           | Size (mm) |   |
|                                  |  |         |         |        |        |        |        |         |         |         |        |         |        |         |        |         |       |        |           | Ø         | H         |   |
| 168 U Rpb16                      |  | 0.00005 | 0.00006 | 0.0002 | 0.01   | 0.018  | 0.0001 | 0.00001 | 0.017   | 0.0003  | 0.01   | 0.0015  | 0.0001 | 0.00006 |        |         |       |        |           |           | 40 x 40   |   |
| 168 U Rpb17                      |  | 0.00009 | 0.001   | 0.0007 | 0.001  | ...    | ...    | 0.0002  | ...     | 0.001   | ...    | ...     | 0.0003 | ...     |        |         |       |        |           |           | 40 x 40   |   |
| 168 U Rpb18                      |  | ...     | ...     | ...    | ...    | ...    | ...    | ...     | ...     | ...     | ...    | ...     | ...    | ...     |        |         |       |        |           |           | 40 x 40   |   |
| 16.8.1 Lead with precious metals |  | Au      | Pt      | Pd     | Rh     | Ru     | Ir     | Ag      | Fe      | Bi      | Te     | As      | Sb     | Tl      | S      |         |       |        |           |           | Size (mm) |   |
|                                  |  |         |         |        |        |        |        |         |         |         |        |         |        |         |        |         |       |        |           | Ø         | H         |   |
| 168 X PBSUSPM1                   |  | 25      | 30      | 10     | 6      | 1      | 3      | 25      | 5       | 120     | 3      | 2       | 2      | 7       | <1     |         |       |        |           |           | 44 x 40   | c |
| 168 U RpbPM                      |  | 100     | 50      | ...    | 50     | 5      | ...    | ...     | ...     | ...     | ...    | ...     | ...    | ...     | ...    |         |       |        |           |           | 40 x 40   |   |
| 16.9 Zinc                        |  | Pb      | Mg      | Al     | Cd     | Fe     | Sn     | Cu      | Ni      | Mn      | Ti     | Cr      | Ag     | In      | Tl     | Sb      | Si    | Bi     | Size (mm) |           |           |   |
|                                  |  |         |         |        |        |        |        |         |         |         |        |         |        |         |        |         |       |        |           | Ø         | H         |   |
| 169 X ZnSUS1                     |  | 0.6     | 0.002   | 0.35   | 0.3    | 0.05   | 0.3    | 0.35    | 0.06    | 0.001   | 0.001  | 0.001   | 0.04   | 0.25    | 0.06   | 0.2     | 0.003 | 0.005  | ...       | 50 x 20   | c         |   |
| 169 U RZn11                      |  | ~8ppm   | <1ppm   | <1ppm  | <1ppm  | ~5ppm  | <1ppm  | ~3ppm   | 1ppm    | <1ppm   | <1ppm  | ...     | ...    | ...     | ...    | ...     | ...   | ...    | ...       | 40 x 40   |           |   |
| 169 U RZn12                      |  | 70ppm   | 40ppm   | 40ppm  | 80ppm  | 70ppm  | 70ppm  | 40ppm   | 10ppm   | 60ppm   | ...    | ...     | 70ppm  | 80ppm   | 80ppm  | 20ppm   | ...   | ...    | ...       | 40 x 40   |           |   |
| 169 U RZn13                      |  | 0.6     | <0.001  | 0.4    | 0.3    | 0.005  | 0.3    | 0.2     | 0.04    | <0.01   | <0.001 | ...     | 0.04   | 0.3     | 0.02   | 0.1     | ...   | ...    | ...       | 40 x 40   |           |   |
| 169 U RZn14                      |  | 0.04    | 0.1     | 11     | 0.04   | 0.08   | 0.03   | 4       | <0.01   | 0.01    | 0.06   | ...     | <0.001 | <0.01   | <0.01  | <0.01   | ...   | ...    | ...       | 40 x 40   |           |   |
| 169 U RZn15                      |  | 0.2     | ...     | 0.2    | 0.4    | 0.4    | 0.06   | 0.3     | ...     | ...     | ...    | ...     | ...    | ...     | ...    | 0.02    | ...   | ...    | ...       | 40 x 40   |           |   |
| 169 U RZn16                      |  | 0.1     | ...     | 0.2    | 0.01   | 0.09   | 0.004  | 0.005   | ...     | ...     | ...    | ...     | ...    | ...     | ...    | ...     | ...   | ...    | ...       | 40 x 40   |           |   |
| 16.10 Titanium                   |  | Al      | V       | Fe     | Pd     | C      | Mo     | Zr      | Sn      | B       | Co     | Cr      | Cu     | Mg      | Mn     |         |       |        |           |           | Size (mm) |   |
|                                  |  |         |         |        |        |        |        |         |         |         |        |         |        |         |        |         |       |        |           | Ø         | H         |   |
| 1610 U RTI11                     |  | ...     | ...     | ~0.05  | ...    | ~0.06  | ...    | ...     | ...     | ...     | ...    | ...     | ...    | ...     | ...    |         |       |        |           |           | 40 x 40   |   |
| 1610 U RTI12                     |  | ...     | ...     | ~0.02  | 0.2    | ~0.06  | ...    | ...     | ...     | ...     | ...    | ...     | ...    | ...     | ...    |         |       |        |           |           | 40 x 40   |   |
| 1610 U RTI13                     |  | 6       | 4       | 0.3    | ...    | 0.08   | ...    | ...     | ...     | ...     | ...    | ...     | ...    | ...     | ...    |         |       |        |           |           | 40 x 40   |   |
| 1610 U RTI14                     |  | (6)     | ...     | 0.01   | ...    | 0.02   | 2      | 4       | 2       | ...     | ...    | ...     | ...    | ...     | ...    |         |       |        |           |           | 40 x 40   |   |
| 1610 M BS TSU-1                  |  | 6.11    | 4.12    | 0.22   | 0.15   | 0.062  | 0.067  | 0.068   | 0.076   | 0.01    | 0.061  | 0.07    | 0.073  | <0.005  | 0.065  |         |       |        |           |           | ...       |   |
| 1610 M BS TSU-2                  |  | 5.15    | 0.08    | 0.18   | ...    | 0.095  | 3.93   | 1.94    | 2.05    | 0.013   | ...    | 4.03    | 0.16   | ...     | 0.089  |         |       |        |           |           | continued |   |
| 1610 M BS TSU-3                  |  | 0.13    | 0.069   | 0.1    | 0.14   | 0.066  | 0.28   | 0.065   | 0.069   | 0.012   | 0.065  | 0.063   | 0.077  | <0.003  | 0.064  |         |       |        |           |           | ...       |   |
| Continuation from above          |  | N       | Nb      | Ni     | O      | P      | Ru     | S       | Si      | Ta      | W      | Y       |        |         |        |         |       |        | Size (mm) |           |           |   |
|                                  |  |         |         |        |        |        |        |         |         |         |        |         |        |         |        |         |       |        |           | Ø         | H         |   |
| 1610 M BS TSU-1                  |  | 0.02    | 0.068   | 0.073  | 0.191  | 0.009  | 0.07   | 0.008   | 0.057   | 0.079   | 0.075  | 0.009   |        |         |        |         |       |        | 44 x 7    | HIP       |           |   |
| 1610 M BS TSU-1                  |  | 0.017   | ...     | 0.059  | 0.164  | 0.012  | ...    | 0.011   | 0.11    | ...     | 0.082  | 0.011   |        |         |        |         |       |        | each      |           |           |   |
| 1610 M BS TSU-1                  |  | 0.018   | 0.066   | 0.77   | 0.25   | 0.01   | 0.066  | 0.005   | 0.067   | 0.083   | 0.065  | 0.008   |        |         |        |         |       |        | set only  |           |           |   |
| 16.11 Tin                        |  | Ag      | Sb      | As     | Bi     | Pb     | Cu     | Zn      | Cd      | Fe      | In     | Tl      | Al     | Ni      | Co     | Au      | Pt    | Pd     | Size (mm) |           |           |   |
|                                  |  |         |         |        |        |        |        |         |         |         |        |         |        |         |        |         |       |        |           | Ø         | H         |   |
| 1611 X SnSUS6                    |  | 0.1     | 0.14    | 0.45   | 0.08   | 0.9    | 0.45   | 0.001   | 0.01    | 0.01    | 0.005  | 0.005   | 0.002  | 0.1     | 0.015  | 0.003   | 0.003 | 0.003  | ...       | 40 x 40   | c         |   |
| 1611 X SnSUS7                    |  | 0.12    | 10.5    | 2.5    | 2.4    | 0.3    | 11.2   | 0.01    | 0.015   | 0.3     | 0.05   | 0.05    | 0.002  | 0.1     | 0.03   | 0.001   | ...   | 0.001  | ...       | 45 x 25   |           |   |
| 1611 U RSn10                     |  | <1ppm   | <10ppm  | <10ppm | <5ppm  | <10ppm | <5ppm  | <1ppm   | <1ppm   | <5ppm   | <5ppm  | <5ppm   | <5ppm  | <5ppm   | ...    | ...     | ...   | ...    | ...       | 40 x 40   |           |   |
| 1611 U RSn11                     |  | ...     | <0.003  | <0.002 | <0.001 | <0.002 | <0.003 | <0.001  | ...     | <0.001  | ...    | ...     | ...    | ...     | ...    | ...     | ...   | ...    | ...       | 40 x 40   |           |   |
| 1611 U RSn12                     |  | 0.2     | 2       | 0.5    | 0.08   | 35     | 1      | 0.01    | 0.1     | <0.001  | 0.1    | 0.2     | <0.001 | <0.001  | <0.001 | ...     | ...   | ...    | ...       | 40 x 40   |           |   |
| 1611 U RSn13                     |  | <0.001  | 15      | <0.01  | 0.06   | 1      | 0.4    | 0.01    | 0.02    | 0.2     | <0.01  | <0.001  | 0.2    | 0.1     | 0.1    | ...     | ...   | ...    | ...       | 40 x 40   |           |   |
| 16.12 Cobalt                     |  | C       | Si      | Mn     | Ni     | Cr     | W      | Mo      | Nb      | Fe      | Al     | B       | S      | P       |        |         |       |        |           | Size (mm) |           |   |
|                                  |  |         |         |        |        |        |        |         |         |         |        |         |        |         |        |         |       |        |           | Ø         | H         |   |
| 1612 X CoSUS1                    |  | 0.9     | 1.3     | 0.9    | 12.0   | 27.0   | 5.0    | 5.0     | 1.1     | 4.0     | 2.0    | 0.01    | 0.1    | 0.05    |        |         |       |        |           | continued |           |   |
| 1612 U RCo11                     |  | ...     | 0.01    | <0.005 | 0.003  | <0.005 | 0.01   | <0.005  | <0.0005 | <0.02   | ...    | ...     | ...    | <0.003  |        |         |       |        |           | continued |           |   |
| 1612 U RCo14                     |  | 0.8     | 1       | 0.5    | 10     | 25     | 7.5    | 1       | <0.03   | 1       | 0.2    | 0.007   | <0.005 | <0.005  |        |         |       |        |           | ...       |           |   |
| Continuation from above          |  | Ti      | Ta      | Zr     | Cu     | V      | Sn     | Pb      |         |         |        |         |        |         |        |         |       |        |           | Size (mm) |           |   |
|                                  |  |         |         |        |        |        |        |         |         |         |        |         |        |         |        |         |       |        |           | Ø         | H         |   |
| 1612 X CoSUS1                    |  | 0.05    | 0.1     | 0.05   | 0.1    | 0.1    | 0.1    | 0.02    |         |         |        |         |        |         |        |         |       |        |           | 45 x 20   | c         |   |
| 1612 U RCo11                     |  | <0.03   | ...     | <0.003 | <0.01  | 0.001  | ...    | ...     |         |         |        |         |        |         |        |         |       |        |           | 35 x 20   |           |   |
| 1612 U RCo14                     |  | <0.03   | ...     | ...    | ...    | ...    | ...    | ...     |         |         |        |         |        |         |        |         |       |        |           | 35 x 40   |           |   |

# 16. Check & Control Samples

Blocks/Discs

All of these samples have been prepared to meet the daily setting up requirements of laboratories using Direct Reading Spectrometers. The Analytical Data are supplied with each sample but are not certified as accurate as these are not intended to be used as Primary Reference Materials.

| 16.20 Steel/Iron                              |  |        |        |        |         |            |        |            |        |        |            |        |           |            |        |            |      |            |   |
|---|--|--------|--------|--------|---------|------------|--------|------------|--------|--------|------------|--------|-----------|------------|--------|------------|------|------------|---|
|   | C  | Si     | S      | P      | Mn      | Ni         | Cr     | Mo         | Cu     | Co     | Sn         | Al     | Nb        | W          | As     |            |      |            |   |
| 1620 U CFe1                                   | 0.004  | 0.0065 | 0.0025 | 0.003  | 0.0385  | 0.022      | 0.013  | <0.001     | 0.01   | 0.003  | 5ppm       | 0.0025 | 0.001     | <2ppm      | 0.0015 |            |      |            |   |
| 1620 U CFe2                                   | 0.26   | 0.25   | 0.022  | 0.035  | 0.9     | 0.25       | 0.25   | 0.09       | 0.12   | 0.025  | 0.015      | 0.065  | 0.045     | 0.01       | 0.05   |            |      |            |   |
| 1620 U CFe3                                   | 0.04   | 0.36   | 0.002  | 0.026  | 1.7     | 11.03      | 16.7   | 2.01       | 0.09   | 0.21   | ...        | 0.007  | 0.77      | 0.03       | ...    |            |      |            |   |
| 1620 U CFe4                                   | 1.7  | 0.4    | 0.010  | 0.010  | 0.40    | 0.30       | 11.0   | 0.80       | 0.06   | 0.03   | 0.005      | 0.008  | 0.04      | 0.03       | 0.008  |            |      |            |   |
| 1620 U CFe5                                   | 3.7  | 0.8    | 0.03   | 0.10   | 0.80    | 0.10       | 0.10   | 0.10       | 0.10   | ...    | 0.04       | ...    | ...       | ...        | ...    | continued  |      |            |   |
| 1620 U CFe6                                   | 3.3  | 2.9    | 0.075  | 0.07   | 0.56    | 0.08       | 0.12   | 0.03       | 0.52   | ...    | 0.014      | <0.002 | ...       | ...        | ...    |            |      |            |   |
| 1620 U CFe7                                   | 3.7  | 3.1    | 0.005  | 0.02   | 0.07    | 0.05       | 0.03   | <0.01      | 0.14   | ...    | 0.003      | 0.015  | ...       | ...        | ...    |            |      |            |   |
| 1620 U CFe8                                   | 3.3  | 2.4    | 0.1    | 0.15   | 0.50    | 0.10       | 0.12   | 0.04       | 0.18   | ...    | 0.02       | 0.05   | ...       | ...        | ...    |            |      |            |   |
| 1620 U CFe9                                   | 0.09   | 0.001  | 0.3    | 0.06   | 1.2     | 0.01       | 0.01   | 0.005      | 0.006  | 0.003  | ...        | 0.0005 | ...       | ...        | 0.003  |            |      |            |   |
| Continuation from above                       |  |        |        |        |         |            |        |            |        |        |            |        |           |            |        |            |      |            |   |
|   | Ti   | V      | Zr     | B      | Ca      | Pb         | N      | Te         | Sb     | Ta     | Size (mm)  |        |           |            |        |            |      |            |   |
|   |  |        |        |        |         |            |        |            |        |        | Ø          | H      |           |            |        |            |      |            |   |
| 1620 U CFe1                                   | 0.0005   | 0.0003 | <2ppm  | 0.001  | <0.0001 | <0.001     | ...    | <0.0002    | ...    | ...    | 40 x 30/50 |        |           |            |        |            |      |            |   |
| 1620 U CFe2                                   | 0.042  | 0.07   | 0.008  | 0.0045 | 0.0028  | ...        | 0.0088 | ...        | 0.0036 | ...    | 40 x 30/50 |        |           |            |        |            |      |            |   |
| 1620 U CFe3                                   | 0.005  | 0.07   | ...    | 0.0045 | ...     | ...        | ...    | ...        | ...    | ...    | 40 x 30/50 |        |           |            |        |            |      |            |   |
| 1620 U CFe4                                   | 0.003  | 1.0    | 0.004  | 0.002  | ...     | ...        | 0.045  | ...        | ...    | ...    | 40 x 30/50 |        |           |            |        |            |      |            |   |
| 1620 U CFe5                                   | ...  | 1.0    | ...    | ...    | ...     | 0.005      | ...    | ...        | ...    | ...    | 40 x 30/50 |        |           |            |        |            |      |            |   |
| 1620 U CFe6                                   | 0.019  | 0.015  | ...    | ...    | ...     | <0.002     | ...    | ...        | ...    | ...    | 40 x 30/50 |        |           |            |        |            |      |            |   |
| 1620 U CFe7                                   | 0.01   | 0.018  | ...    | ...    | ...     | <0.001     | ...    | ...        | ...    | ...    | 40 x 30/50 |        |           |            |        |            |      |            |   |
| 1620 U CFe8                                   | 0.019  | ...    | ...    | ...    | ...     | <0.002     | 0.007  | ...        | ...    | ...    | 40 x 30/50 |        |           |            |        |            |      |            |   |
| 1620 U CFe9                                   | ...  | ...    | ...    | 0.0001 | ...     | 0.3        | 0.007  | ...        | 0.0005 | ...    | 40 x 30/50 |        |           |            |        |            |      |            |   |
| FOR ARGON SYSTEM/ARGON PURITY CHECK IN O.E.S. |  |        |        |        |         |            |        |            |        |        |            |        |           |            |        |            |      |            |   |
| Size (mm)                                     |  |        |        |        |         |            |        |            |        |        |            |        |           |            |        |            |      |            |   |
| Ø H   |  |        |        |        |         |            |        |            |        |        |            |        |           |            |        |            |      |            |   |
| 1620 U CFe0                                   | The following minimum intensities should be achieved for control sample 1620 U CFe0 (FeSi) using HEPS/ spark like discharge (with or without hydrogen in argon) compared to the pure sample 162 U RE 12 or 162 U RE 13 |        |        |        |         |            |        |            |        |        |            |        |           |            |        |            |      |            |   |
|   | Fe 1877 > 60%, Fe 2730 > 70%, Fe 2813 or 3608 > 80%  |        |        |        |         |            |        |            |        |        |            |        |           |            |        | 40 x 30/50 |      |            |   |
| 16.40 Aluminium                               |  |        |        |        |         |            |        |            |        |        |            |        |           |            |        |            |      |            |   |
|   | Si   | Fe     | Cu     | Mn     | Mg      | Cr         | Zn     | Ti         | B      | Na     | Ca         | Ni     |           |            |        |            |      |            |   |
| 1640 U CAI2                                   | 0.88   | 0.28   | 0.058  | 0.63   | 0.75    | 0.052      | 0.05   | 0.048      | <0.001 | ...    | ...        | 0.005  |           |            |        |            |      |            |   |
| 1640 U CAI3                                   | 0.08   | 0.17   | 0.004  | 0.21   | 2.8     | 0.001      | 0.007  | 0.009      | ...    | ...    | 0.02       | 0.002  |           |            |        |            |      |            |   |
| 1640 U CAI4                                   | 19.6   | 5.0    | 0.010  | 0.03   | 0.010   | ...        | <0.01  | ...        | 0.0008 | 0.0008 | ...        | 1.82   | continued |            |        |            |      |            |   |
| 1640 U CAI5                                   | 8.8  | 0.7    | 1.4    | 0.08   | 1.9     | 0.08       | 0.24   | 0.09       | 0.0010 | ...    | ...        | 1.3    |           |            |        |            |      |            |   |
| Continuation from above                       |  |        |        |        |         |            |        |            |        |        |            |        |           |            |        |            |      |            |   |
|   | Pb   | Sn     | Sb     | Ga     | P       | Size (mm)  |        |            |        |        |            |        |           |            |        |            |      |            |   |
|   |  |        |        |        |         | Ø          | H      |            |        |        |            |        |           |            |        |            |      |            |   |
| 1640 U CAI2                                   | <0.005   | <0.003 | <0.005 | 0.011  | ...     | 50 x 30/50 |        |            |        |        |            |        |           |            |        |            |      |            |   |
| 1640 U CAI3                                   | 0.002  | 0.002  | ...    | 0.011  | ...     | 50 x 30/50 |        |            |        |        |            |        |           |            |        |            |      |            |   |
| 1640 U CAI4                                   | <0.01  | ...    | ...    | ...    | ...     | 50 x 30/50 |        |            |        |        |            |        |           |            |        |            |      |            |   |
| 1640 U CAI5                                   | 0.07   | 0.07   | ...    | ...    | 0.0050  | 50 x 30/50 |        |            |        |        |            |        |           |            |        |            |      |            |   |
| FOR ARGON SYSTEM/ARGON PURITY CHECK IN O.E.S. |  |        |        |        |         |            |        |            |        |        |            |        |           |            |        |            |      |            |   |
| Size (mm)                                     |  |        |        |        |         |            |        |            |        |        |            |        |           |            |        |            |      |            |   |
| Ø H   |  |        |        |        |         |            |        |            |        |        |            |        |           |            |        |            |      |            |   |
| 1640 U CAI0                                   | The following minimum intensities should be achieved for control sample 1640 U CAI0 (AlSi) using HEPS / spark like discharge (with or without hydrogen in argon) compared to the pure sample 164 U RA 10               |        |        |        |         |            |        |            |        |        |            |        |           |            |        |            |      |            |   |
|   | Al 3059 > 70%  |        |        |        |         |            |        |            |        |        |            |        |           |            |        | 50 x 30/50 |      |            |   |
| 16.50 Copper                                  |  |        |        |        |         |            |        |            |        |        |            |        |           |            |        |            |      |            |   |
| All elements ppm                              |  |        |        |        |         |            |        |            |        |        |            |        |           |            |        |            |      |            |   |
|   | Ag   | Au     | As     | Bi     | Cd      | Cr         | Co     | Fe         | Mn     | Ni     | Pb         | S      | Sb        | Se         | Sn     | Te         | Zn   | Size (mm)  |   |
|   |  |        |        |        |         |            |        |            |        |        |            |        |           |            |        |            |      | Ø          | H |
| 1650 U CCu2                                   | 4930   | 47     | ...    | 90     | ...     | 110        | ...    | 227        | 113    | 4220   | 3710       | ...    | 2830      | ...        | 2180   | ...        | 1150 | 40 x 30/50 |   |
| 1650 U CCu3                                   | ...  | ...    | 875    | ...    | 96      | ...        | 496    | ...        | ...    | ...    | ...        | 229    | ...       | 475        | ...    | 194        | ...  | 40 x 30/50 |   |
| 16.60 Magnesium                               |  |        |        |        |         |            |        |            |        |        |            |        |           |            |        |            |      |            |   |
|   | Mg   | Al     | Si     | Fe     | Cu      | Mn         | Zn     | Ni         | Pb     | Sn     | Zr         | Cd     | Na        | Size (mm)  |        |            |      |            |   |
|   |  |        |        |        |         |            |        |            |        |        |            |        |           | Ø          | H      |            |      |            |   |
| 1660 U CMg2                                   | 93   | 5.7    | 0.01   | 0.001  | 0.006   | 0.2        | 0.8    | 0.001      | 0.001  | 0.001  | 0.004      | 0.0001 | 0.001     | 50 x 30/50 |        |            |      |            |   |
| 16.90 Zinc                                    |  |        |        |        |         |            |        |            |        |        |            |        |           |            |        |            |      |            |   |
|   | Pb   | Mg     | Al     | Cd     | Fe      | Sn         | Cu     | Size (mm)  |        |        |            |        |           |            |        |            |      |            |   |
|   |  |        |        |        |         |            |        | Ø          | H      |        |            |        |           |            |        |            |      |            |   |
| 1690 X ZnChk1                                 | 0.005  | 0.02   | 4.0    | 0.005  | 0.025   | 0.003      | 1.2    | 50 x 20    |        |        |            |        |           |            |        |            |      |            |   |
| 1690 X ZnChk2                                 | 2.0  | <0.001 | 0.01   | 0.12   | 0.75    | 1.0        | 0.42   | 50 x 20    |        |        |            |        |           |            |        |            |      |            |   |
| 1690 U CZn3                                   | 0.0046   | 0.046  | 4.06   | 0.0058 | 0.0106  | 0.0011     | 1.19   | 40 x 30/50 |        |        |            |        |           |            |        |            |      |            |   |
| 1690 U CZn4                                   | 1.97   | ...    | ...    | 0.107  | 0.67    | 0.96       | 0.39   | 40 x 30/50 |        |        |            |        |           |            |        |            |      |            |   |

# C1. Iron Base

# Irons

# Chippings

| 1.1 Cast Iron |               | Total  | Graphitic |         |        |         |        |        |        |        |        |        |          |          |                     | Typical     | Size |
|---------------|---------------|--------|-----------|---------|--------|---------|--------|--------|--------|--------|--------|--------|----------|----------|---------------------|-------------|------|
|               |               | C      | C         | Si      | S      | P       | Mn     | Ni     | Cr     | Cu     | Ti     | Mg     | Mo       | V        | Others              | Alloy Type  | Size |
| CRM           | C11 E 37B     | 3.37   | 2.85      | 1.66    | 0.069  | 0.148   | 0.737  | 0.074  | 0.088  | 0.052  | 0.034  | ...    | ...      | ...      |                     |             | 80g  |
| CRM           | C11 E 66      | 3.56   | 2.23      | 1.49    | 0.027  | 0.048   | 0.635  | 0.163  | 0.621  | 0.154  | ...    | ...    | 0.022    | ...      |                     |             | 80g  |
| CRM           | C11 E 69      | 3.34   | 2.5       | 2.07    | 0.018  | 0.267   | 0.715  | 0.272  | 0.353  | 0.47   | 0.019  | ...    | (0.004)  | ...      |                     |             | 80g  |
| CRM           | C11 E 75A     | 3.4    | 2.7       | 1.98    | 0.033  | 0.250   | 0.722  | 0.425  | 0.487  | 0.433  | 0.022  | ...    | 0.439    | 0.030    |                     | White       | 100g |
|               | C11 TFB11-2   | 3.148  | ...       | (1.44)  | 0.084  | (0.02)  | (0.42) | ...    | ...    | ...    | ...    | ...    | ...      | ...      |                     |             | 100g |
|               | C11 TFB12-2   | 3.8    | ...       | ...     | 0.17   | ...     | ...    | ...    | ...    | ...    | ...    | ...    | ...      | ...      |                     | White       | 100g |
|               | C11 TFB13     | 2.9    | ...       | ...     | 0.10   | ...     | ...    | ...    | ...    | ...    | ...    | ...    | ...      | ...      |                     | White       | 100g |
|               | C11 TFB20     | 2.114  | ...       | 1.012   | 0.128  | 0.039   | 0.464  | ...    | 0.035  | ...    | ...    | ...    | ...      | ...      |                     | White       | 100g |
|               | C11 TFB20-1   | 3.552  | ...       | (0.935) | 0.059  | (0.068) | (0.39) | ...    | (0.10) | ...    | ...    | ...    | ...      | ...      |                     |             | 100g |
|               | C11 TFG10     | 2.322  | ...       | 2.467   | 0.016  | 0.111   | 1.10   | ...    | ...    | ...    | ...    | ...    | ...      | ...      |                     | Grey        | 100g |
|               | C11 TFG20     | 2.487  | ...       | 1.726   | 0.109  | 1.440   | 0.571  | ...    | ...    | ...    | ...    | ...    | ...      | ...      |                     | Grey        | 100g |
|               | C11 TFA10     | 1.976  | ...       | 1.480   | ...    | 0.045   | 1.063  | 20.05  | 1.99   | 0.492  | ...    | ...    | ...      | ...      |                     |             | 100g |
|               | C11 TFA20     | 0.643  | ...       | 1.519   | ...    | 0.045   | 0.368  | ...    | 28.30  | ...    | ...    | ...    | ...      | ...      |                     |             | 100g |
| CRM           | C11 DB E428-2 | 2.747  | ...       | 1.752   | 0.1105 | 0.0691  | 0.750  | 0.0358 | 0.0366 | 0.0996 | 0.0311 | ...    | (0.0014) | 0.0120   | As 0.0156           |             | 100g |
| CRM           | C11 DB E476-3 | 3.390  | ...       | 1.813   | 0.0493 | 0.0908  | 0.987  | 0.0549 | 0.0648 | 0.2445 | 0.0222 | ...    | ...      | 0.0115   | As 0.0145, N 0.0038 |             | 100g |
| CRM           | C11 DB E478-2 | 4.003  | ...       | 2.411   | 0.0460 | 0.202   | 0.321  | 0.151  | 0.251  | 0.1276 | 0.0328 | ...    | ...      | (0.0113) |                     |             | 100g |
| CRM           | C11 DB E479-1 | 2.86   | ...       | 2.02    | 0.089  | 0.076   | 0.136  | 1.012  | 1.00   | ...    | ...    | ...    | 0.196    | ...      | Al 0.014            |             | 100g |
| CRM           | C11 DB E480-1 | 3.03   | ...       | 2.41    | 0.0086 | 0.0021  | 0.151  | 0.483  | ...    | ...    | ...    | 0.017  | ...      | ...      | Al 0.016            |             | 100g |
| CRM           | C11 A 206/3   | (2.44) | (2.37)    | 3.17    | 0.049  | 1.63    | 0.72   | 0.068  | 0.053  | 0.1    | (0.04) | ...    | ...      | 0.05     | As                  | High Si & P | 100g |
| CRM           | C11 A 236/3   | (2.53) | (1.96)    | 2.0     | 0.068  | 0.046   | 1.16   | (0.21) | ...    | (0.07) | 0.052  | ...    | ...      | ...      | As                  | Hamatite    | 100g |
| CRM           | C11 A E481-1  | 3.91   | ...       | 2.29    | 0.004  | 0.019   | 0.448  | 1.19   | 0.063  | 0.15   | ...    | 0.051  | 0.011    | ...      | As,Al               | Nodular     | 100g |
| CRM           | C11 A E482-2  | 2.599  | ...       | 1.815   | 0.728  | 0.0974  | 0.728  | 2.284  | 0.675  | 1.231  | ...    | ...    | 0.454    | ...      |                     |             | 100g |
| CRM           | C11 A E483-1  | 2.46   | 1.65      | 1.75    | 0.103  | 0.615   | 0.596  | ...    | 0.039  | ...    | ...    | ...    | ...      | ...      | Sn                  | High Duty   | 100g |
| CRM           | C11 A E484-1  | 3.2    | ...       | 0.717   | 0.23   | 0.121   | 0.395  | ...    | 0.155  | ...    | ...    | ...    | ...      | ...      |                     | Whiteheart  | 100g |
| CRM           | C11 A E486-1  | 2.21   | ...       | 2.43    | 0.023  | 1.0     | 0.841  | 0.057  | 0.104  | 0.548  | ...    | ...    | ...      | 0.02     | Sn                  | Foundry     | 100g |
| CRM           | C11 A E489-1  | 2.86   | ...       | 1.524   | 0.155  | 0.815   | (0.51) | ...    | ...    | 0.274  | ...    | ...    | ...      | ...      | N                   | White       | 100g |
| CRM           | C11 TI E485-2 | 3.308  | ...       | 0.508   | 0.165  | 0.61    | 0.19   | 0.0742 | 0.0845 | 0.0303 | ...    | ...    | ...      | ...      | N                   | White       | 100g |
| CRM           | C11 TI E487-1 | 3.27   | ...       | 0.006   | 0.0007 | 0.002   | 0.094  | 0.04   | 0.063  | ...    | ...    | ...    | ...      | ...      | Co,As               |             | 100g |
| CRM           | C11 TI E488-2 | 3.956  | ...       | 0.374   | 0.1173 | 0.0111  | 0.201  | 0.1247 | 0.303  | 0.0256 | 0.0636 | ...    | ...      | 0.0545   | N,Sn                | White       | 100g |
|               | C11 MBS CE209 | 2.46   | ...       | 2.13    | 0.027  | 0.167   | 0.39   | 0.045  | 0.01   | 0.211  | 0.062  | 0.0013 | (0.001)  | 0.03     | Ce,Al,As            | Rare Earth  | 150g |
|               | C11 MBS CE208 | 2.41   | ...       | 1.63    | 0.041  | 0.118   | 0.35   | 0.047  | 0.007  | 0.212  | 0.048  | 0.0008 | (0.001)  | 0.024    | Ce,Al,As            | Rare Earth  | 150g |
|               | C11 MBS CE207 | 3.05   | ...       | 2.07    | 0.017  | 0.089   | 1.2    | 0.048  | 0.039  | 0.222  | 0.079  | 0.0027 | (0.0005) | 0.034    | Ce,Al,As            | Rare Earth  | 150g |
| CRM           | C11 S 120-1   | 2.85   | ...       | 1.32    | 0.0095 | 0.053   | 0.70   | 0.12   | 0.28   | 0.29   | 0.006  | ...    | ...      | 0.007    | N 0.0058            |             | 150g |

| 1.1.5 Pig Iron |              | C    | Si    | S      | P     | Mn    | Ni     | Cr     | Mo      | Cu     | Ti     | V      | Sn      | As     | Pb      | Sb      | N      | Size |
|----------------|--------------|------|-------|--------|-------|-------|--------|--------|---------|--------|--------|--------|---------|--------|---------|---------|--------|------|
|                | C11 CG 01123 | 2.00 | 1.54  | 0.022  | 0.096 | 1.13  | 0.0125 | 0.122  | 0.017   | 0.122  | 0.053  | 0.018  | 0.0043  | 0.0067 | 0.00019 | 0.0010  | ...    | 100g |
|                | C11 CG 01124 | 2.68 | 0.627 | 0.067  | 0.174 | 0.783 | 0.095  | 0.110  | 0.021   | 0.063  | 0.015  | 0.019  | 0.0021  | 0.0048 | 0.00025 | 0.00084 | ...    | 100g |
|                | C11 AU 41008 | 4.03 | 0.88  | 0.040  | 0.049 | 0.40  | ...    | 0.0068 | 0.00065 | 0.0032 | 0.027  | 0.0040 | 0.00015 | 0.0016 | <0.0002 | 0.00014 | ...    | 150g |
|                | C11 AU 41009 | 3.89 | 1.58  | 0.028  | 0.058 | 0.650 | 0.0058 | 0.0081 | 0.00066 | 0.0029 | 0.042  | 0.0049 | 0.00015 | 0.0010 | <0.0002 | 0.00016 | ...    | 150g |
| CRM            | C11 S 102-7  | 4.66 | 0.71  | 0.0181 | 0.103 | 0.375 | ...    | ...    | ...     | ...    | 0.0503 | ...    | ...     | ...    | ...     | ...     | 0.0051 | 150g |

| 1.1.6 Pure Iron |                 | All Elements ppm |      |    |    |     |     |     |      |     |    |      |     |     |     |     | Size   |      |
|-----------------|-----------------|------------------|------|----|----|-----|-----|-----|------|-----|----|------|-----|-----|-----|-----|--------|------|
|                 |                 | C                | Si   | S  | P  | Mn  | Ni  | Cr  | Mo   | Cu  | Co | N    | V   | Sn  | As  | B   | Others | Size |
| CRM             | C11 E 68        | 71               | (20) | 30 | 90 | 42  | 160 | 12  | 50   | 110 | 60 | 34   | ... | ... | ... | ... |        | 50g  |
| CRM             | C11 E 73        | 34               | 28   | 49 | 34 | 44  | 330 | 300 | 49   | 760 | 40 | 76   | ... | ... | ... | ... |        | 120g |
| CRM             | C11 A E088-2(C) | 6                | 52   | 70 | 48 | 809 | 275 | 244 | (25) | 163 | 61 | (10) | 2.9 | ... | ... | ... | Ca,    | 100g |
| CRM             | C11 A E097-1(C) | <20              | <100 | 22 | 16 | 64  | 25  | 16  | <10  | 20  | 37 | 7    | <10 | <25 | 51  | 3   | B, Zn  | 100g |

|  |               | All Elements ppm |    |     |     |     |     |    |     |     |     |     |     |     |     |  | Size |      |
|--|---------------|------------------|----|-----|-----|-----|-----|----|-----|-----|-----|-----|-----|-----|-----|--|------|------|
|  |               | C                | S  | P   | Mn  | Cr  | Ni  | Cu | Al  | Si  | Mo  | Ca  | Mg  | Ti  | N   |  |      | Size |
|  | C11 CG 01401a | 15               | 15 | 14  | 170 | 56  | 120 | 30 | 100 | 490 | 28  | ... | ... | 25  | 25  |  |      | 15g  |
|  | C11 CG 01402d | 12               | 8  | (1) | 2.2 | 3.7 | 11  | 4  | 3.4 | 42  | 1.4 | 17  | 2.4 | (1) | ... |  |      | 15g  |

| 1.1.11 With Cr |               | C    | Si   | S     | P     | Mn   | Ni   | Cr    | Cu    | Mo    | V     | W     | Co   | Sn    | Pb    | Size |
|----------------|---------------|------|------|-------|-------|------|------|-------|-------|-------|-------|-------|------|-------|-------|------|
| CRM            | C11 X 152940S | 2.15 | 0.49 | 0.072 | 0.081 | 0.52 | 4.20 | 31.02 | 0.174 | 0.278 | 0.024 | 0.301 | 1.05 | 0.072 | 0.023 | 100g |

| 1.1.14 Ductile Iron |               | C    | Si    | Mn    | P     | S      | Cu    | Cr     | Ni    | Mo     | Co     | RE     | Mg     | V      | Ti    | Size      |
|---------------------|---------------|------|-------|-------|-------|--------|-------|--------|-------|--------|--------|--------|--------|--------|-------|-----------|
|                     | C11 CG 01119a | 3.67 | 2.673 | 0.497 | 0.084 | 0.0053 | 0.033 | 0.0115 | 0.011 | 0.0013 | 0.0065 | 0.0187 | 0.023  | 0.0205 | 0.068 | 85g       |
|                     | C11 MBS CE206 | 2.64 | 2.76  | 0.99  | 0.15  | 0.018  | 0.45  | 0.068  | 0.048 | 0.007  | 0.029  | 0.021  | 0.0006 | 0.038  | 0.78  | continued |

| Continuation from above |               | Ce    | Al    | As    | La    | Te     | Size |
|-------------------------|---------------|-------|-------|-------|-------|--------|------|
|                         | C11 MBS CE206 | 0.011 | 0.004 | 0.004 | 0.004 | <0.002 | 150g |

# C1. Iron Base

# Steels

# Chippings

| 1.2.1 Plain Carbon |                 | C      | Si      | S       | P       | Mn     | Ni      | Cr      | Mo      | Cu      | Al       | Nb     | As     | N        | Others             | Typical Alloy Type | Size  |       |
|--------------------|-----------------|--------|---------|---------|---------|--------|---------|---------|---------|---------|----------|--------|--------|----------|--------------------|--------------------|-------|-------|
| CRM                | C12 E 11A       | 0.205  | 0.030   | 0.011   | 0.009   | 0.439  | 0.079   | 0.121   | 0.010   | 0.013   | 0.153    | ...    | ...    | ...      |                    | AISI 1020          | 120g  |       |
| CRM                | C12 E 13A       | 0.573  | 0.260   | 0.014   | 0.011   | 0.723  | 0.065   | 0.098   | 0.018   | 0.076   | 0.027    | ...    | ...    | ...      |                    | AISI 1060          | 100g  |       |
| CRM                | C12 E 14A       | 0.415  | 0.292   | 0.036   | 0.029   | 0.699  | 0.104   | 0.100   | 0.029   | 0.278   | (0.009)  | ...    | ...    | ...      |                    | AISI 1040          | 100g  |       |
| CRM                | C12 E 39        | 0.048  | 0.061   | 0.034   | 0.021   | 0.340  | 0.048   | 0.084   | 0.012   | 0.019   | 0.169    | ...    | ...    | ...      |                    | AISI 1006          | 100g  |       |
| CRM                | C12 E 41B       | 0.072  | 0.022   | 0.322   | 0.057   | 1.08   | 0.012   | 0.037   | ...     | 0.005   | ...      | ...    | ...    | ...      | Pb 0.220           | AISI 12L14         | 100g  |       |
| CRM                | C12 E 43        | 0.310  | 0.207   | 0.112   | 0.029   | 1.42   | 0.056   | 0.098   | 0.013   | 0.056   | ...      | ...    | ...    | ...      |                    | AISI 1132          | 120g  |       |
| CRM                | C12 E 55        | 0.837  | 0.240   | 0.027   | 0.023   | 0.923  | 0.174   | 0.215   | 0.099   | 0.187   | 0.093    | 0.061  | ...    | ...      |                    | AISI 1080          | 100g  |       |
| CRM                | C12 E 71        | 0.406  | 0.541   | 0.025   | 0.017   | 1.04   | 0.085   | 0.174   | 0.018   | 0.125   | 0.038    | ...    | ...    | ...      | B 0.0084           | AISI 10B40         | 100g  |       |
| CRM                | C12 E 93        | 0.140  | 0.261   | 0.028   | 0.036   | 1.02   | 0.053   | 0.104   | 0.013   | 0.129   | 0.045    | ...    | ...    | ...      | B 0.0022, Ti 0.034 | AISI 15B13         | 100g  |       |
| CRM                | C12 E 100       | 0.462  | 0.188   | 0.019   | 0.016   | 0.755  | 0.524   | 1.08    | 0.94    | 0.053   | 0.029    | ...    | ...    | 0.0075   | V 0.117            | Cr/Ni/Mo/V         | 100g  |       |
| CRM                | C12 E 108       | 0.598  | 1.96    | 0.020   | 0.028   | 0.861  | 0.052   | 0.133   | 0.017   | 0.121   | 0.019    | ...    | ...    | ...      | Co 0.006, Ti 0.004 | AISI9260           | 100g  |       |
| CRM                | C12 DB E030-4   | 0.456  | 0.318   | 0.021   | 0.018   | 0.603  | 0.042   | 0.117   | ...     | 0.061   | 0.042    | ...    | 0.012  | 0.0051   |                    |                    | 100g  |       |
| CRM                | C12 DB E031-3   | 0.055  | 0.037   | 0.021   | 0.014   | 0.329  | ...     | ...     | ...     | 0.020   | 0.054    | ...    | 0.013  | 0.0050   |                    |                    | 100g  |       |
| CRM                | C12 DB E032-2   | 0.271  | 0.282   | 0.0254  | 0.0129  | 0.556  | (0.040) | (0.088) | ...     | 0.085   | ...      | ...    | 0.020  | 0.0044   |                    |                    | 100g  |       |
| CRM                | C12DB E035-2(C) | 1.277  | 0.216   | 0.111   | 0.0038  | 0.305  | 0.0190  | 0.0104  | 0.0056  | 0.0085  | 0.0177   | ...    | 0.0017 | 0.0230   |                    |                    | 100g  |       |
| CRM                | C12 DB E036-1   | 0.858  | 0.194   | 0.0095  | 0.0074  | 0.327  | (0.058) | (0.091) | ...     | 0.065   | (0.015)  | ...    | 0.0233 | 0.0100   | V (0.019)          |                    | 100g  |       |
| CRM                | C12 DB E042-1   | 0.108  | 0.037   | 0.024   | 0.0057  | 0.666  | 0.029   | 0.016   | ...     | 0.041   | 0.010    | 0.054  | ...    | 0.0078   |                    |                    | 100g  |       |
| CRM                | C12 DB E077-2   | 0.151  | 0.293   | 0.014   | 0.022   | 1.28   | (0.021) | (0.016) | (0.003) | (0.029) | ...      | ...    | 0.007  | 0.0054   |                    |                    | 100g  |       |
| CRM                | C12 DB E079-2   | 0.596  | 0.247   | 0.192   | 0.0234  | 0.743  | 0.022   | 0.0382  | ...     | 0.046   | ...      | ...    | 0.004  | 0.0074   |                    |                    | 100g  |       |
| CRM                | C12 DB E082-1   | 0.415  | 0.235   | 0.030   | 0.013   | 0.769  | 0.027   | 0.018   | ...     | 0.025   | ...      | ...    | ...    | ...      | Pb 0.149, Te 0.030 |                    | 100g  |       |
| CRM                | C12 DB E083-1   | 0.028  | ...     | 0.0100  | 0.0077  | 0.289  | 0.014   | (0.013) | ...     | 0.016   | ...      | ...    | ...    | 0.0022   |                    |                    | 100g  |       |
| CRM                | C12 A 159/3     | 0.51   | 0.24    | 0.036   | 0.016   | 0.77   | (0.12)  | (0.16)  | (0.02)  | (0.15)  | ...      | ...    | ...    | ...      |                    |                    | 100g  |       |
| CRM                | C12 A 161/3     | 0.79   | 0.3     | 0.03    | 0.043   | 1.02   | (0.13)  | (0.11)  | (0.026) | (0.12)  | (0.01)   | ...    | ...    | ...      |                    |                    | 100g  |       |
| CRM                | C12 A 163/2     | 1.26   | 0.24    | 0.022   | 0.019   | 0.3    | (0.1)   | (0.16)  | (0.012) | (0.09)  | ...      | ...    | ...    | ...      |                    |                    | 100g  |       |
| CRM                | C12 A 232/2     | 0.181  | (0.11)  | 0.126   | (0.025) | 1.18   | (0.14)  | (0.05)  | ...     | (0.15)  | ...      | ...    | ...    | ...      |                    |                    | 100g  |       |
| CRM                | C12 A 237/2     | 0.122  | (0.17)  | (0.031) | (0.024) | 0.45   | (0.039) | (0.028) | <0.005  | (0.06)  | ...      | ...    | ...    | ...      |                    |                    | 100g  |       |
| CRM                | C12 A 238/2     | 0.21   | 0.12    | (0.034) | (0.019) | (0.61) | (0.21)  | ...     | ...     | (0.1)   | ...      | ...    | ...    | ...      |                    |                    | 100g  |       |
| CRM                | C12 A 270       | 0.22   | (0.05)  | (0.1)   | 0.092   | (0.88) | (0.14)  | (0.17)  | (0.02)  | (0.21)  | ...      | ...    | ...    | ...      |                    |                    | 100g  |       |
| CRM                | C12 A E057-2(C) | 0.0507 | (0.003) | 0.0172  | 0.012   | 0.246  | 0.0095  | 0.0114  | ...     | 0.0146  | ...      | ...    | ...    | 0.0023   | Al 0.059           |                    | 100g  |       |
| CRM                | C12 A E064-1(C) | 0.0026 | 0.0065  | 0.0104  | 0.0091  | 0.1641 | 0.0115  | 0.0184  | 0.00077 | 0.0077  | 0.0302   | 0.0146 | 0.0036 | 0.0026   | Ti 0.0189          |                    | 100g  |       |
| CRM                | C12 A E084-1(C) | 0.391  | 0.265   | 0.029   | 0.018   | 0.86   | 0.154   | ...     | 0.033   | 0.267   | ...      | ...    | ...    | ...      | Sn                 |                    | 100g  |       |
| CRM                | C12 A E085-1(C) | 0.067  | 0.008   | 0.336   | 0.062   | 0.977  | ...     | ...     | ...     | 0.291   | ...      | ...    | ...    | ...      | Co, Pb, V, Sb, Zn  |                    | 100g  |       |
| CRM                | C12 A E086-1(C) | 0.297  | 0.206   | 0.037   | 0.024   | 0.879  | 0.168   | 0.15    | ...     | 0.32    | ...      | ...    | 0.023  | ...      | Sn,                |                    | 100g  |       |
| CRM                | C12 A E087-1    | 0.174  | 0.263   | 0.046   | 0.01    | 0.671  | 0.118   | 0.078   | 0.021   | 0.171   | ...      | ...    | 0.024  | ...      | Co,Sn,Sb           |                    | 100g  |       |
| CRM                | C12 A E090-1(C) | 1.05   | 0.281   | 0.0095  | 0.013   | 0.226  | 0.053   | 0.121   | 0.0089  | ...     | ...      | ...    | ...    | 0.0146   | V                  |                    | 100g  |       |
| CRM                | C12 A E091-1    | 0.518  | ...     | ...     | ...     | ...    | 0.31    | 0.312   | 0.098   | ...     | ...      | ...    | ...    | 0.0111   |                    |                    | 100g  |       |
| CRM                | C12 A 431/2     | 0.0249 | 0.015   | 0.0065  | 0.121   | 0.902  | 0.04    | 0.049   | (0.004) | ...     | ...      | 0.0040 | ...    | 0.0052   |                    |                    | 100g  |       |
| CRM                | C12 A 432/2     | 0.0065 | 0.0822  | 0.036   | 0.0171  | 0.712  | 0.0196  | 0.0166  | (0.002) | ...     | ...      | 0.0174 | ...    | 0.0066   |                    |                    | 100g  |       |
| CRM                | C12 A 433/2     | 0.096  | 0.0071  | 0.0083  | 0.011   | 1.188  | 0.037   | 0.0262  | (0.004) | ...     | ...      | 0.0590 | ...    | ...      |                    |                    | 100g  |       |
| CRM                | C12 A 434/2     | 0.275  | 0.51    | 0.0141  | 0.0611  | 1.546  | 0.037   | 0.238   | (0.014) | ...     | ...      | 0.038  | ...    | 0.0104   |                    |                    | 100g  |       |
| CRM                | C12 A 435/2     | 0.489  | 0.328   | 0.0424  | 0.0373  | 0.39   | 0.133   | 0.184   | (0.018) | ...     | ...      | 0.134  | ...    | ...      | Co                 |                    | 100g  |       |
| CRM                | C12 Ti E080-1   | 0.452  | 0.317   | 0.024   | 0.028   | 1.116  | ...     | 0.025   | ...     | ...     | ...      | ...    | ...    | 0.0073   |                    |                    | 100g  |       |
| CRM                | C12 Ti E081-1   | 0.099  | 0.105   | 0.014   | 0.0129  | 0.605  | 0.042   | ...     | ...     | 0.026   | ...      | ...    | ...    | ...      | Al,Co              |                    | 100g  |       |
|                    | C12 M BS CE24   | 0.63   | 0.27    | 0.01    | 0.016   | 0.84   | 0.045   | 0.016   | 0.006   | 0.066   | 0.044    | ...    | 0.0029 | ...      | Co                 |                    | 150g  |       |
| CRM                | C12 S 023-8     | 0.112  | 0.22    | 0.0067  | 0.020   | 0.48   | ...     | ...     | ...     | 0.010   | (0.015)  | ...    | ...    | (0.0037) |                    |                    | 150g  |       |
| CRM                | C12 S 030-7     | 0.196  | 0.24    | 0.0076  | 0.024   | 0.75   | ...     | ...     | ...     | 0.024   | 0.023    | ...    | ...    | 0.0033   |                    |                    | 150g  |       |
| CRM                | C12 S 050-6     | 0.38   | 0.19    | 0.0057  | 0.013   | 0.50   | ...     | ...     | ...     | 0.008   | 0.023    | ...    | ...    | 0.0029   |                    |                    | 150g  |       |
| CRM                | C12 S 057-6     | 0.52   | 0.19    | 0.0057  | 0.017   | 0.55   | ...     | ...     | ...     | 0.006   | 0.030    | ...    | ...    | 0.0030   |                    |                    | 150g  |       |
| CRM                | C12 S 061-7     | 0.626  | 0.206   | 0.0106  | 0.0240  | 0.513  | ...     | ...     | ...     | 0.0086  | (0.002)  | ...    | ...    | 0.0036   |                    |                    | 150g  |       |
| CRM                | C12 S 065-5     | 0.80   | 0.20    | 0.0060  | 0.0095  | 0.73   | ...     | ...     | ...     | 0.008   | 0.022    | ...    | ...    | (0.0037) |                    |                    | 150g  |       |
| 1.2.2 Mild Steel   |                 | C      | Si      | S       | P       | Mn     | Ni      | Cr      | Mo      | Cu      | Co       | Sn     | Al     | W        | Ti                 | V                  | As    | Size  |
|                    | C12 X 3490A     | 0.24   | 0.26    | 0.024   | 0.021   | 0.69   | 0.23    | 0.10    | 0.06    | 0.20    | 0.006    | 0.16   | 0.32   | 0.08     | 0.085              | 0.002              | 0.005 | 100g  |
|                    | C12 X 3500A     | 0.18   | 0.45    | 0.032   | 0.029   | 0.70   | 0.18    | 0.31    | 0.10    | 0.15    | 0.005    | 0.03   | 0.35   | 0.29     | 0.054              | 0.002              | 0.070 | 100g  |
| CRM                | C12 X 3520B     | 0.275  | 0.414   | 0.126   | 0.07    | 0.200  | 0.376   | 0.313   | 0.261   | 0.140   | 0.020    | 0.110  | 0.257  | 0.202    | 0.29               | 0.029              | 0.036 | 100g  |
| CRM                | C12 A 451/1     | 0.051  | 0.1116  | 0.014   | 0.009   | 0.62   | 0.016   | 0.10    | 0.04    | 0.47    | ...      | 0.002  | ...    | 0.099    | 0.105              | ...                | 0.041 | 100g. |
| CRM                | C12 A 452/1     | 0.323  | 0.055   | 0.017   | 0.035   | 1.30   | 0.19    | 0.07    | 0.05    | 0.22    | ...      | 0.094  | ...    | 0.054    | 0.031              | ...                | 0.015 | 100g. |
| CRM                | C12 A 453/1     | 0.16   | 0.34    | 0.026   | 0.044   | 1.38   | 0.11    | 0.26    | 0.08    | 0.099   | ...      | 0.022  | ...    | 0.3      | 0.073              | ...                | 0.052 | 100g. |
| CRM                | C12 A 454/1     | 0.376  | 0.31    | 0.047   | 0.061   | 0.80   | 0.069   | 0.06    | 0.20    | 0.05    | ...      | 0.054  | ...    | 0.15     | 0.01               | ...                | 0.070 | 100g. |
| CRM                | C12 A 455/1     | 0.598  | 0.25    | 0.055   | 0.052   | 0.40   | 0.35    | 0.21    | 0.14    | 0.04    | ...      | 0.085  | ...    | 0.2      | 0.022              | ...                | 0.026 | 100g. |
| CRM                | C12 A 456/2     | 0.112  | 0.297   | 0.0221  | 0.0212  | 0.22   | ...     | ...     | ...     | ...     | 0.0504   | ...    | 0.0017 | ...      | ...                | 0.0221             | ...   | 100g  |
| CRM                | C12 A 457/2     | 0.307  | 0.105   | 0.0448  | 0.0098  | 0.327  | ...     | ...     | ...     | ...     | 0.0217   | ...    | 0.088  | ...      | ...                | 0.153              | ...   | 100g  |
| CRM                | C12 A 458/2     | 0.198  | 0.504   | 0.0314  | 0.0281  | 0.479  | ...     | ...     | ...     | ...     | 0.198    | ...    | 0.055  | ...      | ...                | 0.105              | ...   | 100g  |
| CRM                | C12 A 459/2     | 0.467  | 0.64    | 0.0481  | 0.0482  | 0.909  | ...     | ...     | ...     | ...     | 0.089    | ...    | 0.015  | ...      | ...                | 0.0585             | ...   | 100g  |
| CRM                | C12 A 460/2     | 0.383  | 0.126   | 0.0099  | 0.0374  | 0.616  | ...     | ...     | ...     | ...     | 0.0106   | ...    | 0.024  | ...      | ...                | 0.0322             | ...   | 100g  |
| C                  | Si              | S      | P       | Mn      | Co      | Al     | Nb      | V       | B       | Sb      | Zr       | Size   |        |          |                    |                    |       |       |
|                    | C12 X 3530A     | 0.075  | 0.10    | 0.007   | 0.004   | 1.01   | 0.025   | 0.015   | 0.12    | 0.02    | (0.0004) | 0.11   | 0.09   |          |                    |                    |       | 100g  |
|                    | C12 X 3540A     | 0.27   | 0.19    | 0.015   | 0.066   | 0.86   | 0.03    | 0.01    | 0.07    | 0.02    | 0.0002   | 0.05   | 0.03   |          |                    |                    |       | 100g  |
|                    | C12 X 3550A     | 0.20   | 0.48    | 0.024   | 0.028   | 0.62   | 0.05    | <0.01   | 0.02    | 0.11    | 0.001    | 0.08   | <0.01  |          |                    |                    |       | 100g  |
|                    | C12 X 3560A     | 0.36   | 0.37    | 0.031   | 0.049   | 0.44   | 0.12    | 0.05    | 0.02    | 0.09    | 0.007    | 0.02   | 0.01   |          |                    |                    |       | 100g  |
|                    | C12 X 3570A     | 0.45   | 0.23    | 0.062   | 0.016   | 0.24   | 0.21    | 0.06    | <0.001  | 0.19    | 0.014    | <0.005 | <0.005 |          |                    |                    |       | 100g  |

| 1.2.3 Low Alloy |             | C      | Si     | S       | P       | Mn     | Ni    | Cr     | Mo      | Cu     | Co       | Nb     | Soluble |         |         | Typical |            | Size |
|-----------------|-------------|--------|--------|---------|---------|--------|-------|--------|---------|--------|----------|--------|---------|---------|---------|---------|------------|------|
|                 |             |        |        |         |         |        |       |        |         |        |          |        | Al      | V       | N       | Others  | Alloy Type |      |
| CRM             | C12 E 12A   | 0.435  | 0.348  | 0.009   | 0.012   | 0.908  | 0.508 | 0.528  | 0.172   | 0.082  | ...      | ...    | ...     | ...     | ...     | ...     | AISI 8640  | 100g |
| CRM             | C12 E 16A   | 0.212  | 0.287  | 0.018   | 0.019   | 0.820  | 0.559 | 0.493  | 0.201   | 0.053  | ...      | ...    | 0.016   | ...     | ...     | ...     | AISI 8620  | 100g |
| CRM             | C12 E 17A   | 0.415  | 0.260  | 0.021   | 0.014   | 0.724  | 1.76  | 0.820  | 0.259   | 0.074  | 0.039    | ...    | ...     | ...     | ...     | ...     | AISI 4340  | 100g |
| CRM             | C12 E 25    | 0.400  | 0.222  | 0.007   | 0.012   | 0.902  | 0.072 | 1.01   | 0.280   | 0.040  | ...      | ...    | ...     | ...     | ...     | ...     | AISI 4140  | 100g |
| CRM             | C12 E 29A   | 0.614  | 0.372  | 0.0076  | 0.012   | 0.565  | 0.794 | 0.845  | 0.276   | 0.012  | ...      | ...    | 0.028   | 0.080   | 0.0039  | ...     | Ni/Cr/Mo   | 100g |
| CRM             | C12 E 31    | 0.497  | 0.146  | 0.009   | 0.021   | 0.794  | 0.106 | 1.15   | ...     | 0.251  | ...      | ...    | 0.087   | 0.250   | ...     | ...     | AISI 6150  | 100g |
| CRM             | C12 E 33    | 0.603  | 0.133  | 0.007   | 0.011   | 0.772  | 0.059 | 0.793  | ...     | 0.036  | ...      | ...    | 0.099   | ...     | ...     | ...     | AISI 5160  | 100g |
| CRM             | C12 E 36    | 0.315  | 0.291  | 0.004   | 0.016   | 0.430  | 0.217 | 1.25   | 0.201   | 0.129  | ...      | ...    | 0.86    | ...     | ...     | ...     | Cr/Mo/Al   | 100g |
| CRM             | C12 E 47    | 0.122  | 0.273  | 0.020   | 0.013   | 0.959  | 0.221 | 0.573  | ...     | 0.245  | ...      | 0.032  | ...     | ...     | ...     | ...     | ...        | 100g |
| CRM             | C12 E 96    | 0.109  | 0.286  | 0.0049  | 0.017   | 0.845  | 0.018 | 0.614  | ...     | 0.272  | (0.0048) | 0.0072 | 0.041   | ...     | 0.0092  | ...     | ...        | 120g |
| CRM             | C12 E 97    | 0.165  | 0.231  | 0.026   | 0.015   | 1.11   | 0.227 | 1.22   | 0.064   | 0.129  | 0.012    | 0.023  | 0.028   | 0.024   | 0.0119  | Ti, B   | ...        | 100g |
| CRM             | C12 E 117   | 0.515  | 0.349  | 0.011   | 0.019   | 0.557  | 3.01  | 1.02   | 0.292   | 0.07   | 0.014    | ...    | 0.026   | 0.015   | ...     | W       | ...        | 100g |
| CRM             | C12 A 219/4 | 0.315  | 0.079  | 0.027   | 0.011   | 0.81   | 2.55  | 0.66   | 0.58    | 0.088  | ...      | ...    | ...     | ...     | ...     | Sn      | ...        | 100g |
| CRM             | C12 A 222/1 | (0.31) | (0.22) | (0.009) | (0.020) | (0.62) | 3.54  | (0.05) | (0.029) | (0.14) | (0.038)  | ...    | ...     | ...     | ...     | ...     | ...        | 100g |
| CRM             | C12 A 225/2 | 0.40   | 0.23   | 0.012   | 0.019   | 0.56   | 1.43  | 1.08   | 0.34    | (0.17) | (0.02)   | ...    | ...     | (<0.01) | (0.012) | ...     | ...        | 100g |

|  | C           | Si    | S    | P     | Mn    | Ni   | Cr   | Mo   | Cu    | Co    | Sn    | Al    | V     | N     | Nb    | Zr  | Size |
|--|-------------|-------|------|-------|-------|------|------|------|-------|-------|-------|-------|-------|-------|-------|-----|------|
|  | C12 X LA10A | 0.06  | 0.75 | 0.045 | 0.013 | 1.32 | 0.21 | 0.85 | <0.01 | 0.034 | ...   | ...   | <0.01 | 0.41  | ...   | ... | 50g  |
|  | C12 X LA20A | 0.24  | 0.98 | 0.042 | 0.026 | 0.55 | 0.73 | 0.81 | 0.10  | 0.44  | ...   | ...   | 0.03  | 0.09  | ...   | ... | 50g  |
|  | C12 X LA20B | 0.188 | 0.97 | 0.043 | 0.033 | 0.55 | 0.74 | 0.81 | 0.101 | 0.436 | <0.01 | ...   | 1.45  | 0.09  | 0.006 | ... | 50g  |
|  | C12 X LA30A | 0.48  | 0.13 | 0.04  | 0.032 | 1.50 | 0.31 | 0.37 | 0.30  | 0.20  | ...   | ...   | 0.06  | 0.19  | ...   | ... | 50g  |
|  | C12 X LA40A | 0.67  | 0.28 | 0.021 | 0.044 | 0.24 | 0.46 | 0.64 | 0.46  | 0.29  | ...   | ...   | 0.19  | 0.36  | ...   | ... | 50g  |
|  | C12 X LA50A | 0.81  | 0.67 | 0.015 | 0.057 | 0.98 | 0.13 | 0.12 | 0.19  | 0.09  | ...   | ...   | 0.19  | 0.58  | ...   | ... | 50g  |
|  | C12 X LA60A | 0.01  | 0.06 | 0.006 | 0.005 | 0.10 | 0.03 | 0.03 | <0.01 | 0.01  | ...   | ...   | <0.01 | <0.01 | ...   | ... | 50g  |
|  | C12 X LA70A | 0.295 | 0.39 | 0.039 | 0.051 | 0.62 | 0.31 | 1.04 | 0.26  | 0.23  | 0.15  | 0.05  | 1.14  | 0.24  | ...   | ... | 50g  |
|  | C12 X LA80A | 0.205 | 0.26 | 0.024 | 0.028 | 1.05 | 3.98 | 1.98 | 0.39  | 0.30  | 0.06  | 0.1   | 0.12  | 0.05  | ...   | ... | 50g  |
|  | C12 X LA90A | 0.47  | 1.07 | 0.065 | 0.074 | 0.58 | 2.04 | 3.10 | 1.10  | 0.51  | 0.30  | 0.007 | 0.05  | 0.39  | ...   | ... | 50g  |

|     | C                | Si    | Mn     | Ni       | Cr      | Mo     | Ti     | As   | Sn     | Ca     | Al       | V       | Co     | B        | Zr      | Nb    | Sb   | Size |
|-----|------------------|-------|--------|----------|---------|--------|--------|------|--------|--------|----------|---------|--------|----------|---------|-------|------|------|
| CRM | C12 HY CH20      | 0.008 | 0.005  | 0.013    | 0.012   | 0.09   | 0.038  | 0.03 | <0.01  | 0.03   | ...      | (0.003) | (0.01) | <0.005   | ...     | ...   | ...  | 100g |
| CRM | C12 HY CH21      | 0.98  | 1.79   | 0.020    | 0.019   | 0.08   | 4.08   | 1.83 | ...    | 0.50   | ...      | ...     | ...    | ...      | ...     | 0.074 | ...  | 100g |
| CRM | C12 HY CH22      | 0.20  | 0.53   | 0.025    | 0.012   | 0.14   | ...    | 5.94 | ...    | 0.25   | ...      | ...     | ...    | 1.16     | ...     | ...   | ...  | 100g |
| CRM | C12 HY CH23      | 0.55  | 1.72   | 0.043    | 0.047   | 1.07   | ...    | ...  | ...    | 0.49   | ...      | ...     | ...    | ...      | ...     | ...   | 0.09 | 100g |
| CRM | C12 HY CH24      | 0.43  | 0.34   | 0.048    | 0.028   | 0.76   | 1.62   | 1.32 | 0.21   | 0.41   | ...      | ...     | 0.007  | 0.026    | ...     | 0.022 | ...  | 100g |
| CRM | C12 HY CH25      | 1.16  | 1.21   | 0.005    | 0.028   | 0.65   | 0.16   | 3.17 | 1.25   | 0.107  | 0.30     | ...     | ...    | 1.14     | ...     | 0.41  | ...  | 100g |
| CRM | C12 HY CH27      | 0.096 | 0.59   | 0.018    | (0.01)  | 1.53   | 0.97   | 0.64 | 0.56   | 0.73   | ...      | ...     | (0.01) | 0.27     | ...     | ...   | ...  | 100g |
| CRM | C12 JN 100LA     | 1.002 | 0.283  | 0.018    | 0.012   | 0.33   | 0.0266 | 1.52 | 0.01   | 0.0194 | 0.01     | ...     | 0.0046 | 0.0036   | ...     | ...   | ...  | 150g |
| CRM | C12 TI E176-2    | 1.91  | (0.65) | 0.012    | (0.016) | (0.60) | 1.08   | 0.99 | ...    | (0.01) | ...      | ...     | ...    | (0.07)   | ...     | ...   | ...  | 100g |
| CRM | C12 TI E185-1    | 1.172 | (0.25) | 0.0209   | (0.02)  | (0.41) | (0.17) | 0.99 | ...    | (0.17) | ...      | 0.0212  | ...    | ...      | ...     | ...   | ...  | 100g |
| CRM | C12 TI E188-1    | 1.094 | ...    | 0.0113   | ...     | ...    | (0.28) | 1.54 | (0.17) | ...    | (0.06)   | ...     | ...    | (0.02)   | ...     | ...   | ...  | 100g |
| CRM | C12 TI E190-1(C) | 0.395 | 0.278  | 0.0044   | 0.0112  | 1.28   | 0.934  | 2.18 | 0.41   | ...    | 0.03     | ...     | ...    | ...      | 0.0096  | ...   | ...  | 100g |
| CRM | C12 DB E179-2(C) | 0.598 | 0.579  | (0.0006) | 0.0267  | 0.539  | 0.078  | 1.08 | 0.07   | 0.111  | (0.0153) | ...     | ...    | 0.188    | 0.0068  | ...   | ...  | 100g |
| CRM | C12 DB E180-1    | 0.197 | 0.362  | 0.0249   | 0.0174  | 1.286  | 0.096  | 1.25 | ...    | 0.115  | ...      | ...     | ...    | ...      | 0.0068  | ...   | ...  | 100g |
| CRM | C12 DB E181-1    | 0.59  | 1.054  | 0.035    | 0.018   | 1.047  | 0.07   | 0.13 | ...    | 0.174  | ...      | (0.015) | ...    | ...      | 0.0068  | ...   | ...  | 100g |
| CRM | C12 DB E182-1    | 0.79  | 0.368  | 0.011    | 0.0076  | 0.389  | 0.152  | 0.59 | ...    | 0.141  | ...      | ...     | ...    | 0.177    | 0.00102 | ...   | ...  | 100g |
| CRM | C12 DB E183-1    | 0.083 | 0.421  | 0.031    | 0.089   | 0.354  | 0.073  | 0.67 | ...    | 0.445  | ...      | ...     | ...    | ...      | 0.0064  | ...   | ...  | 100g |
| CRM | C12 DB E184-1    | 0.333 | 0.218  | 0.0032   | 0.0047  | 0.528  | 3.318  | 1.29 | 0.46   | 0.06   | 0.056    | 0.0044  | ...    | 0.108    | 0.0051  | ...   | ...  | 100g |
| CRM | C12 DB E187-1(C) | 0.195 | 0.026  | 0.025    | 0.014   | 1.354  | 0.096  | 1.19 | 0.04   | 0.161  | 0.014    | 0.011   | ...    | ...      | 0.014   | ...   | ...  | 100g |
| CRM | C12 DB E192-1(C) | 0.188 | 0.219  | 0.001    | 0.0029  | 1.377  | 0.755  | 0.07 | 0.48   | 0.045  | 0.0055   | (0.003) | ...    | (0.003)  | 0.0118  | ...   | ...  | 100g |
| CRM | C12 DB E193-1(C) | 0.139 | 0.404  | 0.0086   | 0.0063  | 0.972  | 1.178  | 0.18 | 0.35   | 0.598  | 0.0073   | ...     | ...    | (0.0019) | 0.0108  | ...   | ...  | 100g |
| CRM | C12 DB E194-1(C) | 0.153 | 0.431  | 0.008    | 0.0097  | 1.188  | 0.342  | 0.73 | 0.29   | 0.075  | ...      | ...     | ...    | 0.0243   | 0.0115  | ...   | ...  | 100g |

|     | C           | Si    | S     | P      | Mn     | Ni    | Cr    | Cu    | V     | Al    | Size  |      |
|-----|-------------|-------|-------|--------|--------|-------|-------|-------|-------|-------|-------|------|
| CRM | C12 A 401/2 | 0.935 | 0.602 | 0.0078 | 0.0265 | 1.20  | 0.019 | 0.138 | 0.101 | 0.496 | 0.074 | 100g |
| CRM | C12 A 402/2 | 1.311 | 0.111 | 0.0138 | 0.0161 | 0.23  | 0.808 | 0.652 | 0.302 | 0.194 | 0.161 | 100g |
| CRM | C12 A 403/2 | 0.75  | 0.209 | 0.0381 | 0.055  | 1.68  | 0.223 | 0.463 | 0.221 | 0.341 | 0.049 | 100g |
| CRM | C12 A 404/2 | 0.696 | 1.121 | 0.0228 | 0.0479 | 0.53  | 0.393 | 0.774 | 0.427 | 0.107 | 0.017 | 100g |
| CRM | C12 A 405/2 | 0.044 | 0.947 | 0.058  | 0.0095 | 0.90  | 0.102 | 0.206 | 0.022 | 0.411 | 0.330 | 100g |
| CRM | C12 A 406/2 | 0.173 | 0.342 | 0.043  | 0.0102 | 0.45  | 1.620 | 2.001 | 0.289 | 0.010 | 0.013 | 100g |
| CRM | C12 A 407/2 | 0.49  | 0.66  | 0.0105 | 0.038  | 0.20  | 0.527 | 3.300 | 0.397 | 0.190 | 0.040 | 100g |
| CRM | C12 A 408/2 | 0.289 | 0.237 | 0.03   | 0.056  | 0.56  | 4.130 | 0.111 | 0.694 | 0.067 | 0.154 | 100g |
| CRM | C12 A 409/2 | 0.086 | 1.18  | 0.0179 | 0.0141 | 0.56  | 3.020 | 1.318 | 0.205 | 0.008 | 0.094 | 100g |
| CRM | C12 A 410/2 | 0.428 | 1.1   | 0.041  | 0.074  | 0.419 | 2.07  | 1.684 | 0.436 | 0.44  | 0.046 | 100g |

# C1. Iron Base

## Steels

## Chippings

| 1.2.3 Low Alloy (continued) |        |       |        |       |       |       |       |       |       |       |            |          |           |         |      |  |
|-----------------------------|--------|-------|--------|-------|-------|-------|-------|-------|-------|-------|------------|----------|-----------|---------|------|--|
|                             | C      | Si    | S      | P     | Mn    | Ni    | Cr    | Cu    | V     | Ti    | Soluble Al | Total Al | Soluble B | Total B | Size |  |
| C12 CG 01322                | 0.0332 | 1.50  | 0.022  | 0.013 | 0.230 | 0.078 | 0.473 | 0.320 | 0.050 | 0.247 | 0.066      | 0.069    | 0.0061    | 0.0067  | 100g |  |
| C12 CG 01323                | 0.188  | 0.305 | 0.046  | 0.013 | 1.44  | 0.166 | 0.389 | 0.277 | 0.158 | 0.285 | 0.106      | 0.112    | 0.0018    | 0.0023  | 100g |  |
| C12 CG 01324                | 0.283  | 1.09  | 0.023  | 0.022 | 0.438 | 0.224 | 0.300 | 0.247 | 0.144 | 0.171 | 0.128      | 0.132    | 0.0041    | 0.0045  | 100g |  |
| C12 CG 01325                | 0.392  | 0.626 | 0.019  | 0.028 | 1.08  | 0.241 | 0.174 | 0.030 | 0.023 | 0.116 | 0.082      | 0.086    | 0.0037    | 0.0042  | 100g |  |
| C12 CG 01326                | 0.506  | 1.96  | 0.012  | 0.034 | 0.755 | 0.314 | 0.102 | 0.126 | 0.241 | 0.76  | 0.197      | 0.201    | 0.0016    | 0.0019  | 100g |  |
| C12 CG 01327                | 0.569  | 0.204 | 0.0038 | 0.038 | 1.90  | 0.413 | 0.018 | 0.116 | 0.283 | 0.064 | 0.276      | 0.279    | 0.0007    | 0.0010  | 100g |  |

| 1.2.4 Calcium Treated Steel |       |       |        |        |      |        |        |       |       |       |       |        |         |         |         |        |      |
|-----------------------------|-------|-------|--------|--------|------|--------|--------|-------|-------|-------|-------|--------|---------|---------|---------|--------|------|
|                             | C     | Si    | S      | P      | Mn   | Ni     | Cr     | Cu    | Al    | V     | Ti    | N      | Mo      | Co      | Sn      | Ca     | Size |
| C12 M BSCSN-2C              | 0.469 | 0.17  | 0.0305 | 0.012  | 0.60 | 0.071  | 0.072  | 0.073 | 0.046 | 0.004 | 0.002 | 0.0173 | (0.006) | (0.006) | (0.006) | 0.0033 | 100g |
| CRM C12 A E096-2(C)         | 0.105 | 0.262 | 0.0016 | 0.0128 | 1.32 | 0.0253 | 0.0243 | ...   | 0.046 | ...   | ...   | ...    | 0.002   | 0.017   | ...     | 0.002  | 100g |

| 1.2.5 Low-Alloy Structural Steels |       |       |        |        |       |       |       |       |       |         |       |         |        |         |        |        |      |
|-----------------------------------|-------|-------|--------|--------|-------|-------|-------|-------|-------|---------|-------|---------|--------|---------|--------|--------|------|
|                                   | C     | Si    | S      | P      | Mn    | Ni    | Cr    | Mo    | V     | Sn      | As    | Pb      | Sb     | Bi      | Cu     | N      | Size |
| C12 CG 01359                      | 0.285 | 0.236 | 0.012  | 0.030  | 0.315 | 0.102 | 2.37  | 1.27  | 0.351 | 0.0085  | 0.024 | 0.00029 | 0.0058 | 0.00005 | ...    | ...    | 100g |
| C12 CG 01360                      | 0.282 | 0.265 | 0.016  | 0.024  | 0.466 | 0.248 | 1.62  | 1.09  | 0.252 | 0.030   | 0.019 | 0.0015  | 0.0058 | 0.0002  | ...    | ...    | 100g |
| C12 CG 01361                      | 0.318 | 0.033 | 0.025  | 0.034  | 0.348 | 0.204 | 1.93  | 1.19  | 0.301 | 0.014   | 0.037 | 0.0037  | 0.0086 | 0.0022  | ...    | ...    | 100g |
| C12 CG 01362                      | 0.244 | 0.400 | 0.050  | 0.017  | 0.505 | 0.292 | 1.50  | 0.987 | 0.193 | 0.033   | 0.042 | 0.036   | 0.0084 | 0.0027  | ...    | ...    | 100g |
| C12 CG 01363                      | 0.325 | 0.179 | 0.0080 | 0.040  | 0.264 | 0.059 | 2.51  | 1.47  | 0.164 | 0.016   | 0.019 | 0.0056  | 0.0047 | 0.0052  | ...    | ...    | 100g |
| CRM C12 A E195-1(C)               | 0.756 | 0.466 | 0.0121 | 0.0160 | 0.571 | 0.327 | 1.566 | 0.768 | 0.312 | (0.002) | ...   | ...     | ...    | ...     | 0.0355 | 0.0100 | 100g |
| CRM C12 A E276-2(C)               | 0.399 | 1.034 | 0.0189 | 0.0093 | 0.365 | 0.203 | 4.975 | 1.134 | 0.296 | 0.0133  | ...   | ...     | ...    | ...     | 0.183  | 0.0116 | 100g |

# C1. Iron Base

## Stainless Steels

## Chippings

| 1.3.2 Austenitic Stainless Steels |        |       |          |        |       |       |        |       |        |         |             |          |        |        |          |                   |      |
|-----------------------------------|--------|-------|----------|--------|-------|-------|--------|-------|--------|---------|-------------|----------|--------|--------|----------|-------------------|------|
|                                   | C      | Si    | S        | P      | Mn    | Ni    | Cr     | Mo    | Cu     | Co      | Al          | Nb       | Ti     | B      | N        | Others            | Size |
| C13 X 125340A                     | 0.10   | 0.78  | 0.017    | 0.033  | 0.71  | 8.12  | 17.90  | 2.02  | 0.10   | 0.04    | 0.02        | ...      | 0.35   | ...    | ...      | ...               | 100g |
| C13 X 125370A                     | 0.05   | 0.99  | 0.030    | 0.097  | 0.91  | 9.98  | 19.8   | 2.99  | 0.05   | 0.11    | 0.06        | ...      | 0.54   | ...    | ...      | ...               | 100g |
| C13 X 170020A                     | 0.11   | 0.48  | 0.024    | 0.038  | 1.09  | 8.12  | 17.7   | 0.21  | 0.06   | 0.08    | ...         | 0.46     | ...    | 0.016  | ...      | ...               | 100g |
| C13 X 170050A                     | 0.030  | 1.64  | 0.052    | 0.015  | 0.40  | 20.0  | 24.72  | 0.48  | 0.11   | 0.03    | ...         | 0.12     | ...    | 0.002  | ...      | ...               | 100g |
| CRM C13 A 332                     | 0.063  | 0.44  | 0.02     | 0.015  | 0.8   | 12.45 | 12.8   | ...   | (0.1)  | (0.037) | ...         | ...      | ...    | ...    | ...      | ...               | 100g |
| CRM C13 A 461/1                   | 0.0103 | 0.37  | 0.0051   | 0.0053 | 0.686 | 6.124 | 14.727 | 0.01  | 0.0091 | (0.004) | ...         | ...      | ...    | ...    | ...      | ...               | 100g |
| CRM C13 A 462/1                   | 0.0345 | 0.46  | 0.0041   | 0.0053 | 0.722 | 12.85 | 11.888 | 0.03  | 0.0112 | ...     | ...         | ...      | ...    | ...    | ...      | ...               | 100g |
| CRM C13 A 463/1                   | 0.019  | 0.27  | 0.019    | 0.025  | 1.4   | 10.2  | 18.46  | 0.27  | 0.276  | 0.116   | ...         | ...      | <0.005 | 0.0022 | 0.063    | ...               | 100g |
| CRM C13 A 464/1                   | 0.086  | 0.57  | 0.028    | 0.02   | 0.791 | 20.05 | 25.39  | ...   | ...    | 0.054   | ...         | ...      | ...    | ...    | ...      | Pb 0.0004         | 100g |
| CRM C13 A 465/1                   | 0.066  | 0.41  | 0.012    | 0.021  | 1.38  | 9.24  | 17.31  | 0.09  | 0.098  | 0.053   | 0.026       | ...      | 0.4    | 0.0006 | 0.01     | V 0.102           | 100g |
| CRM C13 A 467/1                   | 0.082  | 0.52  | 0.019    | 0.018  | 0.788 | 9.21  | 18.09  | ...   | ...    | ...     | ...         | 0.99     | ...    | ...    | ...      | ...               | 100g |
| CRM C13 A 468/1                   | 0.143  | 1.41  | 0.02     | 0.014  | 1.7   | 8.9   | 17.96  | ...   | ...    | 0.018   | ...         | ...      | ...    | ...    | ...      | ...               | 100g |
| CRM C13 A 474                     | 0.022  | 0.17  | 0.02     | 0.008  | 1.7   | 14.74 | 19.06  | 3.550 | 0.35   | (0.02)  | ...         | ...      | ...    | ...    | ...      | V 0.30            | 100g |
| CRM C13 A 475                     | 0.05   | 0.21  | 0.008    | 0.037  | 0.89  | 5.66  | 14.14  | 1.590 | 1.94   | 0.22    | ...         | 0.22     | ...    | ...    | ...      | Sn 0.015          | 100g |
| CRM C13 E 24A                     | 0.048  | 0.510 | 0.020    | 0.035  | 1.53  | 11.12 | 17.37  | 2.47  | 0.32   | (0.16)  | ...         | ...      | ...    | ...    | (0.036)  | ...               | 100g |
| CRM C13 E 98                      | 0.050  | 0.26  | 0.016    | 0.042  | 1.88  | 11.01 | 16.75  | 1.92  | 0.292  | 0.125   | 0.070 (sol) | ...      | 0.41   | ...    | 0.0112   | Sn 0.019, V 0.053 | 100g |
| C13 X 180030A                     | 0.12   | 0.79  | 0.030    | 0.050  | 1.10  | 10.0  | 19.8   | 0.40  | 0.07   | 0.11    | ...         | 1.00     | ...    | ...    | ...      | ...               | 100g |
| C13 X 180040A                     | 0.09   | 1.30  | 0.017    | 0.077  | 1.53  | 11.98 | 21.84  | 0.60  | 0.02   | 0.16    | ...         | 0.78     | ...    | ...    | ...      | ...               | 100g |
| C13 X 190020A                     | 0.07   | 0.76  | 0.053    | 0.031  | 1.05  | 9.18  | 17.1   | 1.99  | 0.105  | ...     | ...         | 0.07     | ...    | ...    | ...      | ...               | 100g |
| C13 X 190030A                     | 0.09   | 0.59  | 0.029    | 0.063  | 1.60  | 13.1  | 18.9   | 2.50  | 0.08   | ...     | ...         | 0.11     | ...    | ...    | ...      | ...               | 100g |
| CRM C13 S 651-14                  | 0.046  | 0.67  | 0.0058   | 0.027  | 1.19  | 9.03  | 18.26  | 0.11  | 0.12   | 0.17    | (0.002)     | ...      | ...    | ...    | (0.0426) | ...               | 150g |
| CRM C13 S 652-14                  | 0.044  | 0.61  | 0.0020   | 0.032  | 1.34  | 10.62 | 16.86  | 2.07  | 0.086  | 0.20    | (0.003)     | ...      | ...    | ...    | 0.0239   | ...               | 150g |
| CRM C13 S 654-10                  | 0.042  | 0.82  | 0.0007   | 0.015  | 0.97  | 19.12 | 24.87  | 0.039 | 0.038  | 0.16    | 0.017       | ...      | ...    | ...    | 0.0393   | ...               | 150g |
| CRM C13 S 655-10                  | 0.045  | 0.63  | (0.0005) | 0.024  | 0.96  | 9.75  | 17.53  | 0.033 | 0.045  | (0.073) | (0.003)     | 0.49     | ...    | ...    | 0.0072   | ...               | 150g |
| CRM C13 DB E237-1                 | 0.068  | 0.482 | 0.012    | 0.032  | 1.443 | 10.32 | 17.24  | 0.306 | 0.123  | 0.221   | ...         | 0.660    | ...    | ...    | 0.035    | V 0.057           | 100g |
| CRM C13 DB E284-2(C)              | 0.0201 | 0.537 | 0.0237   | 0.0258 | 1.745 | 10.72 | 16.811 | 2.111 | 0.1831 | 0.0525  | 0.0027      | (0.0028) | 0.191  | 0.0026 | 0.0151   | V 0.0425          | 100g |

| 1.3.3 Maraging Steels |       |       |        |        |       |      |       |       |      |        |       |       |       |       |        |        |      |
|-----------------------|-------|-------|--------|--------|-------|------|-------|-------|------|--------|-------|-------|-------|-------|--------|--------|------|
|                       | C     | Si    | S      | P      | Mn    | Ni   | Cr    | Mo    | Co   | Al     | Ti    | Sn    | Cu    | Zr    | B      | N      | Size |
| C13 X 149330A         | 0.017 | 0.05  | 0.016  | 0.02   | 0.15  | 16.9 | 0.04  | 3.97  | 10.9 | 0.002  | 0.04  | ...   | ...   | ...   | ...    | ...    | 50g  |
| C13 X 149350A         | 0.02  | 0.31  | 0.049  | 0.036  | 0.42  | 18.9 | 0.01  | 5.55  | 7.07 | 0.22   | 0.89  | ...   | ...   | ...   | ...    | ...    | 50g  |
| CRM C13 A E285-2(C)   | 0.002 | 0.012 | 0.0025 | 0.0053 | 0.017 | 18.7 | 0.024 | 4.987 | 7.76 | 0.1067 | 0.520 | 0.001 | 0.009 | 0.005 | 0.0008 | 0.0007 | 100g |

# C1. Iron Base

# Stainless Steels

# Chippings

## 1.3.4 Martensitic Stainless Steels

|                   | C      | Si    | S        | P      | Mn    | Ni     | Cr    | Mo    | Cu     | Co     | Nb     | Nb+Ta | Al      | V     | N      | B        | Size         |
|-------------------|--------|-------|----------|--------|-------|--------|-------|-------|--------|--------|--------|-------|---------|-------|--------|----------|--------------|
| C13 X 147750A     | 0.13   | 0.59  | 0.074    | 0.060  | 1.47  | 1.79   | 17.84 | 0.51  | 0.22   | 0.16   | 0.72   | ...   | ...     | ...   | ...    | ...      | 100g         |
| C13 X 150230A     | 0.15   | 0.23  | 0.020    | 0.020  | 1.56  | 1.49   | 10.59 | 1.08  | 0.08   | 0.21   | ...    | 1.15  | ...     | ...   | ...    | ...      | 100g         |
| C13 X 150240A     | 0.20   | 0.77  | 0.035    | 0.042  | 0.66  | 3.00   | 14.9  | 0.26  | 0.36   | 0.10   | 0.17   | ...   | ...     | ...   | ...    | ...      | 100g         |
| C13 CG 01602      | 0.089  | 0.46  | 0.015    | 0.023  | 0.92  | 0.538  | 10.49 | 0.79  | 0.084  | 6.20   | 0.35   | ...   | ...     | 0.216 | 0.018  | 0.009    | 150g         |
| C13 CG 01603      | 0.099  | 0.29  | 0.024    | 0.027  | 0.71  | 2.53   | 11.81 | 1.76  | 0.084  | ...    | ...    | ...   | ...     | 0.36  | 0.021  | ...      | 150g         |
| CRM C13 E 22      | 0.628  | 0.449 | 0.009    | 0.029  | 0.804 | 0.143  | 16.21 | ...   | 0.050  | ...    | ...    | ...   | ...     | ...   | 0.008  | ...      | 100g         |
| CRM C13 E 26      | 0.201  | 0.306 | 0.012    | 0.022  | 0.713 | 0.413  | 13.69 | 0.070 | 0.029  | ...    | ...    | ...   | ...     | ...   | ...    | ...      | 100g         |
| CRM C13 HY CH26   | 0.061  | 1.38  | 0.017    | 0.026  | 1.10  | ...    | 23.5  | ...   | (0.18) | ...    | (0.04) | ...   | 1.53    | ...   | ...    | ...      | 100g         |
| CRM C13 A E296-1C | 0.1166 | 0.242 | 0.0026   | 0.0178 | 0.676 | 2.790  | 11.82 | 1.700 | 0.1498 | 0.0218 | ...    | ...   | ...     | 0.363 | 0.0214 | (0.0003) | As, Sn 100g  |
| CRM C13 A 339     | 0.29   | 0.36  | 0.022    | 0.022  | 0.41  | 0.37   | 12.4  | ...   | (0.08) | ...    | ...    | ...   | ...     | ...   | ...    | ...      | 100g         |
| CRM C13 A 340     | 0.18   | 0.35  | 0.02     | 0.024  | 0.38  | 0.4    | 16.35 | ...   | (0.06) | ...    | ...    | ...   | ...     | ...   | ...    | ...      | 100g         |
| CRM C13 A 341     | 0.1    | 0.31  | 0.024    | 0.016  | 0.43  | 0.56   | 24.0  | ...   | (0.1)  | ...    | ...    | ...   | ...     | ...   | ...    | ...      | 100g         |
| CRM C13 A 342     | 0.18   | 0.92  | 0.026    | 0.03   | 0.91  | 2.16   | 16.15 | 0.690 | (0.08) | ...    | ...    | ...   | ...     | ...   | ...    | ...      | 100g         |
| CRM C13 A 469     | 0.279  | 0.421 | 0.02     | 0.015  | 0.598 | 0.246  | 11.93 | ...   | (0.02) | (0.01) | ...    | ...   | ...     | ...   | ...    | ...      | 100g         |
| CRM C13 A 470     | 0.153  | 0.335 | 0.035    | 0.024  | 0.235 | 0.369  | 17.68 | ...   | (0.02) | (0.02) | ...    | ...   | ...     | ...   | ...    | ...      | 100g         |
| CRM C13 A 471     | 0.095  | 0.326 | 0.023    | 0.018  | 0.417 | 0.96   | 23.85 | ...   | (0.02) | (0.02) | ...    | ...   | ...     | ...   | ...    | ...      | 100g         |
| CRM C13 A 472     | 0.227  | 1.05  | 0.029    | 0.032  | 1.02  | 1.95   | 15.82 | 0.661 | (0.02) | (0.02) | ...    | ...   | ...     | ...   | ...    | ...      | 100g         |
| CRM C13 A 473     | 0.172  | 0.604 | 0.03     | 0.019  | 0.494 | (0.06) | 9.06  | 0.950 | (0.03) | (0.01) | ...    | ...   | ...     | ...   | ...    | ...      | 100g         |
| CRM C13 S 670-3   | 0.008  | 0.55  | (0.0005) | 0.020  | 0.53  | 0.21   | 11.23 | 0.020 | 0.044  | ...    | ...    | ...   | (0.055) | ...   | 0.0064 | ...      | Ti 0.26 150g |
| CRM C13 DB E226-1 | 0.416  | 0.514 | 0.0094   | 0.0207 | 0.434 | 0.139  | 13.67 | 0.024 | ...    | ...    | ...    | ...   | ...     | 0.022 | 0.0362 | ...      | 100g         |

## 1.3.5 Special Stainless

|                     | C      | Si    | S        | P      | Mn    | Ni    | Cr    | Mo     | Cu     | Co     | Al       | As      | Sn       | V       | N       | Others            | Size |
|---------------------|--------|-------|----------|--------|-------|-------|-------|--------|--------|--------|----------|---------|----------|---------|---------|-------------------|------|
| C13 X 125380A       | 0.05   | 0.52  | 0.039    | 0.042  | 0.61  | 6.03  | 25.6  | 2.02   | 2.97   | ...    | ...      | ...     | ...      | ...     | ...     | ...               | 50g  |
| C13 X 142110A       | 0.08   | 1.72  | 0.016    | 0.006  | 0.70  | 12.4  | 26.05 | 0.30   | 0.31   | 0.08   | ...      | ...     | ...      | ...     | ...     | Nb 0.18, W 3.29   | 50g  |
| CRM C13 A E295-1C   | 0.0166 | 0.418 | 0.0003   | 0.0167 | 1.758 | 24.40 | 19.51 | 3.996  | 1.481  | 0.0450 | 0.0203   | 0.0041  | 0.0025   | 0.0456  | 0.0615  | B 0.0018          | 100g |
| CRM C13 A E281-1    | 0.048  | 0.929 | 0.016    | 0.012  | 0.786 | 9.37  | 18.17 | ...    | 0.076  | 0.023  | 0.015    | (0.015) | 0.009    | ...     | 0.023   | B, Pb, Ti         | 100g |
| CRM C13 A E287-1(C) | 0.016  | 0.569 | 0.0014   | 0.027  | 1.48  | 10.35 | 18.61 | 0.247  | 0.203  | 0.148  | ...      | ...     | ...      | ...     | 0.019   | B                 | 100g |
| CRM C13 A E292-1(C) | 0.0367 | 0.402 | 0.0055   | 0.0175 | 1.744 | 10.09 | 18.00 | 0.0464 | 0.0391 | 0.0255 | (0.002)  | (0.008) | ...      | ...     | 0.0640  | Nb 0.571          | 100g |
| CRM C13 TI E276-1   | 0.364  | 0.985 | 0.011    | 0.012  | 0.368 | 0.178 | 5.29  | 1.47   | 0.083  | ...    | ...      | ...     | ...      | 0.541   | 0.0207  | ...               | 100g |
| CRM C13 TI E279-2   | 0.088  | 0.516 | ...      | ...    | 0.258 | 1.603 | 15.64 | ...    | 0.107  | ...    | ...      | ...     | ...      | ...     | (0.043) | ...               | 100g |
| CRM C13 TI E282-1   | 0.086  | 0.734 | 0.0042   | 0.019  | 1.64  | 10.86 | 16.72 | 2.19   | 0.109  | ...    | ...      | ...     | ...      | (0.031) | ...     | Ti 0.488          | 100g |
| CRM C13 DB E278-1   | 0.903  | 0.336 | 0.0052   | 0.0154 | 0.405 | 0.236 | 18.11 | 1.040  | 0.077  | ...    | ...      | ...     | ...      | 0.077   | ...     | ...               | 100g |
| CRM C13 DB E283-1   | 1.219  | 0.345 | 0.029    | 0.022  | 0.217 | ...   | 4.15  | 3.41   | ...    | 10.27  | 0.010    | ...     | ...      | 3.28    | 0.033   | B 0.003, W 9.66   | 100g |
| CRM C13 DB E286-1   | 0.100  | ...   | 0.280    | 0.026  | 1.92  | 8.54  | 18.13 | 0.329  | ...    | 0.150  | (0.0023) | ...     | 0.0084   | ...     | 0.043   | Sb 0.0014         | 100g |
| CRM C13 DB E288-1   | 2.08   | 0.260 | (0.0012) | 0.024  | 0.292 | 0.298 | 12.00 | 0.103  | 0.060  | 0.018  | 0.012    | (0.006) | (0.0043) | 0.055   | 0.151   | Ti 0.020          | 100g |
| CRM C13 DB E289-1   | 0.0489 | 0.531 | 0.0027   | 0.0114 | 1.016 | 24.68 | 14.63 | 1.102  | ...    | 0.065  | 0.199    | (0.006) | 0.111    | 0.260   | ...     | B 0.0044, Ti 2.01 | 100g |
| CRM C13 DB E290-1   | 0.911  | 0.072 | 0.0160   | 0.0160 | 0.244 | 0.329 | 4.18  | 4.83   | 0.081  | 5.12   | ...      | ...     | ...      | 1.91    | 0.0325  | W 6.27            | 100g |
| CRM C13 DB E291-1   | 0.903  | 0.907 | 0.0087   | 0.0168 | 0.808 | 0.563 | 17.10 | 2.10   | 0.0711 | 0.0233 | 0.0030   | ...     | ...      | 0.388   | 0.1142  | ...               | 100g |
| CRM C13 DB E327-2   | 0.152  | 2.052 | 0.0046   | 0.0228 | 1.289 | 19.72 | 24.35 | 0.174  | 0.060  | 0.159  | 0.070    | ...     | ...      | 0.044   | 0.059   | ...               | 100g |

## 1.3.6 Precipitation Hardening

|                  | C     | Si    | S     | P     | Mn   | Ni   | Cr    | Mo    | Cu   | Nb    | Nb+Ta | Co    | As    | N     | Typical Alloy Type | Size |
|------------------|-------|-------|-------|-------|------|------|-------|-------|------|-------|-------|-------|-------|-------|--------------------|------|
| CRM C13 X PH 10M | 0.107 | 0.236 | 0.031 | 0.053 | 1.49 | 5.21 | 16.17 | 0.172 | 3.11 | 0.071 | ...   | 0.004 | 0.003 | 0.238 | ...                | 100g |
| C13 X PH 20A     | 0.08  | 0.47  | 0.045 | 0.058 | 1.24 | 3.6  | 16.88 | 1.00  | 3.97 | 0.17  | ...   | ...   | ...   | 0.035 | 17/4 PH            | 100g |
| C13 X PH 40A     | 0.047 | 0.75  | 0.051 | 0.033 | 0.87 | 4.07 | 15.00 | 0.26  | 5.55 | ...   | 0.39  | ...   | ...   | 0.092 | ...                | 100g |
| C13 X PH 70A     | 0.16  | 1.28  | 0.029 | 0.017 | 1.44 | 5.65 | 14.1  | 2.56  | 0.82 | ...   | 0.28  | ...   | ...   | 0.094 | FV520              | 100g |

## 1.3.7 High Nitrogen

|                   | C      | Si    | S      | P      | Mn    | Ni     | Cr     | Mo     | Cu    | Co    | V      | W    | Nb     | Nb+Ta | Al    | N      | Size |
|-------------------|--------|-------|--------|--------|-------|--------|--------|--------|-------|-------|--------|------|--------|-------|-------|--------|------|
| CRM C13 X NSA 20B | 0.094  | 0.506 | 0.010  | ...    | 0.51  | 9.97   | 16.89  | 1.74   | ...   | ...   | ...    | ...  | ...    | ...   | ...   | 0.126  | 40g  |
| CRM C13 X NSB 30B | 0.178  | 0.63  | 0.009  | ...    | 0.50  | 9.92   | 16.8   | 0.51   | ...   | ...   | ...    | ...  | ...    | ...   | ...   | 0.264  | 40g  |
| C13 X NSC 30A     | 0.71   | 1.19  | ...    | ...    | 9.5   | 3.34   | 24.8   | ...    | ...   | ...   | ...    | ...  | ...    | 2.4   | ...   | 0.62   | 40g  |
| CRM C13 X NSC 40B | 0.565  | 1.95  | 0.0115 | ...    | 8.78  | 7.05   | 32.20  | 0.98   | 0.17  | 0.195 | 0.19   | 0.17 | 1.95   | ...   | ...   | 0.86   | 40g  |
| CRM C13 X NSC 50A | 0.493  | 1.153 | 0.0095 | ...    | 2.49  | 4.16   | 22.46  | 0.0018 | 0.745 | ...   | 0.026  | ...  | 2.31   | ...   | 0.315 | 0.257  | 40g  |
| CRM C13 X NSD 10A | 0.077  | 0.559 | 0.0067 | ...    | 22.59 | 0.100  | 24.97  | 1.10   | 0.023 | ...   | ...    | ...  | ...    | ...   | ...   | 1.09   | 40g  |
| CRM C13 X NSD 20A | 0.253  | 1.50  | 0.0027 | ...    | 17.01 | 0.104  | 23.94  | 1.06   | 0.054 | ...   | ...    | ...  | ...    | ...   | ...   | 0.801  | 40g  |
| CRM C13 JN 500 HA | 0.0413 | 0.720 | 0.012  | 0.0244 | 1.541 | 10.996 | 16.927 | 2.732  | 0.182 | 0.139 | 0.074  | ...  | 0.0227 | ...   | ...   | 0.1154 | 150g |
| CRM C13 JN 501 HA | 0.0138 | 0.676 | 0.0028 | 0.0196 | 0.858 | 17.69  | 19.79  | 6.139  | 0.761 | 0.159 | 0.0437 | ...  | 0.0073 | ...   | ...   | 0.2243 | 150g |

| 1.4.1 Tool Steel                    |        |        |          |        |        |        |        |         |        |         |         |           | Soluble |         | Typical Alloy Type |                    | Size   |     |      |
|-------------------------------------|--------|--------|----------|--------|--------|--------|--------|---------|--------|---------|---------|-----------|---------|---------|--------------------|--------------------|--------|-----|------|
|                                     | C      | Si     | S        | P      | Mn     | Ni     | Cr     | Mo      | Cu     | Co      | W       | V         | Al      | N       |                    |                    |        |     |      |
| CRM C14 E 67                        | 1.27   | 0.26   | 0.007    | 0.036  | 0.256  | 0.32   | 4.33   | 4.39    | 0.092  | 9.79    | 8.03    | 2.58      | ...     | ...     | Co/Mo/W            | 100g               |        |     |      |
| CRM C14 E 50                        | 0.916  | 0.326  | 0.015    | 0.031  | 0.28   | 0.33   | 4.49   | 5.54    | 0.091  | 0.26    | 6.4     | 2.0       | ...     | ...     | AISI M2            | 120g               |        |     |      |
| CRM C14 E 114                       | 0.388  | 1.02   | 0.0023   | 0.021  | 0.361  | 0.165  | 5.20   | 1.29    | 0.064  | 0.018   | 0.174   | 0.89      | 0.028   | ...     |                    | 100g               |        |     |      |
| CRM C14 S 603-8                     | 0.30   | 0.32   | 0.012    | 0.012  | 0.31   | 0.084  | 2.23   | 0.13    | 0.055  | ...     | 5.47    | 0.46      | ...     | 0.0250  |                    | 150g               |        |     |      |
| 1.4.2 High Speed Steel              |        |        |          |        |        |        |        |         |        |         |         |           |         |         |                    |                    |        |     |      |
|                                     | C      | Si     | S        | P      | Mn     | Ni     | Cr     | Mo      | Cu     | Co      | W       | V         | Sn      | N       | Others             | Size               |        |     |      |
| C14 X HS 10A                        | 0.79   | 0.195  | 0.022    | 0.02   | 0.29   | 0.1    | 3.93   | 1.11    | 0.05   | 0.51    | 16.8    | 0.9       | ...     | ...     |                    | 100g               |        |     |      |
| C14 X HS 20A                        | 0.9    | 0.41   | 0.04     | 0.037  | 0.38   | 0.07   | 3.79   | 0.86    | 0.04   | 5.02    | 18.11   | 1.01      | ...     | ...     |                    | 100g               |        |     |      |
| C14 X HS 30A                        | 0.84   | 0.58   | 0.02     | 0.019  | 0.59   | 0.33   | 4.65   | 1.06    | 0.04   | 10.1    | 19.1    | 1.17      | ...     | ...     |                    | 100g               |        |     |      |
| C14 X HS 40A                        | 0.99   | 0.11   | 0.012    | 0.01   | 0.13   | 0.05   | 3.71   | 0.42    | 0.03   | 2.04    | 9.83    | 0.47      | ...     | ...     |                    | 100g               |        |     |      |
| C14 X HS 50A                        | 0.59   | 0.3    | 0.022    | 0.017  | 0.29   | 0.14   | 3.4    | 3.54    | 0.13   | 8.02    | 6.0     | 1.37      | ...     | ...     |                    | 100g               |        |     |      |
| C14 X HS 60A                        | 0.7    | 0.16   | 0.032    | 0.029  | 0.17   | 0.06   | 3.94   | 5.47    | 0.08   | 0.28    | 6.63    | 1.95      | ...     | ...     |                    | 100g               |        |     |      |
| C14 X HS 80A                        | 0.97   | 0.13   | 0.022    | 0.02   | 0.29   | 0.17   | 3.58   | 9.47    | 0.09   | 9.04    | 1.81    | 1.2       | ...     | ...     |                    | 100g               |        |     |      |
| CRM C14 S 606-8                     | 0.76   | 0.28   | 0.0008   | 0.016  | 0.31   | 0.065  | 4.00   | 0.58    | 0.027  | 0.12    | 17.16   | 0.83      | ...     | 0.0290  |                    | 150g               |        |     |      |
| CRM C14 S 607-8                     | 0.78   | 0.30   | 0.0031   | 0.026  | 0.35   | 0.052  | 3.97   | 0.54    | 0.025  | 4.59    | 17.48   | 0.84      | ...     | 0.0270  |                    | 150g               |        |     |      |
| CRM C14 S 608-8                     | 0.80   | 0.36   | 0.0028   | 0.025  | 0.33   | 0.044  | 3.99   | 0.41    | 0.017  | 9.09    | 17.03   | 0.99      | ...     | 0.0320  |                    | 150g               |        |     |      |
| CRM C14 S 609-9                     | 0.92   | 0.32   | (0.0007) | 0.026  | 0.30   | 0.16   | 4.01   | 4.84    | 0.048  | 4.66    | 6.11    | 1.85      | ...     | 0.0248  |                    | 150g               |        |     |      |
| CRM C14 S 610-9                     | 1.24   | 0.30   | 0.0029   | 0.018  | 0.32   | 0.100  | 4.04   | 3.06    | 0.040  | 9.61    | 9.07    | 3.26      | ...     | 0.0354  |                    | 150g               |        |     |      |
| CRM C14 DB E227-1                   | 0.95   | 0.272  | 0.022    | 0.016  | 0.236  | 0.114  | 4.25   | 2.64    | 0.124  | ...     | 3.03    | 2.44      | ...     | 0.040   |                    | 100g               |        |     |      |
| CRM C14 A 481/1                     | 3.91   | 2.29   | 0.004    | 0.019  | 0.448  | 1.19   | 0.063  | 0.011   | 0.15   | ...     | ...     | ...       | ...     | ...     | Al 0.023, As 0.010 | 100g               |        |     |      |
| CRM C14 A 482/1                     | 2.599  | 1.815  | 0.0491   | 0.0974 | 0.728  | 2.284  | 0.675  | 0.454   | 1.231  | ...     | ...     | ...       | ...     | ...     |                    | 100g               |        |     |      |
| CRM C14 A 483/1                     | 2.46   | 1.75   | 0.103    | 0.615  | 0.596  | ...    | 0.039  | ...     | ...    | ...     | ...     | ...       | 0.130   | ...     |                    | 100g               |        |     |      |
| CRM C14 A 484/1                     | 3.2    | 0.717  | 0.23     | 0.121  | 0.395  | ...    | 0.155  | ...     | ...    | ...     | ...     | ...       | ...     | ...     |                    | 100g               |        |     |      |
| CRM C14 A 220/2                     | 0.88   | 0.19   | 0.029    | 0.023  | 0.3    | 0.12   | 5.12   | 4.92    | 0.09   | 0.32    | 6.97    | 1.94      | 0.019   | ...     |                    | 100g               |        |     |      |
| CRM C14 A 241/2                     | 0.84   | 0.21   | 0.025    | 0.024  | 0.27   | 0.15   | 5.35   | 0.53    | 0.08   | 5.7     | 19.9    | 1.59      | 0.025   | ...     |                    | 100g               |        |     |      |
| 1.4.3 High Manganese Steel          |        |        |          |        |        |        |        |         |        |         |         |           |         |         |                    |                    |        |     |      |
|                                     | C      | Si     | S        | P      | Mn     | Ni     | Cr     | Mo      | Cu     | Al      | V       | Sn        | Co      | N       |                    | Size               |        |     |      |
| C14 X MN10A                         | 0.53   | 0.65   | 0.004    | 0.022  | 18.4   | 0.04   | 1.31   | 0.45    | 0.03   | 0.004   | 0.03    | 0.03      | ...     | ...     |                    | 50g                |        |     |      |
| C14 X MN30A                         | 1.06   | 1.4    | 0.013    | 0.061  | 10.7   | 0.35   | 0.59   | 0.27    | 0.24   | 0.002   | 0.04    | 0.02      | ...     | ...     |                    | 50g                |        |     |      |
| CRM C14 A 214/2                     | 0.39   | 0.18   | 0.043    | 0.032  | 1.61   | 0.15   | 0.09   | 0.26    | 0.21   | ...     | <0.01   | ...       | ...     | ...     |                    | 100g               |        |     |      |
| CRM C14 A 290/2                     | 1.15   | 0.34   | 0.019    | 0.042  | 12.5   | 0.29   | 0.16   | (0.031) | (0.17) | ...     | (0.02)  | ...       | (0.35)  | (0.013) |                    | 100g               |        |     |      |
| CRM C14 A 491                       | 0.92   | 0.9    | 0.012    | 0.026  | 16.1   | 0.05   | 1.45   | 0.6     | (0.04) | 0.042   | (0.06)  | ...       | ...     | ...     |                    | 100g               |        |     |      |
| CRM C14 A 494                       | 1.24   | 0.26   | 0.005    | 0.04   | 13.55  | 0.69   | 0.56   | 0.078   | (0.19) | 0.004   | (0.02)  | ...       | (0.43)  | ...     |                    | 100g               |        |     |      |
| CRM C14 A 495/1                     | 0.81   | 0.58   | 0.026    | 0.054  | 13.1   | 1.13   | 1.93   | 0.11    | ...    | 0.17    | (0.02)  | ...       | ...     | ...     |                    | 100g               |        |     |      |
| CRM C14 DB E235-1                   | 0.912  | 0.094  | 0.0072   | 0.045  | 12.73  | (0.08) | 0.354  | 0.032   | 0.073  | ...     | (0.012) | ...       | ...     | 0.020   |                    | 100g               |        |     |      |
| 1.4.4 Resulphurised and Lead Steels |        |        |          |        |        |        |        |         |        |         |         |           |         |         |                    |                    |        |     |      |
|                                     | C      | Si     | S        | P      | Mn     | Mo     | Ni     | Cr      | Cu     | Pb      | As      | Sn        | N       |         |                    | Size               |        |     |      |
| C14 X FM10A                         | 0.5    | 0.07   | 0.65     | 0.029  | 0.54   | 0.34   | ...    | ...     | ...    | ...     | ...     | ...       | ...     |         |                    | 100g               |        |     |      |
| C14 X FM20A                         | 0.1    | 0.14   | 0.134    | 0.053  | 1.37   | 0.06   | ...    | ...     | ...    | ...     | ...     | ...       | ...     |         |                    | 100g               |        |     |      |
| CRM C14 S 519-1                     | 0.39   | 0.25   | 0.022    | 0.012  | 0.7    | ...    | 0.056  | 0.12    | 0.105  | 0.097   | ...     | ...       | ...     |         |                    | 150g               |        |     |      |
| CRM C14 DB E039-2                   | 0.107  | 0.011  | 0.310    | 0.083  | 1.274  | ...    | 0.051  | 0.048   | 0.117  | 0.207   | 0.018   | 0.016     | 0.0113  |         |                    | 100g               |        |     |      |
| 1.4.9 Silicon Steels                |        |        |          |        |        |        |        |         |        |         |         |           |         |         |                    |                    |        |     |      |
|                                     | C      | S      | P        | Mn     | Si     | Ni     | Cr     | Cu      | Mo     | Soluble |         | Insoluble |         | Total   | Ca                 | As                 | Co     | N   | Size |
| C14 CG 01371                        | 0.079  | 0.025  | 0.026    | 0.313  | 2.39   | 0.222  | 0.392  | 0.408   | 0.004  | ...     | ...     | ...       | ...     | ...     | ...                | ...                | ...    | ... | 100g |
| C14 CG 01372                        | 0.057  | 0.02   | 0.012    | 0.225  | 3.36   | 0.316  | 0.259  | 0.314   | 0.0036 | 0.166   | 0.0019  | ...       | ...     | ...     | ...                | ...                | ...    | ... | 100g |
| C14 CG 01373                        | 0.034  | 0.019  | 0.007    | 0.127  | 4.38   | 0.415  | 0.164  | 0.118   | 0.0037 | 0.073   | 0.0018  | ...       | ...     | ...     | ...                | ...                | ...    | ... | 100g |
| C14 CG 01374                        | 0.162  | 0.03   | 0.036    | 0.346  | 0.998  | 0.103  | 0.471  | 0.213   | 0.0048 | 0.208   | 0.001   | ...       | ...     | ...     | ...                | ...                | ...    | ... | 100g |
| CRM C14 A 317                       | 0.028  | 0.023  | 0.015    | 0.085  | 3.49   | ...    | ...    | ...     | ...    | ...     | ...     | ...       | ...     | ...     | ...                | ...                | ...    | ... | 100g |
| CRM C14 A E186-1(C)                 | 0.61   | 0.035  | 0.022    | 0.87   | 1.72   | 0.19   | 0.218  | 0.281   | 0.048  | 0.014   | ...     | ...       | ...     | ...     | ...                | ...                | ...    | ... | 100g |
| C14 J E196-1(C)                     | 0.0039 | 0.0005 | 0.0076   | 0.365  | 1.908  | ...    | ...    | ...     | ...    | ...     | ...     | 0.201     | 0.0005  | ...     | ...                | ...                | 0.0020 | ... | 100g |
| CRM C14 HY CH28                     | 0.026  | 0.017  | 0.009    | 0.184  | 3.24   | 0.11   | 0.03   | 0.09    | ...    | ...     | ...     | ...       | ...     | ...     | ...                | ...                | ...    | ... | 100g |
| C14 M BS CE31                       | 0.074  | 0.0088 | 0.0074   | 0.19   | 3.67   | 0.27   | 0.17   | 0.26    | 0.003  | 0.19    | ...     | ...       | ...     | ...     | 0.0052             | 0.005              | ...    | ... | 100g |
| 1.4.10 Speciality Fe-base Alloys    |        |        |          |        |        |        |        |         |        |         |         |           |         |         |                    |                    |        |     |      |
|                                     | C      | S      | P        | Si     | Mn     | Cr     | Ni     | Cu      | Nb     | R.E.    | Al      | N         | Co      | Ti      | Ta                 | Typical Alloy Type | Size   |     |      |
| C14 CG 01651                        | 0.073  | 0.0053 | 0.0253   | 0.438  | 0.675  | 0.09   | 0.096  | 0.089   | 0.044  | 0.048   | 0.093   | 0.013     | ...     | ...     | ...                | Rare Earth Steel   | 150g   |     |      |
| C14 CG 01652                        | 0.069  | 0.0076 | 0.0135   | 0.715  | 0.991  | 0.228  | 0.071  | 0.075   | 0.076  | 0.018   | 0.123   | 0.014     | ...     | ...     | ...                | Rare Earth Steel   | 150g   |     |      |
| C14 CG 01653                        | 0.124  | 0.0045 | 0.0125   | 0.674  | 0.821  | 0.127  | 0.055  | 0.094   | 0.122  | 0.098   | 0.177   | ...       | ...     | ...     | ...                | Rare Earth Steel   | 150g   |     |      |
| CRM C14 A E376-1                    | 0.0256 | 0.0040 | ...      | 0.313  | 0.046  | ...    | 13.37  | 2.94    | 0.305  | ...     | 8.12    | ...       | 23.70   | 0.158   | (0.016)            | Alnico             | 100g   |     |      |
| CRM C14 A 383                       | 0.025  | 0.2    | ...      | ...    | (0.07) | ...    | (13.2) | (2.63)  | (0.51) | ...     | (7.7)   | ...       | (24.4)  | ...     | ...                | Alcomax III        | 100g   |     |      |
| CRM C14 A 398                       | 0.025  | 0.19   | ...      | 0.11   | 0.065  | ...    | 16.59  | 6.09    | 0.13   | ...     | 9.98    | ...       | 14.92   | 0.765   | ...                | Alnico HC          | 100g   |     |      |



| 2.2 Ni/Cr       |                | C       | Si     | S      | P        | Mn      | Cu     | Fe      | Cr      | Mo    | Co      | Ti     | Al      | Mg     | B        | Ni       | Typical Alloy Type | Size       |                    |                    |      |
|-----------------|----------------|---------|--------|--------|----------|---------|--------|---------|---------|-------|---------|--------|---------|--------|----------|----------|--------------------|------------|--------------------|--------------------|------|
|                 | C22 X 7530A    | 0.06    | 0.96   | ...    | ...      | 0.23    | 0.05   | 5.00    | 19.9    | 0.06  | 0.52    | 0.26   | 0.07    | 0.05   | ...      | ...      | Nimonic 75'        | 50g        |                    |                    |      |
|                 | C22 X 7550A    | 0.12    | 0.22   | ...    | ...      | 0.99    | 0.23   | 1.11    | 18.09   | 0.52  | 0.10    | 0.84   | 0.58    | <0.005 | ...      | ...      |                    | 50g        |                    |                    |      |
|                 | C22 X 8010A    | 0.12    | 0.22   | ...    | ...      | 0.50    | 0.22   | 0.66    | 21.88   | 0.20  | 0.52    | 2.81   | 1.03    | 0.008  | (0.0001) | ...      | Ag, Sn, Zr         | 50g        |                    |                    |      |
|                 | C22 X 8030A    | 0.03    | 1.09   | ...    | ...      | 0.21    | 0.08   | 1.88    | 17.7(2) | 0.50  | 1.99    | 1.81   | 1.84    | 0.001  | <0.001   | ...      | Ag, Sn, Zr         | 50g        |                    |                    |      |
|                 | C22 X 9030A    | 0.05    | 1.00   | ...    | ...      | 0.20    | 0.01   | 0.33    | 20.96   | 0.06  | 18.04   | 1.85   | 1.66    | <0.005 | 0.023    | ...      |                    | 50g        |                    |                    |      |
|                 | C22 X 9050A    | 0.20    | 0.21   | ...    | ...      | 0.97    | 0.22   | 1.09    | 18.10   | 0.51  | 20.99   | 2.75   | 1.01    | <0.005 | <0.001   | ...      |                    | 50g        |                    |                    |      |
|                 | C22 X 10530A   | 0.12    | 0.98   | ...    | ...      | 0.51    | 0.21   | 0.40    | 13.91   | 6.05  | 17.74   | 1.37   | 5.24    | 0.0007 | ...      | ...      |                    | 50g        |                    |                    |      |
|                 | C22 X 10550A   | 0.30    | 0.26   | ...    | ...      | <0.01   | <0.01  | 1.22    | 15.52   | 3.96  | 21.7    | 0.44   | 4.74    | 0.014  | ...      | ...      |                    | 50g        |                    |                    |      |
|                 | C22 X 90120A   | 0.10    | 0.25   | 0.022  | 0.015    | 0.52    | 0.14   | ...     | 13.76   | 4.49  | 0.38    | 2.01   | 0.13    | ...    | 0.008    | 41.1     |                    | 50g        |                    |                    |      |
|                 | C22 X 90130A   | 0.11    | 0.29   | 0.034  | 0.036    | 0.68    | 0.25   | ...     | 11.02   | 6.38  | 1.02    | 3.88   | 0.34    | ...    | 0.036    | 43.6     |                    | 50g        |                    |                    |      |
| CRM             | C22 A 310/1    | 0.068   | 0.46   | ...    | ...      | 0.35    | ...    | ...     | 19.45   | ...   | 17.0    | 2.43   | 1.06    | ...    | ...      | 58.6     |                    | 100g       |                    |                    |      |
| CRM             | C22 A 387/1    | 0.033   | 0.06   | 0.0028 | 0.0033   | 0.025   | 0.0076 | ...     | 11.35   | 5.83  | 0.02    | 3.00   | 0.24    | ...    | 0.017    | 41.2     |                    | 100g       |                    |                    |      |
| 2.3 Fe/Ni/Cr    |                | C       | Si     | S      | P        | Mn      | Cu     | Cr      | Mo      | Co    | Ti      | Al     | Ni      | Fe     |          |          |                    |            | Typical Alloy Type | Size               |      |
|                 | C23 X 80010A   | 0.11    | 0.22   | ...    | ...      | 1.05    | 0.07   | 22.9    | 0.52    | 0.98  | 0.44    | 0.38   | 30.1    | ...    |          |          |                    |            | Incoloy 800'       | 50g                |      |
|                 | C23 X 80030A   | 0.05    | 0.87   | ...    | ...      | 0.42    | 0.53   | 18.92   | 0.14    | 0.11  | 0.10    | 0.06   | 34.7    | ...    |          |          |                    |            |                    | 50g                |      |
|                 | C23 X DS 10A   | 0.13    | 2.38   | ...    | ...      | 1.65    | 0.04   | 17.7    | 0.04    | 0.99  | 0.04    | 0.04   | 34.6    | ...    |          |          |                    |            | Incoloy 800DS'     | 50g                |      |
|                 | C23 X DS 30A   | 0.04    | 1.43   | ...    | ...      | 0.67    | 0.62   | 19.87   | 0.62    | 0.11  | 0.34    | 0.01   | 39.66   | ...    |          |          |                    |            |                    | 50g                |      |
| CRM             | C23 S 680-3    | 0.051   | 0.44   | 0.0018 | (0.0009) | 0.95    | 0.20   | 20.96   | ...     | 0.40  | 0.42    | 0.51   | 32.80   | (43.2) |          |          |                    |            |                    | 150g               |      |
| 2.4 Ni/Cr/Co/Mo |                | C       | S      | Si     | Mn       | Cu      | Fe     | Cr      | Mo      | Co    | Ti      | Al     | Nb      | B      | V        | W        | Zr                 | P          | Others             | Size               |      |
|                 | C24 X 26310A   | 0.06    | 0.002  | 0.12   | 0.71     | 0.07    | 0.74   | 18.96   | 5.66    | 20.9  | 2.56    | 0.30   | ...     | 0.006  | ...      | ...      | ...                | ...        | ...                | 50g                |      |
|                 | C24 X 26350A   | 0.11    | 0.005  | 0.55   | 0.11     | 0.23    | 0.17   | 20.9    | 6.62    | 18.9  | 1.96    | 0.605  | ...     | <0.001 | ...      | ...      | ...                | ...        | ...                | 50g                |      |
|                 | C24 X WASP 10A | 0.02    | 0.002  | 0.56   | 0.11     | 0.07    | 0.58   | 17.82   | 6.20    | 14.9  | 3.68    | 1.65   | <0.01   | <0.001 | <0.01    | 0.02     | 0.03               | 0.009      |                    | 50g                |      |
| CRM             | C24 X WASP 30D | 0.118   | 0.026  | 0.208  | 0.542    | 0.735   | 0.96   | 20.84   | 1.96    | 13.77 | 5.52    | 2.99   | 0.163   | 0.0087 | 0.123    | 0.064    | 0.059              | 0.014      | Ni, Ta             | 50g                |      |
|                 | C24 X WASP 40A | 0.14    | 0.008  | 0.02   | 0.42     | 0.23    | 2.33   | 20.7(3) | 3.06    | 11.76 | 2.53    | 0.91   | 0.12    | 0.011  | 0.15     | 0.22     | 0.10               | <0.001     |                    | 50g                |      |
| CRM             | C24 X WASP 40C | 0.052   | (0.01) | 0.21   | 0.53     | (0.004) | 1.48   | 19.7    | 7.51    | 11.01 | 2.25    | 2.16   | 0.25    | 0.014  | 0.145    | 0.25     | 0.08               | <0.005     | Pb, Ni             | 50g                |      |
| 2.7 Ni/Cr/Mo/Co |                | C       | Si     | Mn     | Cu       | Fe      | Cr     | Mo      | Co      | Ti    | Al      |        |         |        |          |          |                    |            |                    | Typical Alloy Type | Size |
|                 | C27 X 141840A  | 0.29(5) | 0.39   | 0.41   | 0.09     | 0.57    | 21.0   | 10.2    | 10.3    | 0.07  | 0.05    |        |         |        |          |          |                    |            |                    | C242/ANC11         | 50g  |
| 2.8 Ni/Cr/Fe    |                | C       | Si     | S      | P        | Mn      | Cu     | Fe      | Cr      | Mo    | Co      | Ti     | Al      | Nb     | Ni       | B        | N                  | Others     | Size               |                    |      |
|                 | C28 X 60010A   | 0.06    | 0.85   | ...    | ...      | 0.14    | 1.08   | 5.98    | 16.75   | ...   | 0.98    | 0.60   | 0.02    | ...    | ...      | ...      | ...                |            | 50g                |                    |      |
|                 | C28 X 60020A   | 0.16    | 0.20   | ...    | ...      | 0.64    | 0.03   | 10.07   | 13.95   | ...   | 0.21    | 0.12   | 0.26    | ...    | ...      | ...      | ...                |            | 50g                |                    |      |
|                 | C28 X 62510A   | 0.02    | 0.27   | 0.004  | 0.003    | 0.08    | 0.03   | 2.19    | 19.9    | 10.36 | 0.02    | 0.01   | 0.003   | 2.93   | ...      | ...      | ...                |            | 50g                |                    |      |
| CRM             | C28 X 62510K   | 0.039   | 0.47   | 0.001  | (0.0014) | 0.17    | 0.051  | 3.12    | 20.5    | 9.88  | 0.022   | (0.01) | 0.16    | 2.70   | (62.3)   | 0.0047   | 0.211              |            | 50g                |                    |      |
| CRM             | C28 X 62520L   | 0.077   | 0.61   | 0.0039 | 0.010    | 0.28    | 0.145  | 4.14    | 21.5    | 8.77  | 0.20    | 0.027  | 0.21    | 3.39   | 59.9     | 0.014    | 0.32               | Sn, Bi, Ag | 50g                |                    |      |
|                 | C28 X 62530A   | 0.15    | 0.74   | 0.013  | 0.01     | 0.60    | 0.32   | 5.5     | 22.9    | 7.69  | 0.45    | 0.53   | 0.53    | 4.96   | ...      | ...      | ...                |            | 50g                |                    |      |
| CRM             | C28 X 62530M   | 0.124   | 1.26   | 0.013  | 0.02     | 0.54    | 0.30   | 5.41    | 21.90   | 7.86  | 0.39    | 0.044  | 0.32    | 4.25   | 56.67    | 0.023    | 0.35               | Sn, Bi     | 50g                |                    |      |
| CRM             | C28 X 62540K   | 0.037   | 0.53   | 0.0046 | 0.004    | 0.093   | 0.027  | 6.46    | 21.1    | 5.89  | 0.22    | 0.30   | 0.05    | 3.53   | (61.3)   | 0.0014   | 0.065              |            | 50g                |                    |      |
|                 | C28 X 71810A   | 0.05    | 0.24   | 0.011  | 0.005    | 0.10    | 0.02   | ...     | 21.16   | 2.23  | 0.01    | 0.21   | 0.17    | 4.34   | 49.7     | ...      | ...                |            | 50g                |                    |      |
| CRM             | C28 X 71810H   | 0.008   | 0.71   | 0.005  | (0.003)  | 0.108   | 0.013  | (19.5)  | 18.71   | 2.94  | 0.01    | 0.025  | (0.007) | 4.97   | 52.6     | 0.0010   | 0.233              | Sn, V      | 50g                |                    |      |
| CRM             | C28 X 71820L   | 0.035   | 0.47   | 0.0066 | 0.004    | 0.184   | 0.117  | 17.0    | 21.30   | 0.88  | 0.64    | 1.13   | 0.34    | 4.76   | 52.7     | (0.0010) | 0.033              | Ta, V, W   | 50g                |                    |      |
|                 | C28 X 71830A   | 0.19    | 0.38   | 0.05   | 0.026    | 0.47    | 0.35   | ...     | 17.78   | 3.31  | 1.00    | 1.40   | 1.77    | 5.44   | 54.8     | ...      | ...                |            | 50g                |                    |      |
| CRM             | C28 X 71830S   | 0.296   | 0.52   | 0.0023 | 0.003    | 0.36    | 0.26   | (19.6)  | 18.85   | 1.31  | 0.94    | 1.21   | 1.21    | 6.25   | 49.0     | 0.0016   | 0.037              | Ta, V, W   | 50g                |                    |      |
| CRM             | C28 X 71860H   | 0.007   | 0.65   | 0.014  | 0.016    | 0.253   | 0.091  | (16.5)  | 17.85   | 2.88  | 0.404   | 0.20   | 0.32    | 5.15   | 54.84    | 0.0047   | 0.077              | V          | 50g                |                    |      |
|                 | C28 X 75010A   | 0.10    | 0.60   | ...    | ...      | 1.52    | 0.52   | 5.08    | 16.82   | 0.51  | ...     | 2.31   | 0.98    | 1.46   | ...      | ...      | ...                |            | 50g                |                    |      |
|                 | C28 X 75030A   | 0.06    | 0.25   | ...    | ...      | 0.54    | 0.07   | 8.04    | 13.72   | 0.12  | ...     | 2.93   | 0.41    | 0.55   | ...      | ...      | ...                |            | 50g                |                    |      |
| CRM             | C28 A 351      | 0.025   | 0.14   | 0.0006 | (0.006)  | 0.037   | 0.016  | ...     | 18.12   | 3.06  | 0.136   | 1.06   | 0.55    | 5.2    | 53.1     | 0.0051   | ...                |            | 100g               |                    |      |
| CRM             | C28 S 683-2    | 0.049   | 0.39   | 0.0013 | (0.0008) | 0.32    | 0.051  | 9.66    | 15.82   | ...   | (0.011) | 0.013  | 0.12    | ...    | 73.43    | ...      | ...                |            | 150g               |                    |      |

# C2. Nickel Base

Chippings

| 2.1 Ni/Co/Cr/Al/Ti         |                | C                | Si    | Mn      | Cu      | Fe    | Cr     | Mo      | Co    | Ti     | Al     | V      | Ni      | W      | B                  | N                  | Typical Alloy Type | Size         |
|----------------------------|----------------|------------------|-------|---------|---------|-------|--------|---------|-------|--------|--------|--------|---------|--------|--------------------|--------------------|--------------------|--------------|
| CRM                        | C210 X 117750G | 0.024            | 0.36  | 0.127   | (0.008) | 1.02  | 10.42  | 3.19    | 14.83 | 5.76   | 7.0    | 0.47   | (56.6)  | ...    | ...                | (0.003)            | IN100              | 50g          |
| CRM                        | C210 RU N15/3  | 0.052            | 0.219 | 0.047   | 0.017   | 0.51  | 10.02  | 5.55    | 15.06 | 2.55   | 4.02   | 0.319  | ...     | 5.50   | 0.022              | ...                |                    | 250g         |
| 2.11 Ni/Cr/Al              |                | C                | Si    | Mn      | Cu      | Fe    | Cr     | Mo      | Co    | Ti     | Al     | Nb     | Zr      | B      | Ni                 | Typical Alloy Type | Size               |              |
|                            | C211 X 71310A  | 0.04             | 0.11  | 0.06    | 0.008   | 0.57  | 10.92  | 3.53    | 0.14  | 0.45   | 5.5    | 2.78   | 0.06    | <0.001 | ...                |                    | 50g                |              |
|                            | C211 X 71320A  | 0.16             | 0.51  | 0.27    | 0.13    | 0.39  | 12.9   | 5.50    | 1.04  | 1.13   | 6.59   | 1.64   | 0.18    | 0.016  | ...                | N 713              | 50g                |              |
| CRM                        | C211 A 350     | 0.138            | 0.11  | 0.019   | ...     | ...   | 13.43  | 4.29    | 0.338 | 0.87   | 5.97   | 2.17   | ...     | 0.013  | 70.8               | Inconel 713'       | 100g               |              |
| 2.12 Ni/Cu                 |                | C                | Si    | S       | Mn      | Fe    | Cr     | Pb      | Co    | Ti     | Al     | Mg     | Ni      | Cu     | Typical Alloy Type | Size               |                    |              |
|                            | C212 X 40010A  | 0.10             | 1.48  | 0.022   | 3.04    | 0.57  | 0.05   | 0.08    | 0.12  | 0.11   | 0.09   | 0.13   | 67.6    | rem    | 'Monel'            | 50g                |                    |              |
|                            | C212 X 40020A  | 0.04             | 0.10  | 0.075   | 2.00    | 1.17  | 0.02   | 0.04    | 0.08  | 0.06   | 0.05   | 0.02   | 65.2    | rem    | 400/500            | 50g                |                    |              |
|                            | C212 X 40060A  | 0.03             | 3.94  | 0.035   | 0.83    | 1.95  | 0.12   | 0.02    | 0.05  | 1.34   | 3.85   | 0.016  | 63.3    | rem    | 505/506            | 50g                |                    |              |
| CRM                        | C212 A 363/1   | 0.14             | 0.028 | (0.002) | 1.26    | ...   | (0.05) | ...     | 0.032 | 0.03   | 0.027  | ...    | 64.7    | 31.9   | Monel 400'         | 100g               |                    |              |
| 2.15 Ni/Co/Cr/Fe/Mo        |                | C                | Si    | S       | P       | Mn    | Fe     | Cr      | Mo    | Co     | V      | W      | Cu      | Al     | N                  | Typical Alloy Type | Size               |              |
|                            | C215 X HB10A   | 0.04             | 0.14  | 0.051   | <0.006  | 1.15  | 6.95   | 1.15    | 35.8  | 0.05   | 0.57   | ...    | ...     | ...    | ...                |                    | 50g                |              |
| CRM                        | C215 X HB10L   | 0.056            | 0.48  | 0.026   | 0.006   | 1.21  | 7.71   | 0.84    | 33.6  | 0.10   | 0.87   | ...    | 0.05    | 0.31   | 0.042              | 'Hastelloy B'      | 50g                |              |
|                            | C215 X HB50A   | 0.16             | 0.59  | 0.005   | 0.058   | 0.38  | 3.48   | 0.06    | 27.2  | 2.67   | 0.11   | ...    | ...     | ...    | ...                |                    | 50g                |              |
| CRM                        | C215 X HB50J   | 0.147            | 1.30  | 0.002   | 0.053   | 0.44  | 3.05   | 0.03    | 26.0  | 2.47   | 0.14   | ...    | 0.05    | 0.20   | 0.008              |                    | 50g                |              |
|                            | C215 X HC10A   | 0.04             | 0.38  | 0.007   | 0.006   | 1.28  | 4.50   | 16.0    | 19.6  | 2.28   | 0.13   | 3.58   | ...     | ...    | ...                |                    | 50g                |              |
| CRM                        | C215 X HC20H   | 0.066            | 1.02  | 0.003   | 0.012   | 0.97  | 3.62   | 15.7    | 18.9  | 1.70   | 0.38   | 3.91   | 0.023   | 0.18   | 0.18               |                    | 50g                |              |
|                            | C215 X HC50A   | 0.67             | 1.04  | 0.078   | 0.085   | 0.27  | 10.96  | 19.9    | 15.5  | 0.13   | 0.60   | 5.5    | ...     | ...    | ...                | 'Hastelloy C'      | 50g                |              |
| CRM                        | C215 X HC50Q   | 0.190            | 1.56  | 0.044   | 0.049   | 0.30  | 7.65   | 19.9    | 16.0  | 0.08   | 0.72   | 5.4    | 0.05    | 0.22   | 0.32               |                    | 50g                |              |
| 2.16 Pure Nickel           |                | All Elements ppm |       |         |         |       |        |         |       |        |        |        |         |        |                    |                    | Size               |              |
|                            |                | C                | S     | P       | Si      | Mn    | Cr     | Mo      | Pb    | Cu     | Fe     | Al     |         |        |                    |                    |                    |              |
|                            | C216 M BSHPN-1 | 268              | 4     | 5       | 6       | 2     | 22     | 3       | 0     | 2      | 202    | 70     |         |        |                    |                    | 100g               |              |
| 2.19 Various Nickel Alloys |                | C                | Si    | S       | P       | Mn    | Cr     | Mo      | Ni    | Al     | B      | Co     | Cu      | W      | Ti                 | V                  | Others             | Size         |
| CRM                        | C219 X 205000A | 0.025            | 1.48  | 0.004   | 0.002   | 0.22  | 51.2   | 0.002   | 45.7  | ...    | ...    | 0.002  | 0.002   | ...    | ...                | ...                | Fe 1.26            | 50g          |
| CRM                        | C219 DB E326-1 | 0.092            | 1.46  | 0.0028  | 0.0093  | 0.406 | 16.37  | (0.025) | 61.16 | (0.79) | ...    | 0.223  | (0.027) | ...    | ...                | (0.024)            | Zr 0.129           | 100g         |
| CRM                        | C219 RU N8/3   | 0.0103           | 0.421 | 0.0016  | 0.0023  | 0.010 | 14.06  | 4.30    | ...   | ...    | 0.020  | ...    | 0.011   | 6.05   | 2.18               | 0.58               | Mg 0.0015          | 250g         |
| CRM                        | C219 RU N13/4  | 0.0097           | 0.404 | 0.0019  | 0.0017  | 0.203 | 17.89  | 4.40    | ...   | 2.84   | 0.0097 | 5.52   | ...     | 6.53   | 1.11               | ...                | Ce 0.0046          | 250g         |
| CRM                        | C219 RU N14/3  | 0.0120           | 0.67  | 0.0029  | 0.0020  | 0.385 | 24.35  | 1.32    | 57.0  | 0.164  | ...    | ...    | 0.0082  | 13.47  | 0.40               | ...                | Fe 2.16            | 250g         |
| CRM                        | C219 A 345     | 0.153            | ...   | ...     | ...     | ...   | 9.95   | 3.01    | rem   | 5.58   | 0.019  | 14.71  | ...     | ...    | 4.74               | 1.0                |                    |              |
| CRM                        | C219 A 346     | (0.15)           | ...   | ...     | ...     | ...   | (10.0) | (3.0)   | rem   | (5.5)  | ...    | (15.0) | ...     | ...    | (5.0)              | (1.0)              |                    | continued    |
| CRM                        | C219 A 371     | 0.3              | 0.34  | 0.013   | ...     | ...   | ...    | ...     | ...   | ...    | ...    | 0.39   | ...     | ...    | ...                | ...                |                    |              |
| Continuation from above    |                | All Elements ppm |       |         |         |       |        |         |       |        |        |        |         |        |                    |                    | Typical Alloy Type | Size         |
|                            |                | Pb               | Bi    | Ag      | Se      | Te    | Sb     | As      | Cd    | Ga     | Sn     | Zn     | Mg      | Tl     | Ca                 |                    |                    |              |
|                            | C219 A 345     | 0.2              | <0.2  | <0.2    | <0.5    | <0.2  | <2     | (2)     | <0.1  | 8      | 6      | <0.5   | 5       | <0.2   | <5                 |                    |                    | 100g         |
|                            | C219 A 346     | 21               | 10    | 35      | 9       | 12    | 47     | 50      | 0.4   | (52)   | 91     | 29     | 147     | (2)    | (36)               |                    |                    | Inconel' 100 |
|                            | C219 A 371     | ...              | ...   | ...     | ...     | ...   | ...    | ...     | ...   | ...    | ...    | ...    | 600     | ...    | ...                |                    |                    | Comm Nickel  |

| 3.1.1 Brass |         |        |         |          |         |        |          |          |          |          |        |           |        |       |         |        |         |      |
|-------------|---------|--------|---------|----------|---------|--------|----------|----------|----------|----------|--------|-----------|--------|-------|---------|--------|---------|------|
|             | Sn      | Pb     | Fe      | Ni       | Al      | Si     | Mn       | As       | Bi       | Sb       | S      | P         | Cu     | Zn    | Cd      | Se     | B       | Size |
|             | 0.18    | 0.31   | 0.10    | 0.22     | 0.19    | 0.01   | 0.31     | 0.14     | 0.04     | 0.10     | ...    | ...       | 60.3   | ...   | ...     | ...    | ...     | 100g |
|             | 0.025   | 0.007  | 0.014   | 0.008    | <0.005  | <0.005 | <0.005   | <0.01    | <0.005   | <0.005   | ...    | ...       | 70.7   | ...   | ...     | ...    | ...     | 100g |
| CRM         | 0.0075  | 0.0071 | 0.016   | 0.0119   | <0.002  | <0.005 | (0.0003) | (0.0015) | (0.0009) | (0.0009) | ...    | ...       | 69.46  | 30.40 | ...     | ...    | 0.0015  | 100g |
| CRM         | 0.101   | 0.010  | 0.018   | 0.020    | <0.005  | <0.005 | (0.0002) | 0.0016   | 0.066    | 0.0019   | ...    | ...       | 84.80  | 15.01 | ...     | ...    | 0.0030  | 100g |
| CRM         | 0.036   | 0.071  | 0.027   | 0.0089   | (0.001) | 0.0052 | 0.0013   | 0.0095   | 0.030    | 0.0110   | ...    | ...       | 90.22  | 9.53  | ...     | ...    | 0.0022  | 100g |
|             | 0.5     | <0.001 | (0.01)  | (<0.001) | (0.001) | (0.01) | <0.001   | (0.01)   | (0.01)   | <0.001   | <0.001 | <0.001    | 95.0   | ...   | ...     | ...    | ...     | 100g |
| CRM         | 0.105   | 0.110  | 0.073   | 0.090    | 0.083   | 0.042  | 0.088    | 0.099    | 0.032    | 0.050    | ...    | ...       | 61.90  | 37.20 | ...     | ...    | <0.0005 | 100g |
| CRM         | ...     | ...    | ...     | ...      | ...     | ...    | ...      | ...      | ...      | ...      | ...    | ...       | 68.98  | 30.98 | ...     | ...    | ...     | 100g |
| CRM         | 0.7     | 0.35   | 1.02    | 0.56     | 2.22    | 0.044  | 0.86     | (0.008)  | ...      | ...      | ...    | ...       | 58.5   | 35.8  | (0.003) | ...    | ...     | 100g |
| CRM         | 0.00485 | 0.0192 | 0.01061 | 0.01114  | ...     | ...    | ...      | 0.00217  | ...      | 0.00072  | ...    | (0.00106) | 63.334 | 36.63 | ...     | 0.0034 | ...     | 100g |
|             | 0.54    | 0.19   | 0.89    | ...      | 0.26    | ...    | 0.73     | ...      | 0.0024   | 0.0091   | ...    | 0.0076    | 58.0   | rem   | ...     | ...    | ...     | 100g |

| 3.1.3 Naval Brass |      |      |      |      |       |      |      |       |      |      |       |      |      |  |  |  |  |      |
|-------------------|------|------|------|------|-------|------|------|-------|------|------|-------|------|------|--|--|--|--|------|
|                   | Sn   | Pb   | Fe   | Ni   | Al    | Si   | Mn   | As    | Bi   | Sb   | S     | P    | Cu   |  |  |  |  | Size |
|                   | 0.54 | 0.50 | 0.04 | 0.07 | <0.01 | 0.02 | 0.18 | 0.20  | 0.03 | 0.02 | 0.002 | 0.06 | 61.6 |  |  |  |  | 100g |
|                   | 2.07 | 0.09 | 0.11 | 0.16 | 0.29  | 0.22 | 0.02 | 0.025 | 0.09 | 0.39 | 0.002 | 0.20 | 63.8 |  |  |  |  | 100g |

| 3.1.4 Aluminium Brass |       |       |       |       |      |       |        |        |       |       |  |  |  |  |  |  |  |      |
|-----------------------|-------|-------|-------|-------|------|-------|--------|--------|-------|-------|--|--|--|--|--|--|--|------|
|                       | Sn    | Pb    | Fe    | Ni    | Al   | As    | Bi     | Sb     | P     | Cu    |  |  |  |  |  |  |  | Size |
|                       | 0.020 | 0.052 | 0.060 | 0.252 | 2.00 | 0.049 | 0.0018 | 0.0051 | 0.020 | 77.53 |  |  |  |  |  |  |  | 100g |

| 3.1.7 Leaded Brass |       |      |       |        |        |        |        |       |        |        |        |        |        |         |        |       |          |      |
|--------------------|-------|------|-------|--------|--------|--------|--------|-------|--------|--------|--------|--------|--------|---------|--------|-------|----------|------|
|                    | Sn    | Pb   | Fe    | Ni     | Mn     | P      | Al     | Zn    | Sb     | Bi     | As     | S      | Ag     | Cd      | Co     | Cu    | Others   | Size |
| CRM                | 0.18  | 2.45 | 0.007 | 0.001  | ...    | ...    | 0.010  | 39.1  | 0.023  | ...    | ...    | ...    | 0.0015 | 0.049   | ...    | 58.1  | ...      | 100g |
| CRM                | 0.089 | 2.13 | 0.091 | 0.0214 | <0.001 | 0.0003 | ...    | 38.82 | 0.0040 | 0.0018 | 0.0084 | 0.0011 | ...    | ...     | ...    | 58.74 | ...      | 100g |
| CRM                | 0.066 | 1.13 | 0.136 | 0.038  | 1.70   | 0.0112 | ...    | 39.40 | 0.0026 | 0.0006 | 0.0025 | 0.0004 | ...    | ...     | ...    | 57.40 | ...      | 100g |
| CRM                | 0.395 | 2.88 | 0.135 | 0.14   | ...    | 0.0195 | 0.0156 | 35.18 | 0.0048 | 0.0138 | 0.0012 | 0.0007 | ...    | ...     | 0.025  | 61.05 | ...      | 100g |
| CRM                | 0.202 | 2.08 | 0.077 | 0.0088 | ...    | 0.0149 | 0.199  | 32.88 | 0.053  | ...    | 0.047  | ...    | ...    | ...     | ...    | 64.34 | ...      | 100g |
| CRM                | 0.113 | 1.35 | 0.381 | 0.253  | ...    | 0.0378 | 0.386  | 36.50 | 0.096  | 0.025  | 0.097  | ...    | ...    | ...     | 0.0070 | 60.67 | Se 0.003 | 100g |
| CRM                | 0.046 | 1.03 | 0.020 | 0.492  | ...    | 0.125  | 0.561  | 30.09 | 0.188  | ...    | 0.206  | ...    | ...    | ...     | ...    | 67.11 | ...      | 100g |
| CRM                | 0.116 | 1.64 | 0.126 | 0.249  | ...    | 0.018  | 0.077  | 6.23  | 0.114  | ...    | 0.104  | ...    | ...    | ...     | ...    | 91.25 | ...      | 100g |
| CRM                | 0.27  | 2.24 | 0.15  | 0.13   | ...    | ...    | <0.005 | 38.5  | <0.01  | ...    | ...    | ...    | ...    | ...     | ...    | 58.7  | ...      | 100g |
| CRM                | 0.34  | 1.04 | 0.83  | 0.033  | ...    | ...    | 0.83   | 38.6  | ...    | ...    | ...    | ...    | ...    | (0.011) | ...    | 57.1  | ...      | 100g |
|                    | 0.113 | 2.66 | 0.194 | 0.47   | ...    | 0.012  | 0.47   | ...   | 0.0047 | 0.0018 | ...    | ...    | ...    | ...     | ...    | 63.44 | ...      | 100g |

| 3.1.8 Manganese Brass |       |       |       |       |       |       |       |       |       |       |       |  |  |  |  |  |  |      |
|-----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--|--|--|--|--|--|------|
|                       | Sn    | Pb    | Zn    | Fe    | Ni    | Al    | Si    | Mn    | Sb    | P     | Cu    |  |  |  |  |  |  | Size |
| CRM                   | 0.105 | 1.44  | 29.37 | 0.268 | 0.053 | 0.596 | ...   | 0.188 | ...   | ...   | 67.77 |  |  |  |  |  |  | 100g |
| CRM                   | 0.319 | 1.02  | 32.19 | 0.66  | 0.118 | 0.268 | 0.233 | 2.23  | ...   | ...   | 63.02 |  |  |  |  |  |  | 100g |
| CRM                   | 1.75  | 0.127 | 37.91 | 0.56  | 1.31  | 3.35  | 0.49  | 0.243 | ...   | ...   | 54.14 |  |  |  |  |  |  | 100g |
|                       | 0.186 | 0.44  | ...   | 1.13  | ...   | 0.10  | ...   | 3.41  | 0.045 | 0.020 | 55.64 |  |  |  |  |  |  | 100g |

| 3.1.9 Silicon Brass |       |       |       |       |       |      |      |       |       |          |         |      |          |       |        |        |      |
|---------------------|-------|-------|-------|-------|-------|------|------|-------|-------|----------|---------|------|----------|-------|--------|--------|------|
|                     | Sn    | Pb    | Fe    | Ni    | Al    | Si   | Mn   | As    | Sb    | S        | P       | Zn   | Mg       | Co    | Cr     | Cu     | Size |
|                     | 0.22  | 0.23  | 0.20  | 0.14  | 1.16  | 5.27 | 0.03 | 0.10  | 0.03  | <0.002   | 0.011   | 18.9 | 0.004    | 0.19  | ...    | ...    | 100g |
| CRM                 | 0.23  | 0.55  | 0.100 | 0.076 | 1.90  | 5.95 | 0.10 | 0.13  | 0.03  | <0.002   | 0.040   | 7.55 | 0.003    | 0.34  | 0.017  | (82.7) | 100g |
| CRM                 | 0.60  | 0.40  | 0.50  | 0.36  | 0.70  | 3.48 | 1.43 | 0.054 | 0.067 | <0.002   | 0.044   | 9.63 | 0.004    | 0.052 | 0.05   | (82.3) | 100g |
| CRM                 | 0.80  | 0.168 | 0.77  | 0.25  | 0.48  | 4.58 | 1.85 | 0.040 | 0.067 | <0.005   | 0.060   | 5.05 | (0.0007) | 0.109 | 0.045  | 85.7   | 100g |
| CRM                 | 1.00  | 0.068 | 0.99  | 0.49  | 0.085 | 7.08 | 0.45 | 0.03  | 0.13  | 0.004    | 0.072   | 0.13 | 0.002    | 0.053 | 0.022  | (89.5) | 100g |
|                     | 0.39  | 0.96  | 0.05  | 0.37  | 0.10  | 2.61 | 0.29 | 0.01  | 0.10  | 0.01     | 0.06    | 1.12 | 0.004    | 0.05  | ...    | ...    | 100g |
| CRM                 | 0.053 | 0.61  | 0.048 | 0.115 | 0.31  | 2.42 | 0.32 | 0.009 | 0.003 | (0.0034) | (0.008) | 1.00 | (0.0015) | 0.25  | (0.04) | 94.7   | 100g |

### 3.2.1 Phosphor-Bronze

|                   | Sn    | Pb     | Zn     | Fe     | Ni    | Al       | Si     | As     | Mn       | Sb     | Bi    | P      | Cu     | S       | Se     | Mg      | Size |
|-------------------|-------|--------|--------|--------|-------|----------|--------|--------|----------|--------|-------|--------|--------|---------|--------|---------|------|
| CRM C32 X PB10A   | 11.0  | 0.37   | 0.02   | <0.01  | 0.12  | <0.01    | 0.01   | 0.05   | <0.01    | 0.07   | ...   | 0.84   | ...    | ...     | ...    | ...     | 100g |
| CRM C32 X PB20A   | 4.13  | 0.06   | 0.20   | 0.06   | 0.50  | <0.01    | 0.07   | 0.09   | 0.075    | 0.11   | ...   | 0.42   | ...    | ...     | ...    | ...     | 100g |
| CRM C32 X PB100K  | 11.93 | 0.055  | 0.037  | 0.008  | 0.057 | (0.0008) | 0.0015 | 0.011  | 0.0010   | 0.0051 | 0.024 | 0.0236 | 87.70  | 0.018   | 0.0055 | 0.004   | 100g |
| CRM C32 X PB110B  | 3.00  | 1.02   | 1.93   | 0.49   | 1.01  | 0.067    | 0.52   | 0.175  | 0.80     | 0.54   | ...   | 0.72   | (89.5) | 0.016   | ...    | <0.001  | 100g |
| CRM C32 X PB120C  | 4.64  | 0.47   | 0.49   | 0.31   | 0.51  | <0.001   | 0.01   | 0.098  | 0.39     | 0.24   | ...   | 0.42   | (92.0) | (0.010) | ...    | <0.001  | 100g |
| CRM C32 X PB130B  | 6.96  | 0.25   | 0.27   | 0.14   | 0.26  | <0.001   | <0.005 | 0.052  | 0.096    | 0.12   | ...   | 0.22   | (91.5) | (0.03)  | ...    | <0.001  | 100g |
| CRM C32 X PB140B  | 8.95  | 0.086  | 0.23   | 0.041  | 0.099 | <0.005   | 0.050  | 0.026  | 0.035    | 0.039  | 0.15  | 0.050  | (90.1) | 0.069   | ...    | <0.0005 | 100g |
| CRM C32 X PB 230A | 7.57  | 0.0038 | 0.0022 | <0.001 | 0.004 | (0.0003) | 0.0017 | 0.0011 | (0.0006) | 0.0025 | ...   | 0.315  | 91.97  | 0.0016  | ...    | ...     | 100g |
| CRM C32 A 374     | 9.8   | 0.064  | 0.01   | <0.005 | 0.014 | <0.005   | <0.005 | ...    | ...      | (0.01) | ...   | 0.59   | 89.5   | 0.012   | ...    | ...     | 100g |

### 3.2.2 Lead Bronze

|                  | Sn    | Pb    | Zn    | Fe     | Ni   | Al     | As     | Mn     | Bi      | Sb    | P     | S       | Cu     | Cd    | Si    | Size |
|------------------|-------|-------|-------|--------|------|--------|--------|--------|---------|-------|-------|---------|--------|-------|-------|------|
| CRM C32 X LB20A  | 12.38 | 9.42  | 0.27  | 0.40   | 0.22 | 0.04   | 0.017  | 0.22   | 0.009   | 0.023 | 0.04  | (0.001) | (76.8) | ...   | ...   | 100g |
| CRM C32 X LB30A  | 10.3  | 9.4   | <0.01 | <0.01  | 1.52 | <0.01  | 0.02   | <0.01  | 0.025   | 0.04  | 0.006 | 0.020   | ...    | ...   | ...   | 100g |
| CRM C32 X LB130B | 6.03  | 8.17  | 0.58  | 0.025  | 1.29 | 0.0126 | 0.116  | <0.001 | 0.035   | 0.028 | 0.063 | 0.100   | 83.58  | ...   | 0.022 | 100g |
| CRM C32 E 10     | 4.58  | 4.72  | 4.71  | 0.211  | 0.33 | ...    | 0.020  | ...    | ...     | 0.113 | 0.003 | 0.068   | 85.13  | ...   | ...   | 80g  |
| CRM C32 E 74     | 2.84  | 6.24  | 9.88  | 0.315  | 0.15 | ...    | 0.002  | ...    | ...     | 0.016 | 0.002 | 0.056   | 80.41  | 0.013 | ...   | 60g  |
| CRM C32 A 364    | 9.35  | 9.25  | 0.13  | <0.005 | 0.28 | <0.002 | (0.07) | ...    | (<0.01) | 0.18  | 0.056 | (0.060) | 80.6   | ...   | ...   | 100g |
| CRM C32 CG 02137 | 5.69  | 3.25  | 5.25  | ...    | ...  | ...    | ...    | ...    | ...     | ...   | ...   | ...     | 85.16  | ...   | ...   | 100g |
| CRM C32 CG 02138 | 5.31  | 6.33  | 6.50  | ...    | ...  | ...    | ...    | ...    | ...     | ...   | ...   | ...     | 81.29  | ...   | ...   | 100g |
| CRM C32 CG 02139 | 4.08  | 6.16  | 6.96  | ...    | ...  | ...    | ...    | ...    | ...     | ...   | ...   | ...     | 81.45  | ...   | ...   | 100g |
| CRM C32 CG 02140 | 4.24  | 17.62 | 5.37  | ...    | ...  | ...    | ...    | ...    | ...     | ...   | ...   | ...     | 72.25  | ...   | ...   | 100g |

### 3.2.3 Aluminium Bronze

|                  | Sn    | Pb    | Zn    | Fe   | Ni   | Al    | Si    | Mn    | Mg      | As      | P      | Cr      | Cu      | Size |
|------------------|-------|-------|-------|------|------|-------|-------|-------|---------|---------|--------|---------|---------|------|
| CRM C32 X ALB10K | 0.025 | 0.218 | 0.035 | 3.00 | 5.90 | 10.3  | 0.132 | 0.094 | 0.0013  | (0.002) | 0.016  | 0.011   | (80.4)  | 50g  |
| CRM C32 X ALB20H | 0.08  | 0.09  | 0.229 | 4.60 | 4.64 | 9.52  | 0.302 | 0.393 | 0.0104  | 0.0114  | 0.027  | 0.0261  | 80.0    | 50g  |
| CRM C32 X ALB30A | 0.19  | 0.09  | 1.73  | 5.08 | 3.84 | 11.46 | 0.34  | 0.29  | 0.03    | ...     | ...    | ...     | ...     | 50g  |
| CRM C32 X ALB30Q | 0.10  | 0.11  | 0.325 | 4.15 | 3.72 | 11.56 | 0.135 | 0.374 | 0.088   | 0.0060  | 0.025  | 0.0089  | 79.4    | 50g  |
| CRM C32 X ALB40G | 0.093 | 0.149 | 0.305 | 4.68 | 7.02 | 7.96  | 0.335 | 1.20  | 0.297   | 0.010   | 0.028  | 0.0275  | (77.91) | 50g  |
| CRM C32 X ALB50A | 0.03  | 0.04  | 0.16  | 1.95 | 5.11 | 7.6   | 0.03  | 1.39  | 0.018   | ...     | ...    | ...     | ...     | 50g  |
| CRM C32 X ALB60H | 0.126 | 0.060 | 0.19  | 3.06 | 5.62 | 8.42  | 0.30  | 1.41  | 0.0026  | (0.021) | 0.036  | (0.004) | 80.7    | 50g  |
| CRM C32 X ALB80C | 0.57  | 0.009 | 1.01  | 6.70 | 6.79 | 8.08  | 0.69  | 0.307 | (0.002) | 0.172   | 0.141  | 0.045   | 75.3    | 50g  |
| CRM C32 A 304/1  | 0.03  | 0.01  | 0.31  | 4.64 | 4.82 | 9.71  | 0.08  | 0.12  | ...     | ...     | ...    | ...     | 80.23   | 100g |
| CRM C32 CG 02102 | 0.090 | 0.011 | 1.00  | 2.82 | 0.45 | 9.21  | 0.11  | 0.25  | ...     | 0.011   | 0.012  | ...     | rem     | 100g |
| CRM C32 CG 02117 | 0.091 | 0.022 | 0.99  | 0.55 | 0.48 | 9.03  | 0.115 | 2.04  | ...     | ...     | 0.016  | ...     | rem     | 100g |
| CRM C32 CG 02118 | 0.054 | 0.031 | 0.51  | 2.89 | 0.48 | 9.44  | 0.161 | 1.69  | ...     | 0.0108  | 0.0155 | ...     | rem     | 100g |
| CRM C32 CG 02119 | 0.052 | 0.021 | 0.299 | 4.32 | 4.47 | 10.08 | 0.106 | 0.332 | ...     | 0.0108  | 0.0105 | ...     | rem     | 100g |

### 3.2.4 Bismuth Bronze

|                  | Sn   | Pb     | Zn    | Fe    | Ni     | As     | P     | Sb     | Co     | Se    | Bi   | Cd     | B      | Cu     | Size |
|------------------|------|--------|-------|-------|--------|--------|-------|--------|--------|-------|------|--------|--------|--------|------|
| CRM C32 X SEB10B | 3.83 | 0.564  | 11.57 | 0.059 | 0.118  | 0.051  | 0.025 | 0.354  | 0.0108 | 0.895 | 5.77 | ...    | ...    | (76.7) | 100g |
| CRM C32 X SEB20C | 9.34 | 0.424  | 3.73  | 0.078 | 0.028  | 0.0094 | 0.013 | 0.0120 | 0.0121 | 0.026 | 4.36 | ...    | ...    | 81.8   | 100g |
| CRM C32 X SEB40C | 9.29 | 0.010  | 8.55  | 0.365 | 0.0092 | 0.0011 | 0.006 | 0.0055 | 0.476  | 0.115 | 2.69 | 0.0004 | 0.0021 | 78.58  | 100g |
| CRM C32 X SEB50B | 5.28 | 0.0149 | 6.64  | 0.360 | 0.308  | 0.0121 | 0.183 | 0.0344 | 0.0048 | 0.512 | 1.17 | 0.0067 | 0.0028 | 85.5   | 100g |

### 3.2.9 Various Bronzes

|                 | Sn    | Pb    | Zn    | Fe     | Ni    | As     | Mn     | Si       | Sb    | Bi     | P      | S      | Se      | Al     | Ag    | Cu    | Size |
|-----------------|-------|-------|-------|--------|-------|--------|--------|----------|-------|--------|--------|--------|---------|--------|-------|-------|------|
| CRM C32 DB 211  | 10.60 | 0.74  | 0.56  | 0.110  | 0.122 | 0.0213 | 0.0019 | ...      | 0.033 | 0.0020 | 0.0267 | 0.0211 | 0.00114 | ...    | 0.059 | 87.71 | 100g |
| CRM C32 X SN10D | 11.75 | 5.17  | 0.804 | 0.0034 | 2.17  | ...    | 0.0018 | <0.001   | 0.006 | ...    | 0.0025 | 0.0064 | ...     | <0.002 | ...   | 79.93 | 100g |
| CRM C32 X SN20H | 13.54 | 1.97  | 1.28  | 0.0332 | 0.104 | ...    | 0.0043 | (0.0028) | 0.100 | ...    | 0.082  | 0.0326 | ...     | 0.0004 | ...   | 82.80 | 100g |
| CRM C32 X SN30E | 16.51 | 0.270 | 0.43  | 0.0782 | 0.513 | ...    | 0.0026 | (0.002)  | 0.260 | ...    | 0.297  | 0.096  | ...     | 0.0004 | ...   | 81.32 | 100g |

### 3.3 Gun Metal and Lead Red Brass

|                  | Sn    | Pb    | Zn   | Fe    | Ni     | Al       | Si       | As       | Mn       | Bi      | Sb     | P        | Cr     | Ag     | S      | Cu     | Others | Size |
|------------------|-------|-------|------|-------|--------|----------|----------|----------|----------|---------|--------|----------|--------|--------|--------|--------|--------|------|
| CRM C33 X GM40W  | 2.50  | 5.20  | 7.17 | 0.051 | 2.05   | <0.002   | <0.005   | 0.021    | (0.0019) | 0.041   | 0.042  | <0.005   | ...    | 0.0062 | 0.33   | 82.6   |        | 100g |
| CRM C33 X GM50B  | 4.83  | 3.72  | 6.15 | 0.22  | 1.58   | 0.016    | 0.035    | 0.046    | 0.026    | 0.07(5) | 0.073  | 0.031    | ...    | 0.016  | 0.117  | (83.0) |        | 100g |
| CRM C33 X GM60H  | 7.31  | 3.11  | 2.99 | 0.131 | 1.069  | 0.136    | 0.124    | 0.175    | 0.0912   | 0.037   | 0.258  | 0.0566   | 0.0019 | 0.0114 | 0.07   | 84.46  |        | 100g |
| CRM C33 X GM70A  | 9.23  | 0.78  | 2.06 | 0.05  | 0.36   | 0.03     | 0.09     | 0.12     | 0.18     | 0.08    | 0.06   | 0.067    | ...    | ...    | 0.001  | ...    |        | 100g |
| CRM C33 X GM80E  | 4.03  | 6.78  | 6.21 | 0.298 | 0.115  | 0.0067   | (0.0010) | (0.0051) | 0.0010   | 0.0138  | <0.002 | 0.0213   | <0.001 | 0.105  | 0.0055 | 82.3   |        | 100g |
| CRM C33 X GM240A | 3.85  | 3.39  | 3.67 | 0.008 | 0.010  | 0.0001   | 0.003    | 0.0008   | (0.0002) | 0.0008  | 0.0015 | 0.190    | 0.0014 | 0.004  | 0.003  | 88.82  |        | 100g |
| CRM C33 X GM290A | 6.12  | 0.052 | 4.27 | 0.011 | 0.029  | (0.0004) | 0.0030   | 0.0017   | 0.0005   | 0.0020  | 0.0015 | 0.136    | 0.0004 | 0.0025 | 0.002  | 89.30  |        | 100g |
| CRM C33 X RB10A  | 2.137 | 5.02  | 7.95 | 0.928 | 0.0539 | 0.0048   | 0.063    | 0.0030   | 0.0167   | 0.0029  | 0.432  | 0.020    | 0.0013 | 0.0174 | 0.0044 | 83.25  | Co, Mg | 100g |
| CRM C33 X RB20A  | 3.19  | 3.85  | 9.14 | 0.493 | 0.255  | 0.0362   | 0.0116   | 0.0211   | 0.0028   | 0.101   | 0.019  | 0.0208   | 0.0017 | 0.0029 | 0.078  | 82.67  | Co, Mg | 100g |
| CRM C33 A 183/4  | 7.27  | 3.15  | 3.47 | 0.056 | 1.3    | <0.002   | (0.01)   | 0.13     | (0.01)   | 0.005   | 0.23   | 0.09     | ...    | ...    | 0.11   | 84.08  |        | 100g |
| CRM C33 A 207/2  | 9.74  | 0.7   | 1.6  | 0.029 | 0.28   | 0.013    | 0.016    | 0.066    | ...      | 0.04    | 0.1    | (0.018)  | ...    | ...    | ...    | 87.35  |        | 100g |
| CRM C33 DB 227   | 6.01  | 4.12  | 3.46 | 0.129 | 0.284  | ...      | ...      | 0.081    | ...      | 0.0088  | 0.160  | (0.0002) | ...    | ...    | 0.122  | 85.57  |        | 100g |
| CRM C33 DB 228   | 9.76  | 1.24  | 3.32 | 0.036 | 0.109  | ...      | ...      | 0.024    | <0.0001  | 0.0086  | 0.078  | 0.019    | ...    | ...    | 0.036  | 85.34  |        | 100g |

| 3.4 Nickel Silver            |                |         |          |          |          |           |         |          |         |         |         |          |          |                    |        |          |         |       |
|------------------------------|----------------|---------|----------|----------|----------|-----------|---------|----------|---------|---------|---------|----------|----------|--------------------|--------|----------|---------|-------|
|                              | Sn             | Pb      | Zn       | Fe       | Ni       | Si        | Mn      | P        | As      | S       | Co      | Al       | Ag       | Mg                 | C      | Cu       | Size    |       |
| CRM                          | C34 X NS 10A   | ...     | 0.05     | 29.0     | 0.05     | 7.67      | 0.03    | 0.02     | 0.010   | ...     | <0.002  | ...      | ...      | ...                | ...    | ...      | 100g    |       |
| CRM                          | C34 X NS 30E   | 0.031   | 0.155    | 17.94    | 0.201    | 14.86     | 0.018   | 0.129    | 0.013   | ...     | 0.063   | 0.102    | 0.038    | 0.108              | 0.0011 | 0.014    | 66.30   |       |
|                              | C34 X NS 50A   | ...     | 0.85     | 21.4     | 0.76     | 19.7      | 0.18    | 0.03     | 0.046   | ...     | 0.042   | ...      | ...      | ...                | ...    | ...      | 100g    |       |
|                              | C34 CG 02104   | ...     | 0.019    | 20.81    | 0.47     | 14.87     | 0.146   | 0.32     | 0.0048  | 0.0098  | ...     | ...      | ...      | 0.033              | ...    | ...      | 100g    |       |
| 3.6.1 Cupro-Nickel           |                |         |          |          |          |           |         |          |         |         |         |          |          |                    |        |          |         |       |
|                              | Pb             | Fe      | Ni       | Co       | Si       | Mn        | Mg      | S        | P       | Bi      | B       | C        | Cr       | Ti                 | Nb     | Zr       | Cu      | Size  |
|                              | C36 X CN10A    | 0.05    | 1.94     | 9.5      | 0.10     | 0.19      | 1.91    | 0.015    | ...     | ...     | ...     | ...      | ...      | ...                | ...    | ...      | ...     | 100g  |
|                              | C36 X CN40A    | 0.015   | 0.50     | 30.2     | 0.04     | 0.54      | 0.33    | 0.003    | ...     | ...     | ...     | ...      | ...      | ...                | ...    | ...      | ...     | 100g  |
|                              | C36 X CN60A    | 0.008   | 0.65     | 32.6     | 0.03     | 0.30      | 0.51    | ...      | 0.037   | 0.030   | 0.03    | 0.007    | 0.02     | 1.21               | <0.01  | ...      | <0.01   | ...   |
|                              | C36 X CN90A    | 0.05    | 0.93     | 28.1     | <0.01    | 0.56      | 1.20    | ...      | 0.002   | 0.016   | <0.01   | 0.005    | 0.02     | 2.19               | 0.12   | ...      | 0.13    | ...   |
| CRM                          | C36 X CN100A   | 0.004   | 4.28     | 29.3     | 0.081    | 1.02      | 0.262   | 0.0026   | 0.055   | (0.020) | 0.014   | 0.0029   | 0.064    | 1.59               | 0.03   | 0.89     | (0.055) | 61.01 |
| CRM                          | C36 A 180/2    | (0.003) | 0.68     | 30.35    | ...      | (0.018)   | 0.75    | ...      | 0.006   | ...     | ...     | 0.04     | ...      | ...                | ...    | ...      | ...     | 68.12 |
| 3.6.4 Cu/Be/Co               |                |         |          |          |          |           |         |          |         |         |         |          |          |                    |        |          |         |       |
|                              | Sn             | Pb      | Zn       | Fe       | Ni       | Al        | Si      | Mn       | Cr      | Be      | Co      | Ag       | Cu       | Typical Alloy Type |        |          | Size    |       |
|                              | C36 X CBC10A   | 0.002   | 0.002    | <0.01    | 0.03     | 1.88      | 0.02    | 0.04     | <0.01   | 0.005   | 0.42    | 0.13     | ...      | ...                | C17510 |          | 50g     |       |
|                              | C36 X CBC20A   | 0.004   | 0.004    | 0.03     | 0.02     | 0.07      | 0.03    | 0.05     | <0.01   | 0.005   | 0.56    | 2.44     | ...      | ...                | C17500 |          | 50g     |       |
| CRM                          | C36 X CBC20E   | 0.011   | 0.0099   | 0.0103   | 0.0207   | 0.0472    | 0.023   | 0.0208   | 0.0015  | 0.0045  | 0.450   | 2.47     | 0.0020   | 96.96              | C17500 |          | 50g     |       |
|                              | C36 X CBC30A   | <0.002  | 0.003    | 0.02     | 0.04     | 0.02      | 0.02    | 0.06     | <0.01   | 0.005   | 1.81    | 0.23     | ...      | ...                | C17200 |          | 50g     |       |
|                              | C36 X CBC40A   | 0.01    | 0.30     | 0.02     | 0.09     | 0.04      | 0.06    | 0.09     | 0.003   | 0.01    | 1.82    | 0.21     | ...      | ...                | C17300 |          | 50g     |       |
| 3.6.5 Chromium Copper        |                |         |          |          |          |           |         |          |         |         |         |          |          |                    |        |          |         |       |
|                              | Sn             | Fe      | Ni       | Si       | Mn       | Cr        | Zr      | P        | Pb      | Zn      | Al      | S        | Co       | Cd                 | C      | Cu       | Size    |       |
| CRM                          | C36X CGZ A     | 0.0047  | 0.029    | 0.0084   | 0.0032   | 0.0008    | 0.674   | 0.048    | 0.0015  | 0.0024  | 0.0075  | 0.0003   | 0.0008   | 0.0012             | 0.0027 | 0.0018   | 99.21   |       |
| CRM                          | C36 X 2740A    | 0.0142  | 0.078    | 2.55     | 0.595    | 0.0146    | 0.536   | (0.002)  | 0.0012  | 0.0022  | 0.039   | 0.0012   | 0.0036   | 0.0030             | ...    | 0.003    | 96.15   |       |
| 3.7 Various Cu Alloys        |                |         |          |          |          |           |         |          |         |         |         |          |          |                    |        |          |         |       |
|                              | Si             | Fe      | Mn       | P        | S        | Al        | Ni      | Cr       | Sn      | Pb      | Zn      | As       | Sb       | Bi                 | C      | Cu       | Size    |       |
| CRM                          | C37 X 2180A    | 0.56    | 0.075    | 0.084    | 0.0015   | 0.006     | 0.0025  | 2.51     | 0.033   | 0.018   | 0.0025  | 0.029    | ...      | ...                | ...    | (0.002)  | 96.60   |       |
| CRM                          | C37 X 2260A    | 3.54    | 1.52     | 0.582    | 0.0025   | 0.0005    | 0.0020  | 0.0024   | 0.003   | 0.0032  | (0.001) | 2.82     | ...      | ...                | ...    | 0.006    | 91.58   |       |
|                              | C37 DH L0201   | ...     | 0.677    | 0.035    | 0.046    | ...       | 0.022   | 0.795    | ...     | 8.84    | 1.17    | 6.3      | 0.076    | 0.104              | 0.006  | ...      | 81.84   |       |
|                              | C37 DH L0202   | ...     | 0.911    | 0.007    | ...      | 0.037     | ...     | 0.034    | 0.003   | 0.381   | 0.139   | 0.229    | ...      | 0.008              | ...    | ...      | 98.15   |       |
|                              | C37 DH L0203   | 0.23    | 5.76     | 0.057    | ...      | ...       | 12.5    | ...      | ...     | 2.17    | 0.59    | 1.36     | ...      | 0.329              | ...    | ...      | 76.88   |       |
|                              | C37 DH L0204   | 0.22    | 5.7      | 0.057    | 0.007    | ...       | 12.51   | ...      | 2.14    | 2.16    | 0.58    | 1.36     | ...      | 0.336              | ...    | ...      | 77.0    |       |
|                              | C37 DH L0205   | 0.22    | 5.66     | 0.056    | 0.008    | ...       | 12.53   | ...      | 2.78    | 2.14    | 0.76    | 1.36     | ...      | 0.35               | ...    | ...      | 76.82   |       |
|                              | C37 DH L0206   | 0.043   | 1.79     | 0.044    | 0.017    | 0.059     | 0.059   | 0/221    | ...     | 2.78    | 0.891   | 10.89    | 0.025    | 0.06               | ...    | ...      | 83.05   |       |
|                              | C37 DH L0207   | ...     | 0.936    | 0.027    | ...      | ...       | ...     | 0.174    | ...     | 0.74    | 2.16    | 30.2     | ...      | 0.014              | ...    | ...      | 65.66   |       |
|                              | C37 DH L0208   | 0.052   | 2.54     | 0.711    | 0.027    | ...       | 4.15    | 2.82     | 0.009   | 4.78    | 1.31    | 1.85     | ...      | 0.083              | ...    | ...      | 81.87   |       |
|                              | C37 DH L0209   | ...     | ...      | ...      | ...      | ...       | ...     | 0.265    | ...     | 11.92   | 0.542   | ...      | ...      | ...                | ...    | ...      | 87.01   |       |
|                              | C37 DH L0210   | 0.071   | 0.257    | 3.65     | 0.018    | ...       | 5.16    | 0.769    | 0.006   | 0.295   | 0.352   | 21.56    | ...      | 0.012              | ...    | ...      | 65.39   |       |
| 3.8 Pure Copper              |                |         |          |          |          |           |         |          |         |         |         |          |          |                    |        |          |         |       |
|                              | Sn             | Pb      | Zn       | Fe       | Ni       | As        | Sb      | Ag       | Se      | P       | S       | Cd       | Co       | Mn                 | Te     | Bi       | Size    |       |
| CRM                          | C38 E 64       | <5      | 0.6      | (10)     | 4.5      | 1.8       | (2)     | (2)      | 10      | <2      | ...     | ...      | ...      | ...                | ...    | <1       | <1      |       |
| CRM                          | C38 F 17B      | ...     | ...      | ...      | ...      | ...       | ...     | ...      | ...     | 6.9     | 10.4    | ...      | ...      | ...                | ...    | ...      | 50g     |       |
| CRM                          | C38 F 74C      | <0.07   | 0.97     | 0.46     | 1.14     | 1.04      | 0.78    | 0.58     | 12.8    | 0.37    | ...     | ...      | <0.02    | <0.05              | 1.27   | (0.21)   | (0.1)   |       |
| 3.9 Residuals in Pure Copper |                |         |          |          |          |           |         |          |         |         |         |          |          |                    |        |          |         |       |
|                              | Pb             | Zn      | Fe       | Ni       | As       | Bi        | Sb      | Co       | Ag      | Cd      | Te      | Si       |          |                    |        |          |         |       |
|                              | C39 X 178660A  | <0.001  | 0.005    | <0.001   | 0.034    | 0.037     | 0.001   | <0.001   | 0.003   | <0.001  | <0.001  | <0.001   | <0.005   |                    |        |          |         |       |
| CRM                          | C39 X 178660AC | 0.021   | 0.079    | 0.021    | 0.068    | 0.061     | 0.0142  | 0.0057   | 0.108   | 0.0069  | 0.083   | 0.0098   | 0.16     |                    |        |          |         |       |
| CRM                          | C39 X 178670AA | 0.029   | 0.044    | 0.027    | 0.044    | 0.043     | 0.029   | 0.0046   | 0.072   | 0.0062  | 0.055   | 0.021    | 0.115    |                    |        |          |         |       |
| CRM                          | C39 X 178680AD | 0.039   | 0.039    | 0.046    | 0.033    | 0.030     | 0.044   | 0.033    | 0.047   | 0.026   | 0.033   | 0.034    | 0.10     |                    |        |          |         |       |
|                              | C39 X 178700A  | 0.049   | 0.013    | 0.16     | 0.005    | 0.005     | 0.042   | 0.047    | 0.002   | 0.045   | 0.026   | 0.050    | 0.020    |                    |        |          |         |       |
| CRM                          | C39 X 178700AD | 0.059   | 0.008    | 0.054    | 0.0053   | 0.003     | 0.081   | 0.054    | 0.0024  | 0.049   | 0.0014  | 0.01     | (0.002)  |                    |        |          |         |       |
| CRM                          | C39 X 178710A  | 0.0092  | (0.0008) | (0.0020) | 0.027    | 0.029     | 0.069   | 0.017    | 0.0008  | 0.025   | 0.0031  | 0.011    | <0.0005  |                    |        |          |         |       |
| CRM                          | C39 A 399      | (0.002) | (0.003)  | (0.006)  | (0.002)  | <0.001    | ...     | <0.001   | ...     | ...     | (0.003) | ...      | ...      | continued          |        |          |         |       |
| CRM                          | C39 DB 365     | 0.00288 | ...      | 0.00223  | 0.01753  | 0.00298   | 0.00294 | 0.00088  | ...     | 0.01027 | ...     | ...      | ...      | continued          |        |          |         |       |
| Continuation from above      |                |         |          |          |          |           |         |          |         |         |         |          |          |                    |        |          |         |       |
|                              | Mn             | Al      | Sn       | Mg       | S        | P         | Cr      | In       | Au      | Se      | B       | Zr       | Be       | Cu                 | Size   |          |         |       |
|                              | C39 X 178660A  | <0.001  | <0.002   | 0.013    | <0.001   | 0.003     | <0.002  | 0.002    | ...     | ...     | ...     | ...      | ...      | ...                | ...    | ...      | 50g     |       |
|                              | C39 X 178660AC | 0.0167  | 0.0067   | 0.065    | 0.0041   | 0.106     | 0.019   | 0.23     | ...     | 0.0050  | 0.0045  | (0.003)  | (0.0006) | 0.00015            | ...    | ...      | 50g     |       |
|                              | C39 X 178670AA | 0.0221  | 0.039    | 0.045    | 0.0049   | 0.058     | 0.017   | 0.256    | ...     | 0.0085  | 0.0115  | (0.001)  | (0.001)  | 0.0003             | ...    | ...      | 50g     |       |
|                              | C39 X 178680AD | 0.059   | 0.139    | 0.035    | 0.047    | 0.018     | 0.041   | 0.21     | ...     | 0.020   | 0.0040  | (0.0024) | (0.005)  | 0.0013             | ...    | ...      | 50g     |       |
|                              | C39 X 178700A  | 0.036   | 0.006    | 0.009    | 0.003    | 0.005     | 0.0043  | 0.006    | ...     | ...     | ...     | ...      | ...      | ...                | ...    | ...      | 50g     |       |
|                              | C39 X 178700AD | 0.024   | 0.0024   | 0.016    | (0.0007) | (0.004)   | 0.075   | 0.0016   | (0.007) | 0.031   | 0.007   | 0.0014   | ...      | ...                | ...    | ...      | 50g     |       |
|                              | C39 X 178710A  | 0.0010  | <0.0005  | ...      | (0.0002) | 0.0080    | <0.0005 | (0.0003) | ...     | 0.0048  | 0.028   | ...      | <0.0005  | (0.0004)           | ...    | ...      | 50g     |       |
|                              | C39 A 399      | <0.001  | ...      | (0.003)  | ...      | ...       | 0.045   | ...      | ...     | ...     | ...     | ...      | ...      | ...                | ...    | (99.935) | 100g    |       |
|                              | C39 DB 365     | <0.0001 | ...      | <0.0005  | ...      | (0.00077) | ...     | ...      | ...     | ...     | ...     | ...      | ...      | ...                | ...    | 99.937   | 100g    |       |

| 4.1 Zinc with Impurities |                 | Pb       | Mg       | Al        | Cd       | Fe       | Sn       | Cu      | Ni       | Mn       | Sb       | As       | Bi       | In       | Tl       | Ti       | Cr       | Ag       | Size      |
|--------------------------|-----------------|----------|----------|-----------|----------|----------|----------|---------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|
| CRM                      | C41 X Z10M      | 0.0018   | (0.0003) | (0.00015) | 0.00005  | 0.0005   | <0.0002  | 0.0005  | 0.00010  | 0.00018  | (0.0004) | ...      | ...      | <0.00005 | (0.0003) | ...      | ...      | ...      | 50g       |
| CRM                      | C41 X Z30K      | 0.0052   | 0.0009   | 0.0083    | 0.0044   | 0.002    | 0.0039   | 0.0019  | 0.0031   | 0.0007   | 0.0037   | ...      | ...      | 0.0007   | 0.002    | 0.0012   | ...      | ...      | 50g       |
| CRM                      | C41 X Z40K      | 0.0092   | 0.0019   | 0.0096    | 0.0066   | 0.003    | 0.0070   | 0.0047  | 0.0069   | 0.0012   | 0.005    | ...      | ...      | 0.0015   | 0.003    | <0.0005  | ...      | ...      | 50g       |
| CRM                      | C41 X Z50L      | 0.0235   | 0.012    | 0.142     | 0.024    | (0.015)  | 0.0213   | 0.0228  | 0.0116   | 0.0033   | 0.006    | ...      | ...      | 0.004    | 0.0032   | ...      | ...      | ...      | 50g       |
| CRM                      | C41 X 0336 Z10K | 0.95     | 0.0049   | 0.014     | 0.0056   | 0.0124   | 0.005    | 0.007   | (0.0006) | 0.0035   | ...      | ...      | ...      | ...      | ...      | ...      | ...      | ...      | 50g       |
| CRM                      | C41 X 0336 Z30J | 0.019    | 0.134    | 0.43      | 0.341    | 0.270    | 0.111    | 0.361   | ...      | 0.0058   | ...      | ...      | ...      | ...      | ...      | ...      | ...      | ...      | 50g       |
| CRM                      | C41 X 0336 Z40B | 2.87     | 0.179    | 1.39      | 0.638    | (0.018)  | 2.38     | 0.874   | 0.0074   | 0.038    | 0.048    | 0.0005   | 0.027    | 0.0035   | (0.004)  | ...      | ...      | 0.0023   | 50g       |
| CRM                      | C41 X 0336 Z50A | 0.91     | <0.0005  | 0.035     | 0.056    | 0.016    | 0.21     | 0.023   | (0.0005) | (0.0001) | 0.008    | ...      | (0.001)  | ...      | ...      | ...      | ...      | ...      | 50g       |
| CRM                      | C41 X 0336 Z60A | 1.82     | 0.0008   | 0.105     | 0.014    | 0.08     | 0.0023   | 0.0203  | 0.0018   | 0.0010   | 0.234    | 0.0020   | 0.123    | 0.0123   | 0.0132   | ...      | ...      | 0.0055   | 50g       |
| CRM                      | C41 X 4380 Z10C | 0.068    | 0.0012   | 0.055     | 0.376    | 0.01     | 0.049    | 0.175   | 0.0029   | 0.0015   | 0.002    | ...      | 0.0017   | ...      | ...      | (0.001)  | 0.002    | ...      | 50g       |
| CRM                      | C41 X 4380 Z40C | 0.325    | 0.126    | 0.144     | 0.094    | 0.056    | 0.038    | 0.0022  | 0.0040   | 0.0007   | 0.017    | ...      | 0.011    | ...      | ...      | 0.005    | (0.0003) | ...      | 50g       |
| CRM                      | C41 X 4380 Z70C | 1.25     | 0.0028   | 0.137     | 0.015    | (0.0044) | 0.0047   | 0.012   | 0.012    | ...      | 0.090    | ...      | ...      | ...      | ...      | 0.009    | 0.0045   | ...      | 50g       |
| CRM                      | C41 X 4380 Z80C | 0.73     | 0.007    | 0.225     | 0.0079   | 0.003    | 0.011    | 0.020   | 0.024    | 0.0015   | 0.016    | ...      | 0.011    | ...      | ...      | 0.012    | 0.0019   | ...      | 50g       |
| CRM                      | C41 X 2951 Z10  | 0.0042   | 0.0029   | 0.029     | 0.0005   | 0.011    | (0.0007) | 0.79    | 0.0038   | 0.0013   | ...      | ...      | ...      | ...      | ...      | 0.278    | 0.083    | ...      | 50g       |
| CRM                      | C41 X 2951 Z30  | 0.0065   | 0.0164   | 0.078     | 0.0062   | 0.029    | (0.006)  | 1.89    | 0.0010   | 0.0018   | ...      | ...      | ...      | ...      | ...      | 0.133    | 0.184    | ...      | 50g       |
|                          |                 |          |          |           |          |          |          |         |          |          |          |          |          |          |          |          |          |          | <b>Co</b> |
| CRM                      | C41 X GLV10A    | 0.056    | ...      | 0.115     | 0.0093   | 0.059    | 0.010    | 0.0028  | 0.0141   | ...      | <0.001   | <0.001   | 0.0025   | ...      | ...      | ...      | ...      | ...      | 50g       |
| CRM                      | C41 X GLV20A    | 0.214    | ...      | 0.068     | 0.0025   | 0.048    | 0.003    | 0.0052  | 0.0070   | ...      | 0.006    | <0.001   | 0.017    | ...      | ...      | ...      | ...      | ...      | 50g       |
| CRM                      | C41 X GLV30A    | 0.0080   | ...      | 0.31      | 0.021    | 0.012    | 0.006    | 0.0188  | 0.0301   | ...      | 0.048    | (0.0008) | 0.0011   | ...      | ...      | ...      | ...      | ...      | 50g       |
| CRM                      | C41 X GLV40A    | 0.0038   | ...      | 0.201     | (0.0001) | 0.017    | <0.005   | 0.0009  | 0.049    | ...      | 0.025    | <0.002   | 0.0051   | ...      | ...      | ...      | ...      | ...      | 50g       |
| CRM                      | C41 X GLV50A    | 0.0187   | ...      | 0.014     | 0.0138   | 0.076    | 0.020    | 0.0116  | 0.0030   | ...      | 0.162    | 0.0041   | 0.0109   | ...      | ...      | ...      | ...      | ...      | 50g       |
| CRM                      | C41 X GLV60A    | 0.120    | ...      | 0.475     | 0.0055   | 0.0048   | 0.015    | 0.041   | 0.0008   | 0.0014   | 0.011    | 0.0015   | 0.024    | ...      | ...      | ...      | 0.0030   | 0.0050   | 50g       |
| CRM                      | C41 X GLV70A    | 0.082    | ...      | 0.399     | 0.00056  | 0.0031   | (0.0006) | 0.023   | 0.0060   | 0.0025   | 0.0031   | 0.0016   | 0.0108   | ...      | ...      | ...      | 0.0010   | (0.0001) | 50g       |
|                          | C41 CG 02701    | 0.0030   | ...      | ...       | 0.0010   | 0.0010   | ...      | 0.00010 | ...      | ...      | ...      | ...      | ...      | ...      | ...      | ...      | ...      | ...      | 50g       |
|                          | C41 CG 02702    | 0.0142   | ...      | ...       | 0.0103   | 0.0097   | ...      | 0.00099 | ...      | ...      | ...      | ...      | ...      | ...      | ...      | ...      | ...      | ...      | 50g       |
|                          | C41 CG 02703    | 0.309    | ...      | ...       | 0.0733   | 0.0301   | 0.0025   | 0.0021  | ...      | ...      | 0.0106   | 0.0052   | ...      | ...      | ...      | ...      | ...      | ...      | 50g       |
|                          | C41 M BS SP-A   | 0.003    | ...      | 0.051     | ...      | 0.011    | <0.001   | <0.0005 | ...      | ...      | 0.099    | ...      | ...      | ...      | ...      | ...      | ...      | ...      | 50g       |
|                          | C41 M BS SP-B   | 0.021    | ...      | 0.141     | ...      | 0.025    | <0.001   | <0.002  | ...      | ...      | 0.061    | ...      | ...      | ...      | ...      | ...      | ...      | ...      | 50g       |
|                          | C41 M BS SP-C   | 0.005    | ...      | 0.185     | ...      | 0.041    | <0.001   | <0.0005 | ...      | ...      | 0.031    | ...      | ...      | ...      | ...      | ...      | ...      | ...      | 50g       |
|                          | C41 M BS SP-D   | 0.038    | ...      | 0.25      | ...      | 0.060    | <0.001   | <0.0005 | ...      | ...      | 0.006    | ...      | ...      | ...      | ...      | ...      | ...      | ...      | 50g       |
| 4.2 Zn/Al                |                 | Pb       | Mg       | Al        | Cd       | Fe       | Sn       | Cu      | Ni       | Mn       | Cr       | In       | Tl       | Sb       | Si       | Ce       | La       | Size     |           |
|                          | C42 X Z10A      | 0.002    | <0.001   | 4.3       | <0.001   | 0.002    | 0.002    | 0.003   | 0.001    | <0.001   | ...      | ...      | ...      | ...      | ...      | ...      | ...      | ...      | 50g       |
| CRM                      | C42 X Z30H      | 0.006    | 0.0287   | 3.74      | 0.0048   | (0.047)  | 0.0030   | 0.159   | 0.0102   | 0.0256   | 0.0020   | ...      | ...      | 0.003    | 0.015    | (0.0003) | (0.0003) | ...      | 50g       |
|                          | C42 X Z40A      | 0.01     | 0.05     | 3.25      | 0.003    | 0.005    | 0.003    | 0.057   | 0.017    | 0.014    | ...      | ...      | ...      | ...      | ...      | ...      | ...      | ...      | 50g       |
| CRM                      | C42 X Z40B      | 0.011    | 0.058    | 3.51      | 0.008    | 0.014    | 0.006    | 0.063   | 0.017    | 0.008    | ...      | (0.0014) | (0.0026) | 0.002    | ...      | 0.021    | 0.019    | ...      | 50g       |
| CRM                      | C42 X Z50A      | 0.0047   | 0.073    | 4.22      | 0.0021   | 0.029    | (0.0023) | 0.100   | 0.019    | 0.0070   | 0.0018   | 0.0050   | 0.0056   | 0.005    | ...      | 0.011    | 0.009    | ...      | 50g       |
| CRM                      | C42 X Z70A      | 0.0097   | 0.0095   | 4.39      | 0.030    | 0.027    | 0.012    | 0.0249  | 0.0067   | 0.0045   | (0.0001) | ...      | ...      | ...      | 0.006    | 0.053    | 0.047    | ...      | 50g       |
| CRM                      | C42 X Z80A      | 0.0025   | 0.0033   | 7.03      | 0.0003   | 0.013    | (0.0023) | 0.0215  | 0.0019   | 0.0014   | (0.0002) | ...      | ...      | ...      | 0.013    | 0.0081   | 0.0079   | ...      | 50g       |
| 4.3 Zn/Al/Cu             |                 | Pb       | Mg       | Al        | Cd       | Fe       | Sn       | Cu      | Ni       | Mn       | Cr       | Ti       | Bi       | Sb       | Si       | In       | Tl       | Size     |           |
|                          | C43 X Z20A      | 0.008    | 0.042    | 3.2       | 0.01     | 0.02     | 0.01     | 0.89    | 0.003    | 0.008    | ...      | ...      | ...      | ...      | ...      | ...      | ...      | ...      | 50g       |
| CRM                      | C43 X Z20K      | 0.0065   | 0.073    | 3.79      | 0.0068   | 0.021    | 0.003    | 1.04    | 0.012    | 0.0059   | 0.0021   | ...      | (0.0022) | 0.008    | 0.009    | 0.003    | 0.004    | ...      | 50g       |
| CRM                      | C43 X Z30L      | 0.0132   | 0.0143   | 3.64      | 0.0132   | 0.061    | 0.0125   | 1.59    | 0.0061   | 0.0125   | 0.004    | ...      | 0.018    | 0.003    | 0.005    | (0.0019) | (0.0035) | ...      | 50g       |
| CRM                      | C43 X Z40B      | (0.0024) | 0.043    | 4.76      | 0.0025   | (0.064)  | (0.0023) | 3.21    | 0.0286   | 0.088    | 0.0063   | 0.0017   | 0.012    | 0.0043   | (0.0065) | ...      | ...      | ...      | 50g       |
| CRM                      | C43 X Z50A      | 0.0045   | 0.041    | 3.05      | 0.0111   | 0.023    | 0.0032   | 6.05    | 0.0021   | 0.0030   | 0.0010   | 0.0009   | ...      | ...      | 0.003    | ...      | ...      | ...      | 50g       |
| CRM                      | C43 X Z60A      | 0.0016   | 0.0256   | 4.02      | 0.0016   | 0.019    | 0.0053   | 2.72    | 0.029    | 0.0006   | 0.0006   | 0.0013   | 0.0049   | 0.0045   | 0.012    | ...      | ...      | ...      | 50g       |
|                          | C43 X Z110A     | 0.015    | 0.05     | 11.2      | 0.014    | 0.008    | 0.02     | 0.47    | 0.006    | 0.01     | ...      | ...      | ...      | ...      | ...      | ...      | ...      | ...      | 50g       |
| CRM                      | C43 X Z120D     | 0.0133   | 0.027    | 10.05     | 0.0114   | 0.047    | 0.0089   | 0.796   | 0.0035   | 0.0059   | 0.0023   | 0.0054   | (0.002)  | 0.0039   | (0.008)  | ...      | ...      | ...      | 50g       |
| CRM                      | C43 X Z130D     | 0.0125   | 0.0204   | 9.55      | 0.0100   | 0.05     | 0.0111   | 0.981   | 0.0109   | 0.0070   | ...      | ...      | ...      | 0.009    | (0.0048) | ...      | ...      | ...      | 50g       |
| CRM                      | C43 X Z140D     | 0.0082   | 0.0026   | 8.24      | 0.0067   | 0.015    | 0.0053   | 1.23    | 0.0052   | 0.0033   | 0.0046   | 0.0012   | 0.010    | 0.011    | 0.010    | ...      | ...      | ...      | 50g       |
|                          | C43 X Z150 A    | 0.003    | 0.01     | 8.1       | 0.002    | 0.004    | 0.004    | 1.37    | 0.006    | 0.002    | ...      | ...      | ...      | ...      | ...      | ...      | ...      | ...      | 50g       |
| CRM                      | C43 X Z150 C    | 0.0054   | 0.0024   | 7.36      | 0.0030   | 0.009    | 0.004    | 1.53    | 0.0019   | 0.0020   | 0.0025   | 0.0020   | 0.005    | 0.005    | (0.011)  | ...      | ...      | ...      | 50g       |
|                          | C43 X Z210A     | 0.007    | 0.06     | 24.9      | 0.01     | 0.05     | 0.01     | 2.05    | 0.002    | 0.009    | ...      | ...      | ...      | ...      | ...      | ...      | ...      | ...      | 50g       |
| CRM                      | C43 X Z210C     | 0.012    | 0.047    | 23.5      | 0.027    | 0.12     | 0.0140   | 1.81    | 0.043    | 0.0104   | 0.0087   | 0.013    | ...      | ...      | 0.022    | ...      | ...      | ...      | 50g       |
|                          | C43 X Z230A     | 0.002    | 0.01     | 29.8      | 0.002    | 0.008    | 0.003    | 2.73    | 0.003    | 0.002    | ...      | ...      | ...      | ...      | ...      | ...      | ...      | ...      | 50g       |
| CRM                      | C43 X Z230C     | 0.0028   | 0.0133   | 31.4      | 0.0024   | (0.24)   | (0.002)  | 2.74    | 0.0115   | 0.0124   | 0.036    | 0.0026   | ...      | ...      | 0.061    | ...      | ...      | ...      | 50g       |

# C5. Aluminium Base

Chippings

| 5.2 Residuals in Al |                 | Cu              | Mg       | Si           | Fe    | Mn       | Ni      | Zn      | Pb       | Sn      | Ti      | Cr     | V        | Co      | Bi      | Sb       | Be                  | Size |     |           |                     |        |      |
|---------------------|-----------------|-----------------|----------|--------------|-------|----------|---------|---------|----------|---------|---------|--------|----------|---------|---------|----------|---------------------|------|-----|-----------|---------------------|--------|------|
| CRM                 | C51 X G00H10A   | 0.034           | 0.039    | 0.12         | 0.051 | 0.041    | 0.038   | 0.042   | 0.018    | 0.028   | 0.031   | 0.027  | 0.016    | 0.011   | 0.011   | <0.005   | 0.0004              | 50g  |     |           |                     |        |      |
| CRM                 | C51 X G00H10D   | 0.0132          | 0.054    | 0.143        | 0.835 | 0.0074   | 0.230   | 0.249   | 0.0021   | 0.097   | 0.0135  | 0.0062 | 0.0080   | ...     | 0.024   | (0.003)  | ...                 | 50g  |     |           |                     |        |      |
| CRM                 | C51 X G00H20B   | 0.173           | 0.088    | 0.61         | 0.49  | 0.303    | 0.206   | 0.219   | 0.116    | 0.122   | 0.136   | 0.100  | 0.070    | 0.079   | 0.062   | 0.057    | 0.0024              | 50g  |     |           |                     |        |      |
| 5.4 Al/Si           |                 | Cu              | Mg       | Si           | Fe    | Mn       | Ni      | Zn      | Pb       | Sn      | Ti      | Cr     | V        | Co      | Bi      | Be       | Others              | Size |     |           |                     |        |      |
| CRM                 | C54 X G25D10L   | 0.010           | 0.67     | 3.37         | 0.721 | 0.815    | 0.262   | 0.359   | (0.0033) | <0.005  | 0.099   | 0.140  | 0.016    | ...     | 0.112   | 0.0011   | ...                 | 50g  |     |           |                     |        |      |
| CRM                 | C54 X G25D20K   | 0.130           | 0.59     | 3.93         | 0.576 | 0.479    | 0.139   | 0.169   | 0.073    | 0.042   | 0.152   | 0.150  | (0.006)  | 0.105   | 0.22    | 0.049    | Cd 0.011            | 50g  |     |           |                     |        |      |
|                     | C54 X G25D30A   | 0.13            | 0.31     | 6.3          | 0.61  | 0.34     | 0.11    | 0.14    | 0.09     | 0.09    | 0.1     | 0.08   | ...      | ...     | ...     | ...      | ...                 | 50g  |     |           |                     |        |      |
| CRM                 | C54 X G25D30R   | 0.117           | 0.208    | 5.97         | 0.454 | 0.289    | 0.111   | 0.092   | 0.074    | 0.054   | 0.078   | 0.061  | 0.011    | ...     | ...     | 0.0032   | Ga 0.016            | 50g  |     |           |                     |        |      |
| CRM                 | C54 X G25D40M   | 0.162           | 0.075    | 7.34         | 0.125 | 0.093    | 0.098   | 0.111   | 0.160    | 0.092   | 0.09    | 0.020  | (0.0022) | 0.045   | 0.092   | 0.019    | Cd 0.018            | 50g  |     |           |                     |        |      |
| CRM                 | C54 X G25D50L   | 0.273           | (0.0011) | 8.14         | 0.191 | (0.0046) | 0.0082  | 0.020   | 0.273    | 0.130   | 0.0068  | 0.0097 | (0.0025) | 0.0024  | ...     | 0.022    | ...                 | 50g  |     |           |                     |        |      |
| CRM                 | C54 X G06H20S   | 0.54            | 0.40     | 10.19        | 0.640 | 0.234    | 0.55    | 0.47    | 0.213    | 0.116   | 0.179   | 0.130  | 0.018    | 0.0086  | 0.027   | ...      | ...                 | 50g  |     |           |                     |        |      |
|                     | C54 X G06H30A   | 0.29            | 0.47     | 11.1         | 0.73  | 0.40     | 0.33    | 0.01(4) | 0.10     | 0.08    | 0.09    | 0.08   | ...      | ...     | ...     | ...      | ...                 | 50g  |     |           |                     |        |      |
| CRM                 | C54 X G06H30N   | 0.327           | 0.179    | 11.27        | 0.500 | 0.445    | 0.295   | 0.072   | 0.065    | 0.050   | 0.084   | 0.069  | 0.010    | 0.021   | ...     | ...      | Cd 0.0052, Ga 0.010 | 50g  |     |           |                     |        |      |
| CRM                 | C54 X G06H40Q   | 0.237           | 0.134    | 132.21       | 0.138 | 0.691    | 0.139   | 0.131   | 0.040    | (0.007) | 0.124   | 0.120  | 0.011    | 0.207   | ...     | ...      | ...                 | 50g  |     |           |                     |        |      |
| CRM                 | C54 X G06H50L   | 0.0229          | (0.0022) | 13.76        | 0.210 | 0.85     | 0.0067  | 0.225   | (0.0020) | 0.022   | 0.0106  | 0.026  | 0.008    | <0.0005 | ...     | ...      | ...                 | 50g  |     |           |                     |        |      |
| CRM                 | C54 X G13H10N   | 1.87            | 2.89     | 8.91         | 0.801 | 0.0137   | 1.83    | 0.37    | 0.240    | 0.260   | 0.112   | 0.062  | ...      | 0.0051  | <0.001  | 0.0078   | ...                 | 50g  |     |           |                     |        |      |
| CRM                 | C54 X G13H20M   | 1.29            | 1.37     | 10.42        | 0.767 | 0.248    | 1.15    | 0.530   | 0.083    | 0.145   | 0.166   | 0.103  | ...      | 0.004   | ...     | ...      | ...                 | 50g  |     |           |                     |        |      |
|                     | C54 X G13H30A   | 0.82            | 1.05     | 10.8         | 0.72  | 0.38     | 0.94    | 0.31    | 0.08     | 0.09    | 0.17    | 0.06   | ...      | ...     | ...     | ...      | ...                 | 50g  |     |           |                     |        |      |
| CRM                 | C54 X G13H40N   | 0.643           | 0.78     | 12.55        | 0.405 | 0.617    | 0.84    | 0.251   | 0.055    | 0.068   | 0.083   | 0.0264 | ...      | (0.001) | <0.001  | 0.0048   | Zr 0.021, Sr 0.026  | 50g  |     |           |                     |        |      |
| CRM                 | C54 X G231H10C  | 1.19            | 0.45     | 9.82         | 0.80  | 0.029    | 0.31    | 0.60    | 0.145    | 0.082   | 0.022   | 0.089  | ...      | ...     | ...     | (0.0002) | ...                 | 50g  |     |           |                     |        |      |
| CRM                 | C54 A 182/3     | 0.037           | 0.067    | 11.03        | 0.51  | 0.26     | 0.046   | 0.128   | 0.056    | 0.027   | 0.107   | ...    | ...      | ...     | ...     | ...      | ...                 | 100g |     |           |                     |        |      |
| CRM                 | C54 A 268/1     | 1.35            | 0.49     | 5.49         | 0.47  | 0.24     | 0.16    | 0.028   | 0.028    | 0.031   | (0.008) | ...    | ...      | ...     | ...     | ...      | ...                 | 100g |     |           |                     |        |      |
| CRM                 | C54 A 380/1     | 0.91            | 0.24     | 1.93         | 1.24  | 0.094    | 0.94    | 0.025   | ...      | ...     | 0.024   | ...    | ...      | ...     | ...     | ...      | ...                 | 100g |     |           |                     |        |      |
| 5.5 Al/Si/Cu        |                 | 5.6 Al/Cu       |          | 5.7 Al/Cu/Si |       |          | Cu      | Mg      | Si       | Fe      | Mn      | Ni     | Zn       | Pb      | Sn      | Ti       | Cr                  | Co   | V   | Zr        | Bi                  | Others | Size |
|                     | C55 X G02D40A   | 3.16            | 0.10     | 8.98         | 0.64  | 0.18     | 0.67    | 2.46    | 0.19     | 0.26    | 0.09    | 0.11   | ...      | ...     | ...     | ...      | ...                 | ...  | ... | ...       | ...                 | ...    | 50g  |
| CRM                 | C55 X G02D60J   | 0.487           | 0.336    | 12.3         | 1.27  | 0.648    | 0.027   | 0.083   | 0.457    | <0.005  | 0.34    | 0.035  | 0.018    | ...     | ...     | ...      | ...                 | ...  | ... | ...       | Li 0.0055, Ca 0.006 | 50g    |      |
| CRM                 | C55 X G02D70K   | 1.59            | 0.52     | 10.74        | 0.90  | 0.45     | 0.249   | 0.614   | 0.219    | 0.047   | 0.160   | 0.094  | 0.093    | 0.007   | ...     | 0.078    | ...                 | ...  | ... | ...       | Be 0.00055          | 50g    |      |
| CRM                 | C55 X G02D80H   | 2.26            | 0.205    | 9.91         | 0.94  | 0.453    | 0.366   | 1.29    | 0.335    | 0.186   | 0.240   | 0.052  | 0.058    | 0.024   | ...     | ...      | ...                 | ...  | ... | ...       | Be 0.0008           | 50g    |      |
| CRM                 | C55 X G02D90H   | 3.40            | 0.207    | 8.62         | 0.82  | 0.113    | 0.62    | 2.46    | 0.106    | 0.194   | 0.090   | 0.109  | 0.052    | 0.007   | ...     | ...      | ...                 | ...  | ... | ...       | Be 0.0010, Ga 0.01  | 50g    |      |
| CRM                 | C55 X G02D100K  | 4.65            | <0.01    | 6.56         | 0.186 | 0.015    | 0.97    | 4.76    | (0.004)  | 0.87    | <0.005  | 0.160  | 0.059    | ...     | ...     | 0.09     | ...                 | ...  | ... | ...       | ...                 | 50g    |      |
|                     | C55 X G04H30A   | 3.60            | 0.17     | 5.55         | 0.86  | 0.40     | 0.33    | 1.30    | 0.10     | 0.10    | 0.20    | 0.06   | ...      | ...     | ...     | ...      | ...                 | ...  | ... | ...       | ...                 | 50g    |      |
| CRM                 | C55 X G04H90D   | 2.64            | 0.079    | 5.99         | 0.304 | 0.304    | 0.231   | 1.89    | 0.062    | 0.031   | 0.31    | 0.005  | 0.010    | 0.009   | ...     | ...      | Cd 0.0015           | ...  | ... | ...       | ...                 | 50g    |      |
| CRM                 | C55 X G04H100D  | 1.360           | 0.004    | 7.21         | 0.512 | 0.532    | 0.0232  | 2.26    | (0.0074) | <0.01   | 0.0097  | 0.090  | 0.043    | 0.0077  | ...     | 0.029    | Ga 0.011            | ...  | ... | ...       | ...                 | 50g    |      |
|                     | C55 X G26H10F   | 4.34            | 0.29     | 7.69         | 1.78  | 0.015    | 0.012   | 1.14    | 0.24     | (0.008) | 0.21    | 0.20   | 0.022    | 0.012   | ...     | 0.07     | ...                 | ...  | ... | ...       | ...                 | 40g    |      |
| CRM                 | C55 X G26H20F   | 4.14            | 1.49     | 9.36         | 0.71  | 0.52     | 0.41    | 0.64    | 0.111    | 0.110   | 0.120   | 0.083  | 0.052    | 0.011   | ...     | 0.035    | ...                 | ...  | ... | ...       | ...                 | 40g    |      |
| CRM                 | C55 X G26H30F   | 2.19            | 1.01     | 9.6          | 1.07  | 0.45     | 0.51    | 0.79    | 0.228    | 0.16    | 0.147   | 0.130  | 0.076    | 0.020   | ...     | ...      | Ga 0.011, Li 0.006  | ...  | ... | ...       | ...                 | 40g    |      |
| CRM                 | C55 X G28J10Z   | 1.82            | 1.26     | 14.33        | 0.678 | 0.024    | 2.47    | 0.258   | 0.0038   | 0.182   | 0.104   | 0.319  | 0.119    | 0.0095  | ...     | ...      | ...                 | ...  | ... | ...       | ...                 | 40g    |      |
|                     | C55 X G28J30A   | 1.60            | 1.04     | 17.4         | 0.64  | 0.44     | 1.57    | 0.12    | 0.09     | 0.08    | 0.12    | 0.20   | ...      | ...     | ...     | ...      | ...                 | ...  | ... | ...       | ...                 | 40g    |      |
| CRM                 | C55 X G28J30B   | 1.58            | 0.99     | 17.5         | 0.50  | 0.378    | 1.81    | 0.32    | 0.081    | 0.059   | 0.073   | 0.256  | 0.345    | 0.011   | ...     | ...      | Cd 0.004, Be 0.0042 | ...  | ... | ...       | ...                 | 40g    |      |
|                     | C55 X A30J30A   | 4.09            | 0.48     | 17.5         | 0.71  | 0.32     | 0.10    | 0.07    | 0.06     | 0.08    | 0.12    | 0.05   | ...      | ...     | ...     | ...      | ...                 | ...  | ... | ...       | ...                 | 25g    |      |
| CRM                 | C55 X A30J30J   | 4.02            | 0.31     | 16.5         | 0.286 | 0.259    | 0.072   | 0.048   | 0.018    | 0.083   | 0.144   | 0.037  | 0.194    | 0.006   | ...     | 0.020    | ...                 | ...  | ... | ...       | ...                 | 25g    |      |
| CRM                 | C55 X G900J20F  | 0.86            | 0.62     | 0.44         | 0.38  | 0.145    | 0.133   | 0.309   | 0.52     | 0.34    | 0.054   | 0.118  | ...      | ...     | ...     | 0.55     | ...                 | ...  | ... | ...       | ...                 | 50g    |      |
| CRM                 | C55 X G900J40F  | 0.249           | 0.459    | 1.39         | 0.306 | 0.75     | 0.351   | 0.149   | 0.088    | 0.153   | 0.171   | 0.343  | ...      | ...     | ...     | 0.285    | ...                 | ...  | ... | ...       | ...                 | 50g    |      |
|                     | C56 CG 02204    | 4.89            | 0.034    | 0.050        | 0.077 | 0.41     | ...     | ...     | ...      | ...     | 0.24    | ...    | ...      | 0.18    | 0.093   | ...      | B 0.013, Cd 0.19    | ...  | ... | ...       | ...                 | 100g   |      |
| CRM                 | C56 X G250J10C  | 3.82            | 0.075    | 0.26         | 0.41  | 0.040    | 1.33    | 0.28    | 0.101    | 0.125   | 0.008   | 0.0067 | 0.008    | 0.102   | (0.003) | ...      | ...                 | ...  | ... | ...       | ...                 | 50g    |      |
| CRM                 | C56 X G250J20D  | 4.81            | 0.060    | 0.211        | 0.346 | 0.225    | 1.10    | 0.155   | (0.0016) | (0.004) | 0.210   | 0.063  | 0.195    | 0.018   | 0.247   | ...      | Sb 0.324            | ...  | ... | ...       | ...                 | 50g    |      |
| CRM                 | C56 X G250J30C  | 4.90            | (0.0011) | 0.11         | 0.079 | 0.278    | 0.92    | 0.103   | 0.024    | 0.031   | 0.162   | 0.024  | 0.264    | 0.036   | 0.275   | ...      | Sb 0.35, Be 0.0014  | ...  | ... | ...       | ...                 | 50g    |      |
| CRM                 | C56 X G250J50D  | 4.36            | 0.022    | 0.205        | 0.535 | 0.150    | 1.77    | 0.086   | 0.076    | 0.097   | 0.051   | 0.047  | 0.34     | 0.021   | 0.22    | ...      | Sb 0.076, Be 0.0022 | ...  | ... | ...       | ...                 | 50g    |      |
| CRM                 | C56 X G2000J10B | 3.47            | 2.75     | (0.046)      | 0.132 | 1.42     | 0.010   | 1.01    | (0.008)  | 0.104   | (0.004) | 0.005  | ...      | (0.003) | 0.26    | 0.16     | ...                 | ...  | ... | ...       | ...                 | 50g    |      |
| CRM                 | C57 X G12H10C   | 5.54            | 0.40     | 2.52         | 0.88  | 0.032    | 0.31    | 1.03    | 0.016    | 0.095   | 0.114   | 0.069  | 0.113    | 0.15    | 0.07    | ...      | Cd 0.012, Li 0.008  | ...  | ... | ...       | ...                 | 50g    |      |
| CRM                 | C57 X G12H50G   | 12.2            | 0.028    | 0.55         | 0.192 | 0.073    | 0.108   | 0.072   | 0.068    | 0.067   | 0.036   | 0.016  | 0.054    | 0.033   | 0.045   | ...      | Be 0.003, Cd 0.023  | ...  | ... | ...       | ...                 | 50g    |      |
| 5.8 Al/Zn           |                 | 5.9 Al/Zn/Mg/Cu |          |              | Cu    | Mg       | Si      | Fe      | Mn       | Ni      | Zn      | Pb     | Sn       | Ti      | Cr      | V        | Co                  | Zr   | Cd  | Others    | Size                |        |      |
|                     | C58 CG 02222    | 0.00089         | ...      | ...          | ...   | 0.028    | 0.00093 | 5.76    | ...      | ...     | ...     | ...    | ...      | ...     | ...     | ...      | 0.57                | ...  | ... | R.E. 0.85 | ...                 | 100g   |      |
| CRM                 | C58 A 300/1     | 1.27            | 2.74     | 0.14         | 0.24  | 0.33     | ...     | 5.87    | ...      | ...     | 0.09    | 0.13   | ...      | ...     | ...     | ...      | 0.18                | ...  | ... | ...       | ...                 | 100g   |      |
| CRM                 | C58 X G40H60B   | 0.111           | (0.003)  | 0.09         | 0.08  | 0.004    | 0.008   | 7.55    | <0.002   | <0.005  | 0.064   | 0.005  | <0.005   | 0.006   | (0.004) | 0.032    | ...                 | ...  | ... | ...       | ...                 | 50g    |      |
| CRM                 | C59 X G77J10F   | 2.41            | 4.83     | 0.15         | 0.205 | 0.46     | 0.167   | 1.91    | 0.125    | 0.126   | 0.178   | 0.242  | 0.005    | 0.018   | (0.010) | (0.0035) | Mo 0.004            | ...  | ... | ...       | ...                 | 50g    |      |
| CRM                 | C59 X G77J30E   | 2.42            | 2.27     | 0.366        | 0.712 | 0.594    | 0.43    | 4.57    | 0.075    | 0.137   | 0.107   | 0.023  | 0.006    | <0.005  | 0.026   | 0.0115   | Bi 0.046            | ...  | ... | ...       | ...                 | 50g    |      |
| CRM                 | C59 X G77J50D   | 0.122           | 0.72     | 0.30         | 1.32  | 0.030    |         |         |          |         |         |        |          |         |         |          |                     |      |     |           |                     |        |      |

# C5. Aluminium Base

Chippings

| 5.10 | Al/Cu/Mg;        | 5.11  | Al/Mg;  |       | 5.14 Al/Mn |       |          |       |        |        |        |         |         |          |                    |        |  | Typical Alloy Type | Size |      |
|------|------------------|-------|---------|-------|------------|-------|----------|-------|--------|--------|--------|---------|---------|----------|--------------------|--------|--|--------------------|------|------|
|      |                  |       | Cu      | Mg    | Si         | Fe    | Mn       | Ni    | Zn     | Pb     | Sn     | Ti      | Cr      | V        | Be                 | Others |  |                    |      |      |
|      | C510 CG 02220    | 2.17  | 1.56    | 0.88  | 1.18       | 0.14  | 1.15     | 0.30  | ...    | ...    | 0.041  | ...     | ...     | ...      |                    |        |  |                    |      | 50g  |
|      | C510 CG 02221    | 4.46  | 1.51    | 0.34  | 0.38       | 0.36  | 0.045    | 0.28  | ...    | ...    | 0.055  | ...     | ...     | ...      |                    |        |  |                    |      | 50g  |
|      | C511 CG 02201    | 0.043 | 6.02    | 0.14  | 0.18       | 0.60  | 0.038    | 0.20  | ...    | ...    | 0.076  | ...     | ...     | 0.0022   |                    |        |  |                    |      | 50g  |
| CRM  | C511 X G05H10H   | 0.32  | 2.02    | 0.42  | 0.79       | 0.012 | 0.123    | 0.47  | 0.023  | 0.179  | 0.205  | 0.240   | 0.053   | (0.0002) | Cd 0.013           |        |  |                    |      | 25g  |
| CRM  | C511 X G05H20G   | 0.37  | 3.12    | 0.35  | 0.60       | 0.186 | 0.22     | 0.26  | 0.068  | 0.154  | 0.079  | 0.30    | (0.001) | 0.004    | Cd 0.002, Ga 0.012 |        |  |                    |      | 25g  |
|      | C511 X G05H30A   | 0.10  | 5.35    | 0.24  | 0.54       | 0.38  | 0.09     | 0.09  | 0.10   | 0.10   | 0.07   | 0.06    | ...     | ...      |                    |        |  |                    | LM 5 | 25g  |
| CRM  | C511 X G05H30H   | 0.093 | 3.97    | 0.21  | 0.405      | 0.396 | 0.090    | 0.092 | 0.107  | 0.098  | 0.249  | 0.095   | ...     | 0.0074   |                    |        |  |                    |      | 25g  |
| CRM  | C511 X G05H40F   | 0.056 | 5.16    | 0.11  | 0.14       | 0.547 | 0.040    | 0.062 | 0.152  | 0.144  | 0.048  | 0.029   | ...     | 0.015    |                    |        |  |                    |      | 25g  |
| CRM  | C511 X G10H40B   | 0.052 | 10.4    | 0.33  | 0.19       | 0.12  | 0.085    | 0.21  | 0.10   | 0.051  | 0.097  | 0.15    | ...     | 0.023    | B 0.004            |        |  |                    |      | 40g  |
| CRM  | C511 X G3000B20B | 0.20  | 0.68    | 0.23  | 0.335      | 0.81  | 0.063    | 0.098 | 0.137  | 0.105  | 0.111  | 0.200   | <0.005  | 0.0017   | Co 0.007           |        |  |                    |      | 40g  |
| CRM  | C511 X G3000B30B | 0.120 | 0.80    | 0.35  | 0.376      | 1.06  | 0.116    | 0.140 | 0.062  | 0.028  | 0.22   | 0.056   | <0.005  | 0.005    | Co 0.008           |        |  |                    |      | 40g  |
| CRM  | C511 A 262/1     | 0.039 | 10.75   | 0.16  | 0.2        | 0.084 | 0.071    | 0.085 | (0.05) | (0.04) | 0.005  | (0.002) | ...     | <0.01    |                    |        |  |                    |      | 100g |
| CRM  | C511 A 263/2     | 0.019 | 4.67    | 0.14  | 0.26       | 0.36  | ...      | 0.056 | ...    | ...    | 0.022  | 0.074   | ...     | <0.001   |                    |        |  |                    |      | 100g |
| CRM  | C514 X 909110C   | 0.046 | (0.001) | 0.035 | 0.081      | 6.93  | (0.0026) | 0.029 | 0.016  | 0.013  | 0.0017 | <0.005  | ...     | ...      | Zr 0.184           |        |  |                    |      | 40g  |
| CRM  | C514 X 909130D   | 0.623 | 0.149   | 0.74  | 0.94       | 11.3  | 0.143    | 0.225 | 0.114  | 0.019  | 0.425  | 0.106   | ...     | ...      | Zr <0.005          |        |  |                    |      | 40g  |

# C6. Magnesium Base

Chippings

| 6.1 Magnesium with Impurities |              |         |          |        |         |        |        |          |          |        |          |          |            |            |          |            |      |     |
|-------------------------------|--------------|---------|----------|--------|---------|--------|--------|----------|----------|--------|----------|----------|------------|------------|----------|------------|------|-----|
|                               | Al           | Zn      | Mn       | Cu     | Si      | Fe     | Ni     | Ca       | Sn       | Pb     | Ag       | Be       | Cd         | Ce         | La       |            | Size |     |
| CRM                           | C61 X MgP10A | 0.0144  | (0.0017) | 0.0035 | 0.0008  | 0.005  | 0.027  | ...      | <0.001   | <0.002 | <0.002   | <0.0002  | <0.0002    | <0.0002    | <0.0005  | <0.0005    | 30g  |     |
| CRM                           | C61 X MgP20A | 0.065   | 0.0122   | 0.0118 | 0.0109  | 0.029  | 0.0061 | 0.0029   | 0.0139   | 0.0073 | 0.0061   | 0.003    | <0.0001    | 0.0063     | 0.0019   | 0.0014     | 30g  |     |
| CRM                           | C61 X MgP30A | 0.096   | 0.0196   | 0.0135 | 0.0296  | 0.046  | 0.014  | 0.0049   | 0.053    | 0.0154 | 0.0148   | 0.0125   | <0.0001    | 0.0154     | 0.0055   | 0.0038     | 30g  |     |
| 6.3 Mg/Mn                     |              |         |          |        |         |        |        |          |          |        |          |          |            |            |          |            |      |     |
|                               | Al           | Zn      | Mn       | Cu     | Si      | Fe     | Ni     | Ca       | Sn       | Pb     | Zr       | Ag       | Cd         | Ti         |          | Size       |      |     |
|                               | C63 X MgE20A | 0.056   | 0.04     | 1.58   | 0.058   | 0.035  | 0.009  | 0.012    | (0.003)  | 0.011  | 0.013    | ...      | ...        | ...        | ...      | 30g        |      |     |
| CRM                           | C63 X MgE30B | 0.015   | 0.022    | 2.36   | 0.012   | 0.01   | 0.004  | 0.0023   | 0.13     | 0.0057 | 0.005    | <0.001   | 0.005      | 0.001      | (0.0026) | 30g        |      |     |
| 6.5 Mg/Al/Zn                  |              |         |          |        |         |        |        |          |          |        |          |          |            |            |          |            |      |     |
|                               | Al           | Zn      | Mn       | Cu     | Si      | Fe     | Ni     | Ca       | Sn       | Pb     | Ag       | Be       | Cd         | Ce         | La       | Sr         | Size |     |
| CRM                           | C65 X MgA10H | 3.83    | 1.40     | 0.20   | 0.148   | 0.17   | (0.01) | 0.008    | 0.008    | 0.090  | 0.016    | ...      | 0.00055    | ...        | ...      | 0.0007     | 30g  |     |
| CRM                           | C65 X MgA10J | 5.45    | 1.26     | 0.060  | 0.221   | 0.20   | 0.021  | 0.021    | 0.029    | 0.072  | 0.012    | 0.012    | 0.006      | 0.013      | 0.009    | 0.007      | ...  | 30g |
| CRM                           | C65 X MgA20G | 7.19    | 0.95     | 0.14   | 0.112   | 0.13   | 0.011  | 0.003    | (0.005)  | 0.050  | 0.006    | ...      | 0.0007     | ...        | ...      | ...        | 30g  |     |
|                               | C65 X MgA30A | 8.4     | 0.60     | 0.27   | 0.06    | 0.12   | 0.03   | 0.009    | 0.004    | 0.01   | 0.01     | ...      | ...        | ...        | ...      | ...        | 30g  |     |
| CRM                           | C65 X MgA30H | 8.97    | 0.70     | 0.152  | 0.006   | 0.044  | 0.004  | (0.0015) | (0.0005) | 0.003  | (0.0036) | ...      | 0.0007     | ...        | ...      | <0.0001    | 30g  |     |
| CRM                           | C65 X MgA40H | 11.70   | 0.0047   | 0.0061 | 0.062   | 0.024  | 0.008  | (0.0036) | 0.033    | 0.0101 | 0.0040   | 0.0186   | 0.0011     | ...        | ...      | ...        | 30g  |     |
| CRM                           | C65 X MgA50A | 8.01    | 0.411    | 0.399  | 0.020   | 0.110  | 0.006  | 0.020    | 0.013    | 0.013  | 0.043    | 0.0050   | 0.0013     | 0.0035     | ...      | 0.00034    | 30g  |     |
| CRM                           | C65 X MgB10D | 2.39    | 1.711    | 0.68   | 0.20    | 0.17   | 0.016  | 0.013    | 0.41     | 0.011  | 0.017    | 0.029    | 0.0008     | 0.070      | (0.014)  | (0.013)    | ...  | 30g |
|                               | C65 X MgB20A | 2.32    | 0.95     | 0.44   | 0.096   | 0.06   | 0.015  | 0.005    | 0.008    | 0.012  | 0.012    | ...      | ...        | ...        | ...      | ...        | 30g  |     |
| CRM                           | C65 X MgB30B | 3.12    | 0.60     | 0.012  | 0.021   | 0.013  | 0.008  | 0.0018   | 0.029    | 0.005  | 0.004    | (0.0023) | 0.0030     | 0.011      | ...      | ...        | 30g  |     |
| 6.6 Mg/Zn                     |              |         |          |        |         |        |        |          |          |        |          |          |            |            |          |            |      |     |
|                               | Al           | Zn      | Mn       | Zr     | Cu      | Si     | Fe     | Ni       | Ca       | Sn     | Pb       | Ag       | Be         | Total R.E. | Others   |            | Size |     |
| CRM                           | C66 X MgD30B | 0.039   | 1.97     | 0.282  | (0.029) | 0.058  | 0.017  | 0.023    | (0.002)  | (0.05) | 0.008    | 0.006    | (0.004)    | (0.0003)   | ...      |            | 30g  |     |
|                               | C66 X MgD40A | 0.006   | 2.80     | 0.02   | 0.44    | 0.01   | 0.01   | 0.003    | 0.002    | 0.004  | 0.003    | 0.017    | ...        | ...        | ...      |            | 30g  |     |
|                               | C66 X MgC20A | 0.007   | 5.93     | 0.016  | 0.45    | 0.15   | 0.007  | 0.013    | 0.016    | 0.006  | 0.010    | 0.018    | ...        | ...        | ...      |            | 30g  |     |
| CRM                           | C66 X MgC40C | 0.039   | 6.80     | 0.167  | <0.001  | 0.0023 | 0.06   | 0.006    | 0.001    | <0.001 | 0.021    | 0.003    | 0.0074     | 0.0001     | ...      | Sr 0.00014 | 30g  |     |
| CRM                           | C66 A 307    | (0.008) | 2.08     | 0.006  | 0.56    | 0.005  | <0.001 | 0.002    | <0.001   | ...    | <0.001   | ...      | ...        | ...        | 2.84     |            | 100g |     |
| CRM                           | C66 A 316    | 8.01    | 0.68     | 0.28   | ...     | 0.04   | 0.055  | 0.009    | 0.004    | ...    | 0.005    | 0.024    | ...        | ...        | ...      |            | 100g |     |
| 6.7 Mg/Rare Earth             |              |         |          |        |         |        |        |          |          |        |          |          |            |            |          |            |      |     |
|                               | Al           | Zn      | Mn       | Zr     | Th      | Cu     | Si     | Fe       | Ni       | Sn     | Pb       | Ca       | Total R.E. |            |          |            | Size |     |
|                               | C67 X MgF30A | 0.01    | 3.18     | 0.015  | 0.48    | ...    | 0.03   | 0.005    | 0.009    | 0.002  | 0.006    | 0.017    | 0.006      | 2.4        |          |            | 30g  |     |
|                               | C67 X MgG40A | 0.001   | 5.47     | 0.015  | 0.72    | 1.85   | 0.06   | 0.003    | 0.003    | 0.007  | 0.005    | 0.009    | 0.001      | ...        |          |            | 30g  |     |
| 6.8 Mg/Ag/Rare Earth          |              |         |          |        |         |        |        |          |          |        |          |          |            |            |          |            |      |     |
|                               | Al           | Zn      | Mn       | Zr     | R.E.    | Th     | Cu     | Si       | Fe       | Ni     | Ag       |          |            |            |          |            | Size |     |
|                               | C68 X MgH40A | 0.004   | 0.17     | 0.015  | 0.46    | 2.4    | ...    | 0.03     | 0.002    | 0.001  | 0.004    | 2.05     |            |            |          |            | 30g  |     |
|                               | C68 X MgL10A | 0.002   | 0.009    | 0.016  | 0.54    | 2.09   | 0.24   | 0.013    | 0.001    | 0.009  | 0.005    | 1.41     |            |            |          |            | 30g  |     |



# C7. Tin Base

Chippings

| 7.1 Tin with Impurities |          |       |       |          |           |          |          |          |        |           |       |        |        |        |          |      |
|-------------------------|----------|-------|-------|----------|-----------|----------|----------|----------|--------|-----------|-------|--------|--------|--------|----------|------|
|                         | Sb       | As    | Bi    | Pb       | Cu        | Fe       | Ni       | Al       | Cd     | Zn        | In    | Te     | Ag     | Au     | Sn       | Size |
| CRM C71 X SR10D         | 0.013    | 0.004 | 0.010 | 0.030    | 0.0088    | 0.0017   | 0.001    | 0.0007   | 0.0070 | 0.0071    | 0.014 | 0.0032 | 0.009  | 0.003  | ...      | 50g  |
| CRM C71 X SR20D         | 0.057    | 0.041 | 0.056 | 0.127    | 0.054     | 0.0027   | 0.0096   | 0.003    | 0.041  | 0.015     | 0.049 | 0.022  | 0.025  | 0.0083 | ...      | 50g  |
| CRM C71 X SR30E         | 0.15     | 0.061 | 0.105 | 0.30     | 0.099     | 0.003    | 0.0009   | (0.0009) | 0.021  | 0.014     | 0.028 | 0.008  | 0.0069 | 0.003  | ...      | 50g  |
| C71 A 192h              | (0.0007) | ...   | ...   | (0.0007) | (0.00007) | (0.0002) | <0.00005 | ...      | ...    | (0.00006) | ...   | ...    | ...    | ...    | (99.997) | 100g |

| 7.2 Tin-Antimony |       |       |       |      |       |       |      |         |       |      |
|------------------|-------|-------|-------|------|-------|-------|------|---------|-------|------|
|                  | Sb    | As    | Bi    | Pb   | Cu    | Zn    | Cd   | Fe      | Sn    | Size |
| CRM C72 X SA50R  | 4.93  | 0.015 | 0.006 | 0.08 | 0.018 | 0.035 | 0.05 | (0.004) | ...   | 50g  |
| CRM C72 CG 02301 | 7.87  | 0.018 | 0.014 | 1.32 | 4.06  | ...   | ...  | ...     | 86.61 | 100g |
| CRM C72 CG 02302 | 11.81 | 0.020 | 0.012 | 1.2  | 6.72  | ...   | ...  | ...     | 80.27 | 100g |

| 7.3 Tin White Metal |       |       |       |       |       |       |       |        |        |         |       |        |        |         |      |      |
|---------------------|-------|-------|-------|-------|-------|-------|-------|--------|--------|---------|-------|--------|--------|---------|------|------|
|                     | Sb    | As    | Bi    | Pb    | Cu    | Fe    | Ni    | Al     | Cd     | Zn      | In    | Ag     | Co     | S       | Sn   | Size |
| CRM C73 X SC40A     | 6.02  | 0.005 | 0.218 | 0.514 | 3.05  | 0.011 | 0.017 | 0.005  | 0.052  | 0.008   | 0.011 | 0.042  | 0.0035 | (0.003) | ...  | 50g  |
| CRM C73 X SC70A     | 14.01 | 0.047 | 0.009 | 0.356 | 6.51  | 0.046 | 0.008 | 0.001  | 0.0018 | (0.003) | 0.014 | 0.006  | 0.0160 | <0.001  | ...  | 50g  |
| CRM C73 X SC90A     | 8.18  | 0.53  | 0.066 | 0.20  | 8.47  | 0.037 | 0.008 | <0.001 | 0.078  | (0.003) | 0.010 | 0.004  | 0.0030 | (0.008) | ...  | 50g  |
| CRM C73 X SC110A    | 11.63 | 0.31  | 0.537 | 0.040 | 10.54 | 0.072 | 0.49  | <0.002 | 1.63   | 0.065   | ...   | 0.060  | ...    | ...     | ...  | 50g  |
| CRM C73 A 178/2     | 9.45  | 0.15  | 0.11  | 3.18  | 4.58  | 0.024 | 0.17  | 0.005  | 0.14   | 0.040   | ...   | (0.02) | ...    | ...     | 82.2 | 100g |

| 7.4 Tin-base (Lead-Free) Solders |       |       |        |       |        |        |       |       |        |        |        |     |      |
|----------------------------------|-------|-------|--------|-------|--------|--------|-------|-------|--------|--------|--------|-----|------|
|                                  | Cu    | Ag    | Pb     | Sb    | Bi     | Zn     | Ni    | Fe    | As     | Cd     | Se     | Sn  | Size |
| CRM C74 X E A                    | 3.01  | 0.742 | 0.0262 | 0.027 | 0.0097 | <0.001 | 0.011 | 0.052 | 0.088  | 0.0021 | 0.0025 | rem | 50g  |
| CRM C74 X HA A                   | 0.604 | 2.69  | 0.025  | 1.98  | 0.057  | 2.59   | 0.016 | 0.052 | 0.0076 | 0.0027 | ...    | rem | 50g  |
| CRM C74 X HB A                   | 4.75  | 0.070 | 0.058  | 5.00  | 0.008  | 0.018  | 1.12  | 0.12  | 0.026  | 0.011  | ...    | rem | 50g  |

# C8. Lead Base

Chippings

| 8.2 Pb/Ag         |      |      |      |       |       |      |       |       |        |        |       |      |  |  |  |  |
|-------------------|------|------|------|-------|-------|------|-------|-------|--------|--------|-------|------|--|--|--|--|
|                   | Sn   | Sb   | Bi   | Cu    | As    | Ag   | Zn    | Cd    | Fe     | Al     | In    | Size |  |  |  |  |
| CRM C82 X Ag 1.5E | 0.04 | 0.39 | 0.06 | 0.27  | 0.006 | 1.55 | 0.004 | ...   | ...    | ...    | ...   | 100g |  |  |  |  |
| CRM C82 X Ag 3.5D | 0.24 | 0.11 | 0.27 | 0.075 | 0.022 | 3.48 | 0.001 | 0.004 | 0.001  | <0.001 | 0.045 | 100g |  |  |  |  |
| CRM C82 X Ag 6.0A | 0.50 | 0.48 | 0.52 | 0.18  | 0.021 | 5.93 | 0.007 | 0.010 | <0.001 | <0.001 | 0.008 | 100g |  |  |  |  |

| 8.3 Pure Lead  |        |        |        |        |        |        |        |        |        |        |        |        |        |        |          |          |
|----------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|----------|----------|
|                | ppm Sn | ppm Sb | ppm Bi | ppm Cu | ppm As | ppm Ag | ppm Zn | ppm Cd | ppm Ni | ppm Te | ppm Se | ppm Tl | ppm Fe | ppm Al | % Pb     | Size     |
| CRM C83 F 286B | <0.05  | 0.10   | 21.5   | 1.49   | <0.002 | 0.015  | <0.1   | 0.125  | 0.041  | <0.1   | <0.05  | 2.5    | ...    | ...    | ...      | 160g     |
| CRM C83 F 287B | <0.05  | 0.04   | 67.3   | 0.98   | <0.003 | 15.2   | <0.1   | 0.36   | 0.024  | <0.2   | <0.05  | 0.73   | ...    | ...    | ...      | 160g     |
| CRM C83 F 288B | 30.6   | 32.5   | 215.8  | 19.3   | 55.7   | 30.5   | 8.2    | 33.3   | 4.57   | 32.8   | <0.2   | 2.3    | ...    | ...    | ...      | 160g     |
| CRM C83 A 210e | <20    | <20    | ...    | (6)    | ...    | ...    | <50    | ...    | <10    | ...    | ...    | ...    | <5     | 10     | (99.996) | Bar 500g |

| 8.3.1 Lead with Impurities |       |       |       |       |         |       |       |       |       |         |       |         |       |         |         |      |
|----------------------------|-------|-------|-------|-------|---------|-------|-------|-------|-------|---------|-------|---------|-------|---------|---------|------|
|                            | Sn    | Sb    | Bi    | Cu    | As      | Ag    | Zn    | Cd    | Ni    | Te      | In    | Ca      | Na    | Se      | Au      | Size |
| CRM C83 X PR10G            | 0.004 | 0.005 | 0.080 | 0.006 | 0.050   | 0.088 | 0.002 | 0.075 | 0.001 | 0.003   | 0.045 | 0.004   | 0.01  | <0.002  | 0.008   | 100g |
| CRM C83 X PR40F            | 0.009 | 0.012 | 0.014 | 0.015 | (0.002) | 0.014 | 0.005 | 0.010 | 0.013 | 0.025   | 0.005 | 0.0026  | 0.001 | 0.003   | 0.002   | 100g |
| CRM C83 X PR70A            | 0.21  | 0.84  | 0.50  | 0.22  | 0.049   | 0.30  | 0.002 | 0.49  | 0.005 | 0.002   | 0.077 | (0.001) | 0.004 | (0.01)  | (0.001) | 100g |
| CRM C83 X PR80A            | 0.59  | 0.25  | 1.13  | 0.083 | 0.17    | 0.55  | 0.007 | 0.260 | 0.003 | (0.002) | 0.74  | <0.002  | 0.019 | (0.012) | (0.011) | 100g |

| 8.4 Pb/Sn/Ca (Battery Alloys) |       |        |        |        |          |        |          |        |          |          |        |          |      |  |  |  |
|-------------------------------|-------|--------|--------|--------|----------|--------|----------|--------|----------|----------|--------|----------|------|--|--|--|
|                               | Sn    | Sb     | Bi     | Cu     | As       | Ag     | Zn       | Cd     | Ni       | Te       | Al     | Ca       | Size |  |  |  |
| CRM C84 X BA10E               | 1.05  | 0.0018 | 0.0148 | 0.0019 | (0.0004) | 0.0099 | 0.0031   | 0.0026 | 0.0002   | (0.0004) | 0.0135 | 0.099    | 100g |  |  |  |
| CRM C84 X BA20B               | 0.51  | 0.002  | 0.024  | 0.003  | <0.0005  | 0.008  | 0.019    | 0.0052 | (0.0002) | <0.002   | ...    | 0.062    | 100g |  |  |  |
| CRM C84 X BA40B               | 0.108 | 0.061  | 0.074  | 0.031  | (0.0008) | 0.003  | (0.0003) | 0.010  | 0.0007   | 0.030    | ...    | (0.0014) | 100g |  |  |  |
| CRM C84 X BA80A               | 0.293 | 0.0009 | 0.019  | 0.0007 | (0.0004) | 0.0043 | 0.0013   | 0.0010 | ...      | <0.002   | 0.021  | 0.157    | 100g |  |  |  |

| 8.5 Various Lead Alloys; 8.6 Lead Babbit |       |       |        |        |       |         |        |        |        |         |          |       |          |          |       |      |
|--|-------|-------|--------|--------|-------|---------|--------|--------|--------|---------|----------|-------|----------|----------|-------|------|
|  | Sn    | Sb    | Bi     | Cu     | As    | Ag      | Ni     | Cd     | Zn     | In      | Te       | Se    | Fe       | S        | Pb    | Size |
| CRM C85 X ANTH D                         | 1.32  | 6.32  | 0.059  | 0.0234 | 0.487 | 0.0058  | 0.0035 | 0.0052 | 0.0004 | ...     | 0.010    | 0.017 | 0.0041   | (0.0030) | ...   | 100g |
| CRM C85 X HRH A                          | 0.87  | 1.14  | 0.090  | 0.080  | 0.73  | 0.247   | 0.0009 | 0.0002 | ...    | ...     | 0.002    | 0.035 | ...      | (0.0008) | ...   | 100g |
| CRM C85 X 0616Pb10A                      | 0.070 | 1.76  | 0.026  | 0.047  | 0.068 | 0.0023  | 0.0010 | 0.0022 | 0.0009 | ...     | (0.0016) | 0.017 | <0.001   | ...      | ...   | 100g |
| C86 CG 02401                             | 15.97 | 16.09 | 0.024  | 1.96   | 0.014 | ...     | ...    | ...    | ...    | ...     | ...      | ...   | ...      | ...      | 65.72 | 100g |
| C86 CG 02402                             | 5.69  | 15.02 | 0.0075 | 2.88   | 0.012 | ...     | ...    | ...    | ...    | ...     | ...      | ...   | ...      | ...      | 76.22 | 100g |
| C86 A 177/2                              | 5.07  | 10.1  | 0.028  | 0.12   | 0.05  | (0.008) | 0.007  | ...    | ...    | ...     | ...      | ...   | ...      | ...      | 84.5  | 100g |
| CRM C86 X PSS20A                         | 6.33  | 8.16  | 0.054  | 0.118  | 1.42  | 0.004   | 0.0080 | 0.069  | <0.002 | (0.002) | ...      | ...   | <0.001   | ...      | ...   | 100g |
| CRM C86 X PSS40A                         | 10.69 | 16.97 | 0.120  | 0.328  | 0.278 | (0.006) | 0.0031 | 0.047  | <0.002 | 0.013   | ...      | ...   | (0.0013) | ...      | ...   | 100g |

# C9. Solders

Chippings

| 9.1 Sn/Pb Solders |                 | Sn    | Sb    | Bi    | Cu    | As      | Ag     | Fe       | Zn      | Cd     | Ni     | Au     | In     | Te     | Pb  | Size |
|-------------------|-----------------|-------|-------|-------|-------|---------|--------|----------|---------|--------|--------|--------|--------|--------|-----|------|
| CRM               | C91 X S30 PR30C | 30.88 | 0.269 | 0.294 | 0.102 | 0.0126  | 0.024  | 0.0016   | (0.003) | 0.0115 | 0.0269 | 0.0063 | 0.0085 | ...    | ... | 100g |
| CRM               | C91 X S63 PR00A | 59.8  | 0.013 | 0.007 | 0.023 | 0.008   | 0.010  | (0.0026) | <0.001  | 0.012  | <0.005 | 0.018  | 0.01   | <0.001 | rem | 100g |
|                   | C91 X S63 PR10F | 61.30 | 0.075 | 0.062 | 0.252 | (0.001) | 0.0065 | 0.012    | 0.0032  | 0.0057 | 0.0010 | 0.040  | 0.028  | 0.0008 | rem | 100g |
| CRM               | C91 X S63 PR20G | 62.6  | 0.614 | 0.162 | 0.052 | 0.080   | 0.057  | 0.030    | 0.007   | 0.0168 | 0.0073 | 0.090  | 0.019  | 0.009  | rem | 100g |
| CRM               | C91 X S63 PR40A | 66.8  | 0.093 | 0.030 | 0.021 | <0.002  | 0.030  | <0.005   | <0.001  | 0.021  | <0.005 | 0.05   | 0.014  | 0.006  | rem | 100g |

| 9.3 Sn/Pb/Sb Solders |                  | Sn    | Sb   | Bi    | Cu    | As     | Ag     | Fe      | Zn       | Cd     | Ni     | In     | Te     | Pb  | Size |
|----------------------|------------------|-------|------|-------|-------|--------|--------|---------|----------|--------|--------|--------|--------|-----|------|
| CRM                  | C93 X S30 APR10C | 28.58 | 2.54 | 0.059 | 0.192 | 0.010  | 0.0144 | (0.012) | (0.0004) | 0.0014 | 0.0010 | 0.0094 | 0.0024 | ... | 100g |
| CRM                  | C93 X S30 APR20C | 30.68 | 1.80 | 0.168 | 0.062 | 0.0178 | 0.049  | 0.0026  | 0.028    | 0.0061 | 0.042  | 0.0199 | 0.0102 | ... | 100g |
| CRM                  | C93 X S30 APR30C | 33.0  | 0.96 | 0.28  | 0.008 | 0.018  | 0.021  | 0.003   | 0.0053   | 0.009  | 0.010  | ...    | ...    | rem | 100g |

# C10. Titanium Base

Chippings

| 10.1 Various Titanium Alloys |               | Al   | Mo     | Si       | Sn       | Zr       | V    | Fe    | Nb   | B        | Cr      | Cu     | W        | Ni     | N      | C      | Typical Alloy Type | Size |
|------------------------------|---------------|------|--------|----------|----------|----------|------|-------|------|----------|---------|--------|----------|--------|--------|--------|--------------------|------|
|                              | C101 P 3180A  | 6.5  | ...    | ...      | ...      | ...      | 4.08 | 0.19  | ...  | ...      | ...     | ...    | ...      | ...    | ...    | ...    | 318                | 50g  |
|                              | C101 P 5510A  | 4.04 | 3.8    | 0.48     | 3.89     | ...      | ...  | 0.05  | ...  | ...      | ...     | ...    | ...      | ...    | ...    | ...    | 551                | 50g  |
|                              | C101 P 6790A  | 2.35 | 1.0    | 0.2      | 10.88    | 4.88     | ...  | 0.02  | ...  | ...      | ...     | ...    | ...      | ...    | ...    | ...    | 679                | 50g  |
|                              | C101 P 6850A  | 6.11 | 0.48   | 0.21     | ...      | 5.05     | ...  | 0.02  | ...  | ...      | ...     | ...    | ...      | ...    | ...    | ...    | 685                | 50g  |
|                              | C101 P 8290A  | 5.62 | 0.25   | 0.28     | 3.49     | 2.98     | ...  | 0.02  | 0.97 | ...      | ...     | ...    | ...      | ...    | ...    | ...    | 829                | 50g  |
|                              | C101 P 8110A  | 7.97 | 0.97   | ...      | ...      | ...      | 1.02 | 0.08  | ...  | ...      | ...     | ...    | ...      | ...    | ...    | ...    | 811                | 50g  |
| CRM                          | C101 A 356    | 6.25 | 0.0020 | (0.0200) | (0.0155) | <0.0005  | 4.05 | 0.124 | ...  | <0.0005  | 0.01123 | 0.0055 | (0.0010) | 0.0070 | 0.0103 | ...    | ...                | 50g  |
| CRM                          | C101 A 357    | 5.46 | 0.053  | (0.0500) | (0.0620) | (0.0455) | 3.53 | 0.202 | ...  | (0.0013) | 0.0521  | 0.0537 | (<0.001) | 0.0511 | 0.0148 | ...    | ...                | 50g  |
| CRM                          | C101 CG 02501 | 6.42 | 2.53   | 0.28     | ...      | 0.276    | ...  | 0.473 | ...  | ...      | 1.55    | ...    | ...      | ...    | 0.010  | 0.013  | ...                | 50g  |
| CRM                          | C101 CG 02502 | 6.33 | 3.40   | 0.275    | ...      | 1.71     | ...  | 0.057 | ...  | ...      | ...     | ...    | ...      | ...    | 0.021  | 0.0123 | ...                | 50g  |

# C11. Cobalt Base

Chippings

| 11.1 - Various Cobalt Alloys |                   | C     | Si    | S      | Mn     | Ni      | Cr      | W    | Nb    | Fe    | Cu     | Pb      | Sn     | Mo     | Al    | B      | Co    | N     | Size |
|------------------------------|-------------------|-------|-------|--------|--------|---------|---------|------|-------|-------|--------|---------|--------|--------|-------|--------|-------|-------|------|
|                              | C111 X 126670A    | 0.38  | 0.064 | ...    | 0.97   | 1.12    | 19.7    | 10.2 | 1.53  | 2.20  | 0.11   | 0.03    | 0.10   | ...    | ...   | ...    | ...   | ...   | 30g  |
|                              | C111 X 126690A    | 0.51  | 0.62  | ...    | 0.54   | 0.57    | 22.7    | 12.3 | 2.59  | 1.2   | 0.006  | 0.001   | 0.01   | ...    | ...   | ...    | ...   | ...   | 30g  |
|                              | C112 X 149360A    | 0.50  | 0.12  | ...    | 0.74   | 1.57    | 23.0    | 0.95 | ...   | 0.44  | ...    | ...     | ...    | 4.97   | 0.50  | ...    | ...   | ...   | 30g  |
|                              | C112 X 149430A    | 0.23  | 0.72  | ...    | 1.21   | 0.09    | 30.7(1) | 0.07 | ...   | 0.18  | ...    | ...     | ...    | 8.0(3) | <0.01 | ...    | ...   | ...   | 30g  |
|                              | C113 X X4010A     | 0.53  | 1.25  | ...    | 0.20   | 11.5(1) | 26.9    | 7.14 | ...   | 0.65  | ...    | ...     | ...    | ...    | ...   | ...    | ...   | ...   | 30g  |
|                              | C113 X X4020A     | 0.42  | 0.28  | ...    | 1.13   | 9.64    | 24.75   | 7.95 | ...   | 2.17  | ...    | ...     | ...    | ...    | ...   | ...    | ...   | ...   | 30g  |
|                              | C119 X COB10E     | 0.009 | 0.41  | 0.0015 | 0.52   | 22.8    | 24.3    | 11.1 | ...   | 16.4  | <0.005 | ...     | ...    | ...    | 0.39  | ...    | ...   | 0.188 | 50g  |
| CRM                          | C119 X ST30G      | 2.04  | 0.95  | 0.020  | 0.62   | 2.44    | 30.4    | 10.1 | <0.05 | 1.48  | 0.026  | (0.002) | (0.03) | 0.45   | ...   | 0.0022 | ...   | 0.104 | 50g  |
| CRM                          | C119 TI E378-1(C) | 1.181 | 1.172 | 0.0055 | 0.0579 | 0.617   | 28.22   | 4.43 | ...   | 0.606 | ...    | ...     | ...    | ...    | ...   | ...    | 63.52 | ...   | 100g |
| CRM                          | C119 DB E328-1    | 0.390 | 0.629 | 0.003  | 1.395  | 20.38   | 20.54   | 4.16 | 3.61  | 2.40  | 0.013  | ...     | ...    | 4.41   | 0.070 | ...    | 41.65 | 0.027 | 100g |

# C13. Carbides

Chippings

| 13.1 Various Carbides |              | Total C | Free C | Ni     | Co     | Fe     | Nb      | Al     | Ca    | Cr     | V    | Ta   | Ti     | Type                          | Size |
|-----------------------|--------------|---------|--------|--------|--------|--------|---------|--------|-------|--------|------|------|--------|-------------------------------|------|
|                       | C131 M BS107 | 6.14    | (0.04) | 0.0008 | 0.0013 | 0.008  | (0.014) | 0.0004 | 0.001 | 0.0014 | 0.15 | ...  | ...    | Tungsten Carbide              | 100g |
| CRM                   | C131 A 352/1 | 6.154   | 0.036  | ...    | ...    | 0.0029 | ...     | ...    | ...   | ...    | ...  | ...  | ...    | Tungsten Carbide              | 100g |
|                       | C13 MA 307   | 6.16    | ...    | ...    | ...    | ...    | ...     | ...    | ...   | ...    | ...  | ...  | ...    | Tungsten carbide              | 150g |
| CRM                   | C131 B 276b  | 6.10    | (0.04) | ...    | ...    | ...    | ...     | ...    | ...   | ...    | ...  | ...  | ...    | Tungsten Carbide              | 75g  |
| CRM                   | C131 B 887   | (5.5)   | ...    | <0.01  | 10.35  | <0.05  | <0.05   | ...    | ...   | ...    | ...  | ...  | <0.05  | Cemented Carbide W83-Co10     | 100g |
| CRM                   | C131 B 888   | (4.6)   | ...    | <0.05  | 24.7   | <0.05  | <0.05   | ...    | ...   | ...    | ...  | 4.77 | (0.04) | Cemented Carbide W64-Co25-Ta5 | 100g |
| CRM                   | C131 B 889   | (6.0)   | ...    | <0.05  | 9.50   | <0.05  | <0.05   | ...    | ...   | ...    | ...  | 4.03 | 4.03   | Cemented Carbide W/Co/Ta/Ti   | 100g |

# 17. Gases In Metals

| 17.1.1 Steel   | ppm O | ppm N |  | Sample Form      | Typical Alloy Type | Quantity  |  |
|--|-------|-------|--|------------------|--------------------|-----------|--|
| 17 MA 644  | 3     | 171   |  | 1g Pins          | Steel              | 100 pins  |  |
| 17 MA 645  | 60    | 58    |  | 1g Pins          | Steel              | 100 pins  |  |
| 17 MA 646  | 31    | 677   |  | 1g Pins          | Steel              | 100 pins  |  |
| 17 MA 1647   | 41    | 1797  | These values may change as the batches are remade. | 1g Pins          | Steel              | 100 pins  |  |
| 17 MA 1648   | 180   | 73    |  | 1g Pins          | Steel              | 100 pins  |  |
| 17 MA 1649   | n/a   | 23    |  | 1g Pins          | Steel              | 101 pins  |  |
| 17 MA 1650   | 76    | 97    |  | 1g Pins          | Steel              | 100 pins  |  |
| 17 MA 1651   | 64    | 213   |  | 1g Pins          | Steel              | 100 pins  |  |
| 17 MA 1652   | 54    | 532   |  | 1g Pins          | Steel              | 100 pins  |  |
| 17 MA 1653   | 14    | 34    |  | 1g Pins          | Steel              | 100 pins  |  |
| These are nominal values. Exact chemistry is given with the product. |       |       |  |                  |                    |           |  |
| Each pin is plated to ensure stable and accurate oxygen values       |       |       |  |                  |                    |           |  |
| Each grade is also available as 0.5g pins.                           |       |       |  |                  |                    |           |  |
| 17 DB E099-1   | 8     | 78    |  | 1g Balls         | Ball-Bearing Steel | 100 balls |  |
| 17 DB E026-1   | 31    | 53    |  | 8mm Ø x 80mm Rod | Unalloyed          | 1 rod     |  |
| 17 DB E026-2   | 25    | 42    |  | 8mm Ø x 80mm Rod | Unalloyed          | 1 rod     |  |
| 17 DB E027-1   | 84    | 157   |  | 8mm Ø x 80mm Rod | Unalloyed          | 1 rod     |  |
| 17 DB E028-1   | 113   | 29    |  | 8mm Ø x 80mm Rod | Unalloyed          | 1 rod     |  |
| 17 DB E029-1   | 312   | 83    |  | 8mm Ø x 80mm Rod | Unalloyed          | 1 rod     |  |
| 17 DB E284-2   | 99    | 151   |  | Chippings        | Stainless Steel    | 100g      |  |

| 17.1.2 Steel  | ppm H     | ppm N | ppm O      | Others            | Sample Form        | Typical Alloy Type | Quantity |
|---|-----------|-------|------------|-------------------|--------------------|--------------------|----------|
| 17 MA 546   | 0.61      | ...   | ...        |                   | 1g Pins            | Steel              | 100 pins |
| 17 MA 555   | 2.5       | ...   | ...        |                   | 1g Pins            | Steel              | 100 pins |
| 17 MA 556   | 5.75      | ...   | ...        |                   | 1g Pins            | Steel              | 100 pins |
| 17 MA 557   | 3.7       | 425   | 18         |                   | 1.07g Pins         | Steel              | 50 pins  |
| These pins are Ni plated. These are nominal values - exact chemistry is given with the product. |           |       |            |                   |                    |                    |          |
| 17 M BSH0N  | 2.02      | 362.7 | 56.4       | C 490ppm, S 25ppm | 1g pins            | AISI 302           | 250 pins |
| 17 JS GS1D  | 1.7 ± 0.2 | 254   | 46.0 ± 3.8 |                   | 5mm Ø x 230mm Rods |                    | 8 rods   |
| 17 JS GS2C  | ...       | 145   | 17.5       |                   | 5mm Ø x 230mm Rods |                    | 8 rods   |
| 17 JS GS5C  | ...       | 29    | 125        |                   | 5mm Ø x 230mm Rods |                    | 8 rods   |
| 17 JS GS6B  | ...       | ...   | 3.4        |                   | 1.04g Pins         |                    | 150 pins |
| 17 CG 02606   | 6.5       | ...   | ...        |                   | 2g Balls           |                    | 100 pcs  |
| 17 CG 02607-2B  | 4.7       | ...   | ...        |                   | 2g Balls           |                    | 20 pcs   |
| 17 CG 02608   | 2.4       | ...   | ...        |                   | 2g Balls           |                    | 100 pcs  |
| 17 CG 02609   | ...       | 51    | 12         |                   | 1g Balls           |                    | 50 pcs   |
| 17 CM 3001  | 5.9       | 184   | 68         |                   | ...                |                    | 20 pcs   |
| 17 CM 3012-3  | 6.5       | ...   | ...        |                   | 2g Balls           |                    | 20 pcs   |
| 17 CM 3012-4  | 6.5       | ...   | ...        |                   | 1g Balls           |                    | 20 pcs   |
| 17 CM 3013  | 4.5       | ...   | ...        |                   | 1g Balls           |                    | 20 pcs   |
| 17 CM 3014-1  | 4.4       | ...   | ...        |                   | 2g Balls           |                    | 20 pcs   |
| 17 CM 3014-2  | 4.4       | ...   | ...        |                   | 1g Balls           |                    | 20 pcs   |
| 17 CM 3015-1  | 2.4       | ...   | ...        |                   | 1g Balls           |                    | 20 pcs   |
| 17 CM 3016-1  | 2.4       | ...   | ...        |                   | 2g Balls           |                    | 20 pcs   |
| 17 CM 3031  | ...       | ...   | 214        |                   | 0.64g              |                    | 20 pcs   |
| 17 CM 3032  | ...       | 360   | 187        |                   | 1g Balls           |                    | 20 pcs   |
| 17 CM 3033  | ...       | 184   | 64         |                   | 1g Balls           |                    | 20 pcs   |
| 17 CM 3034  | ...       | 231   | 39         |                   | 1g Balls           |                    | 20 pcs   |
| 17 CM 3036  | ...       | 256   | 62.4       |                   | 0.5g Balls         |                    | 20 pcs   |
| 17 CM 3037  | ...       | 100   | 137        |                   | 0.45g Balls        |                    | 20 pcs   |
| 17 CM 3038  | ...       | 297   | 244        |                   | 0.5g Balls         |                    | 20 pcs   |
| 17 CM 3039  | ...       | 204   | 353        |                   | 0.5g Balls         |                    | 20 pcs   |

|             | ppm O | % N | % Sol Al | % C  | % Mn | % Si | % Cr | % Ni | Sample Form        | Quantity |
|-------------|-------|-----|----------|------|------|------|------|------|--------------------|----------|
| CRM 17 J 31 | 15    | ... | 0.020    | 1.03 | 0.36 | 0.32 | ...  | ...  | 10mm Ø x 500mm Rod | 1 rod    |
| CRM 17 J 32 | 28    | ... | 0.008    | 1.02 | 0.30 | 0.32 | 1.38 | ...  | 10mm Ø x 500mm Rod | 1 rod    |
| CRM 17 J 34 | 68    | ... | 0.047    | 0.13 | 1.40 | 0.31 | ...  | ...  | 10mm Ø x 500mm Rod | 1 rod    |
| CRM 17 J 35 | 198   | ... | 0.001    | 0.04 | 1.51 | 0.31 | 17.3 | 9.9  | 10mm Ø x 500mm Rod | 1 rod    |

|                | ppm N   | ppm O   | ppm H |  | Sample Form       | Quantity |
|----------------|---------|---------|-------|--|-------------------|----------|
| 17 S SS-1      | 5-10    | 410-450 | ...   |  | 0.5g Pins         | 100      |
| 17 S SS-2      | 10-20   | 100-120 | ...   | Nominal ranges. Exact values will be supplied with product | 1.0g Pins         | 100      |
| 17 S SS-3      | 55-70   | 165-185 | ...   |  | 1.0g Pins         | 100      |
| 17 S SS-4      | 135-145 | 10-15   | ...   |  | 1.0g Pins         | 100      |
| 17 S SS-6      | 10-20   | 580-640 | ...   |  | 1.0g Pins         | 100      |
| 17 S SS-5      | ...     | ...     | 6.5-8 | Nominal range.   | 10g Rods          | 10       |
| 17 S SMN-11    | 4-6     | ...     | ...   | Nominal range.   | Chippings         | 150g     |
| 17 S SMO-10    | ...     | 1691    | ...   |  | 0.5g pin          | 100      |
| CRM 17 S GS-3C | 32      | 34.6    | ...   |  | 5mm Ø x 230mm Rod | 1        |
| CRM 17 J 47    | 76      | 1.1%    | ...   |  | Powder            | 35g      |

# 17. Gases In Metals

Balls/Pins/Discs

| 17.2 Nickel     |                | ppm<br>O | ppm<br>S | ppm<br>N   | ppm<br>C   | Sample Form        | Typical<br>Alloy Type    | Quantity |
|-----------------|----------------|----------|----------|--|--|--------------------|--------------------------|----------|
| CRM             | 172 F 099      | 8.4      | ...      | 1.1  | ...  | 2g Cubes           | Pure Nickel              | 25 cubes |
| CRM             | 172 PN Ni/1    | ...      | 31       | ...  | 1260   | Chippings          | Nickel Alloy             | 100g     |
| CRM             | 172 PN Ni/2    | ...      | 149      | ...  | 128  | Chippings          | Nickel Alloy             | 100g     |
| 17.3 Copper     |                | ppm<br>O | ppm<br>S | ppm<br>P   | ppm<br>C   | Sample Form        | Typical<br>Alloy Type    | Quantity |
| CRM             | 173 F 022A     | 138      | ...      | ...  | ...  | 26mm Ø x 9mm Disc  | Electrolytic tough pitch | 1 disc   |
| CRM             | 173 F 022B     | 138      | ...      | ...  | ...  | 26mm Ø x 9mm Disc  | Electrolytic tough pitch | 1 rod    |
| CRM             | 173 F 054R     | 0.47     | ...      | ...  | ...  | 26mm Ø x 9mm Disc  | Low Oxygen               | 1 rod    |
| CRM             | 173 F 058      | 390      | ...      | ...  | ...  | 26mm Ø x 9mm Disc  | Continuous cast          | 1 rod    |
|                 | 173 MA 147     | 13       | 26       | These values may<br>change as the<br>batches are remade. |  | 1g Pins            |                          | 100 pins |
|                 | 173 MA 148     | 498      | 12       |  |  | 1g Pins            |                          | 100 pins |
|                 | 173 MA 149     | 305      | 6        |  |  | 1g Pins            |                          | 100 pins |
|                 |                | ppm<br>O | ppm<br>S | ppm<br>P   | ppm<br>C   | Sample Form        | Typical<br>Alloy Type    | Quantity |
|                 | 173 DB 379/1   | 38       | ...      | ...  | ...  | 40mm Ø x 30mm Disc |                          | 1 disc   |
|                 | 173 DB 379/2   | 212      | ...      | ...  | ...  | 40mm Ø x 30mm Disc |                          | 1 disc   |
|                 | 173 DB 379/3   | 378      | ...      | ...  | ...  | 40mm Ø x 30mm Disc |                          | 1 disc   |
| CRM             | 173 PN Cu10/1  | 3.8      | ...      | ...  | ...  | 6mm Ø Rod          |                          | 1 rod    |
| CRM             | 173 PN Cu600/1 | 581      | ...      | ...  | ...  | 6mm Ø Rod          |                          | 1 rod    |
| CRM             | 173 PN CuS-10  | ...      | 7.5      | ...  | ...  | Chippings          |                          | 150g     |
| CRM             | 173 PN CuS-20  | ...      | 23.1     | ...  | ...  | Chippings          |                          | 150g     |
| CRM             | 173 F 017A     | ...      | ...      | 6.9  | ...  | 42mm Ø x 30mm Disc |                          | 1 disc   |
| CRM             | 173 F 017B     | ...      | 10.4     | ...  | ...  | Chippings          |                          | 50g      |
|                 | 173 DB 373/1   | ...      | ...      | 33.8   | ...  | 50mm Ø x 30mm Disc |                          |          |
|                 | 173 DB 373/2   | ...      | ...      | 226.5  | ...  | 50mm Ø x 30mm Disc |                          | set only |
|                 | 173 DB 373/3   | ...      | ...      | 455.7  | ...  | 50mm Ø x 30mm Disc |                          |          |
| 17.5 Aluminium  |                | ppm<br>O | ppm<br>C | ppm<br>B   | ppm<br>H   | Sample Form        | Typical<br>Alloy Type    | Quantity |
|                 | 175 US US1001  | ...      | ...      | ...  | 0.18   | 12mm Ø x 250mm Rod | Al-6Cu                   | 1 rod    |
|                 | 175 US US1002  | ...      | ...      | ...  | 0.16   | 12mm Ø x 250mm Rod | Al-6Cu                   | 1 rod    |
|                 | 175 US US1003  | ...      | ...      | ...  | 0.23   | 12mm Ø x 250mm Rod | Al-1Mg                   | 1 rod    |
|                 | 175 US US1004  | ...      | ...      | ...  | 0.23   | 12mm Ø x 250mm Rod | Al-6Mg                   | 1 rod    |
| 17.10 Titanium  |                | ppm<br>O | ppm<br>N | ppm<br>H   | ppm<br>C   | Sample Form        | Typical<br>Alloy Type    | Quantity |
| CRM             | 1710 F 024B    | 608      | 117      | ...  | ...  | 0.4g cube          | Pure Titanium            | 25 pcs   |
| CRM             | 1710 F 024C    | 608      | 117      | ...  | ...  | 0.2g cube          | Pure Titanium            | 25 pcs   |
| CRM             | 1710 F 059A    | 1750     | ...      | ...  | ...  | Ø 26mm x 9mm Disc  | Ti 6Al 4V alloy          | 1 disc   |
| CRM             | 1710 F 059B    | 1750     | ...      | ...  | ...  | 0.2g cube          | Ti 6Al 4V alloy          | 25 pcs   |
| CRM             | 1710 F 318     | ...      | ...      | 12.2   | ...  | Ø 7mm x 1mm Disc   | Pure Titanium            | 25 pcs   |
|                 | 1710 MA 637    | 597      | 101      | 16   | ...  | 0.1g Pins          |                          | 100 pins |
|                 | 1710 MA 642    | 1500     | 120      | 49   | These values may<br>change as the<br>batches are remade. |                    | 0.25g Pins               | 100 pins |
|                 | 1710 MA 648    | 1238     | 49       | 142  |  |                    | 0.1g Pins                | 100 pins |
|                 | 1710 MA 649    | 810      | 119      | 200  |  |                    | 0.25g Pins               | 100 pins |
|                 | 1710 MA 650    | 1913     | 330      | 62   |  |                    | 0.25g Pins               | 100 pins |
|                 | 1710 MA 651    | 1275     | 51       | 29   |  |                    | 0.1g Pins                | 100 pins |
|                 | 1710 CG 02601  | ...      | 170      | ...  | ...  | Chippings          | Pure Titanium            | 35g      |
|                 | 1710 CG 02602  | ...      | 200      | ...  | ...  | Chippings          | Ti 5Al 4V alloy          | 35g      |
|                 | 1710 CG 02604  | 2730     | 230      | ...  | ...  | 2x3x100mm Strip    | Pure Titanium            | 3 strips |
|                 | 1710 CG 02618  | ...      | 130      | ...  | ...  | Chippings          | Ti 15Al 3V alloy         | 20g      |
| 17.12 Zirconium |                | ppm<br>O | ppm<br>N | ppm<br>C   | ppm<br>H   | Sample Form        | Typical<br>Alloy Type    | Quantity |
| CRM             | 1712 F 276     | 1541     | 41       | 107.6  | ...  | 4.5mm Ø x 2mm Pins | Zircaloy 4               | 100 pcs  |
|                 | 1712 MA 640    | 1480     | 51       | ...  | 11   | 0.10g Pins         |                          | 100 pcs  |

# 18. Carbon, Sulphur & Nitrogen in Steels Chippings/Pins

| 18.1 Cast Iron |        | %     | %   |             | Typical    |        |
|----------------|--------|-------|---|-------------|------------|--------|
|                | C      | S     |   | Sample Form | Alloy Type | Weight |
| 18 MA 301      | 2.12   | 0.01  |   | Chippings   | Cast       | 150g   |
| 18 MA 302      | 3.31   | 0.03  |   | Chippings   | Grey       | 150g   |
| 18 MA 303      | 3.95   | 0.01  | These pins are Ni plated.<br>These are nominal values.<br>Exact chemistry is given<br>with the product. | Chippings   | Nodular    | 150g   |
| 18 MA 304      | 4.20   | 0.02  |   | Chippings   | Ductile    | 150g   |
| 18 MA 305      | 2.75   | 0.02  |   | Chippings   | Malleable  | 150g   |
| 18 MA 306      | 3.50   | 0.01  |   | Chippings   | Nodular    | 150g   |
| 18 MA 309      | 3.70   | 0.01  |   | Chippings   | Nodular    | 150g   |
| 18 MA 310      | 3.38   | 0.10  |   | Chippings   | Cast       | 150g   |
| 18 MA 673      | 0.0004 | 0.001 |   | Chippings   | Pure Iron  | 454g   |

| 18.3 Steel      |        | %       | %      | %  | Typical       |          |
|-----------------|--------|---------|--------|--|---------------|----------|
|                 | C      | S       | N      | Sample Form                              | Alloy Type    | Quantity |
| 18 M BS CSN 2-1 | 0.476  | 0.034   | 0.064  | 1.00g Pins                               | AISI 440A     | 500 pins |
| 18 M BS CSN 2-2 | 0.548  | 0.028   | 0.076  | 1.00g Pins                               | AISI 440A     | 500 pins |
| 18 M BS CSN 3   | 0.892  | 0.0035  | 0.0047 | 1.00g Pins                               | Low Alloy     | 500 pins |
| 18 M BS CSN 4   | 0.011  | 0.0008  | 0.026  | 1.00g Pins                               | AISI 302 mod  | 500 pins |
| 18 M BS CS5     | 0.050  | 0.0040  | ...    | 1.00g Pins                               | AISI 304      | 500 pins |
| 18 M BS CSN A   | 0.068  | 0.305   | 0.0081 | Chippings                                | AISI 1213 mod | 100g     |
| 18 M BS ST-626  | 0.068  | 0.020   | 0.0064 | Pins                                     | Carbon Steel  | 100pins  |
| CRM 18 E 58     | 0.294  | 0.019   | ...    | Chippings                                | Carbon Steel  | 120g     |
| CRM 18 E 59A    | 0.497  | 0.027   | ...    | Chippings                                | Carbon Steel  | 120g     |
| CRM 18 E 60A    | 0.715  | 0.012   | ...    | Chippings                                | Carbon Steel  | 100g     |
| 18 J 36         | 0.0125 | 0.0126  | 0.0337 | Chippings                                |               | 150g     |
| 18 J 40         | 0.793  | 0.200   | 0.0344 | Chippings                                |               | 100g     |
| CRM 18 S 243-5  | ...    | 0.346   | ...    | Chippings                                | Binary Alloy  | 150g     |
| 18 S CS-01      | 0.93   | 0.006   | ...    | 8mm Ø x 0.5g Ring,<br>8mm Ø Double Ring, |               | 200 pcs  |
| 18 S CS-11      | 0.93   | 0.006   | ...    |  |               | 100 pcs  |
| 18 MA 947       | 0.389  | 0.094   | 0.0121 | Chippings                                |               | 150g     |
| 18 MA 948       | 0.534  | 0.089   | 0.0082 | Chippings                                |               | 150g     |
| 18 MA 949       | 0.018  | 0.028   | 0.0628 | Chippings                                |               | 150g     |
| 18 MA 950       | 0.071  | 0.013   | 0.0016 | Chippings                                |               | 150g     |
| 18 MA 951       | 0.179  | 0.023   | 0.0090 | Chippings                                |               | 150g     |
| 18 MA 952       | 0.449  | 0.024   | 0.0089 | Chippings                                |               | 150g     |
| 18 MA 953       | 0.968  | 0.013   | 0.0078 | Chippings                                |               | 150g     |
| 18 MA 954       | 0.405  | 0.022   | 0.0076 | Chippings                                |               | 150g     |
| 18 MA 955       | 0.203  | 0.021   | 0.0085 | Chippings                                |               | 150g     |
| 18 MA 956       | 0.450  | 0.297   | 0.0060 | Chippings                                |               | 150g     |
| 18 MA 957       | 0.183  | 0.106   | 0.0083 | Chippings                                |               | 150g     |
| 18 MA 958       | 0.057  | 0.027   | 0.0517 | Chippings                                |               | 150g     |
| 18 MA 959       | 0.019  | 0.023   | 0.0742 | Chippings                                |               | 150g     |
| 18 MA 960       | 0.105  | 0.0006  | 0.0403 | Chippings                                |               | 150g     |
| 18 MA 961       | 0.0194 | 0.0161  | 0.0499 | Chippings                                |               | 150g     |
| 18 MT 088A      | 0.0151 | 0.00045 | ...    | 2g Pins                                  | T-302 HQ      | 200 pins |





# 19. Soil

19.3 Soils

|                    | Si     | Al     | Ca     | Fe    | K      | Mg     | Mn     | Na     | P      | Ti     | ppm As | ppm Ba  | ppm Cd | ppm Ce | ppm Co | ppm Cr |           |
|--------------------|--------|--------|--------|-------|--------|--------|--------|--------|--------|--------|--------|---------|--------|--------|--------|--------|-----------|
| CRM 193 A SO-2     | 24.99  | 8.07   | 1.96   | 5.56  | 2.45   | 0.54   | 0.072  | 1.9    | 0.3    | 0.86   | ...    | 966     | ...    | ...    | 9      | 16     |           |
| CRM 193 A SO-3     | 15.86  | 3.05   | 14.63  | 1.51  | 1.61   | 4.98   | 0.052  | 0.74   | 0.048  | 0.2    | ...    | 296     | ...    | ...    | 8      | 26     | continued |
| 193 A TILL-1       | 28.4   | 7.3    | 1.94   | 4.77  | 1.84   | 1.29   | 0.14   | 2.01   | 0.10   | 0.59   | 18     | 702     | ...    | 71     | 18     | 65     |           |
| 193 A TILL-2       | 28.4   | 8.5    | 0.91   | 3.77  | 2.55   | 1.10   | 0.08   | 1.62   | 0.07   | 0.53   | 26     | 540     | ...    | 98     | 15     | 74     | continued |
| 193 A TILL-3       | 32.2   | 6.5    | 1.88   | 2.74  | 2.01   | 1.03   | 0.05   | 1.96   | 0.05   | 0.29   | 87     | 489     | ...    | 42     | 15     | 123    |           |
| 193 A TILL-4       | 30.3   | 7.6    | 0.89   | 3.94  | 2.70   | 0.76   | 0.05   | 1.83   | 0.09   | 0.49   | 111    | 395     | ...    | 78     | 8      | 53     |           |
| 193 S JSO-1        | 17.91  | 9.56   | 1.82   | 7.97  | 0.28   | 1.27   | 0.153  | 0.50   | 0.21   | 0.90   | 8.1    | 267     | ...    | ...    | 32     | 71     | continued |
| 193 S JSO-2        | 19.71  | 11.30  | 0.78   | 7.31  | 1.29   | 1.00   | 0.136  | 0.76   | 0.07   | 0.84   | 1076   | 352     | ...    | ...    | 1071   | 1118   |           |
| 193 S JSAC 0401    | (35.0) | (6.5)  | ...    | (3.0) | (1.7)  | ...    | 0.0266 | ...    | ...    | (0.38) | 10.62  | (410)   | 4.25   | (62)   | (6.2)  | 50.4   | continued |
| 193 S JSAC 0411    | ...    | (7.6)  | ...    | (3.3) | (0.64) | ...    | 0.0943 | ...    | ...    | (0.32) | 11.3   | (250)   | 0.274  | (43)   | (6.5)  | 23.5   |           |
| 193 CG 08302       | 30.57  | 7.11   | 2.59   | 3.34  | 2.12   | 1.53   | 0.068  | 1.52   | 0.086  | 0.40   | 3.8    | 509     | 0.081  | 83.6   | 13.1   | 60.8   | continued |
| 193 CG 08303       | 25.9   | 6.86   | 4.79   | 2.79  | 1.57   | 1.30   | 0.0051 | 1.10   | 0.16   | 0.36   | 10.6   | 724     | 1.20   | ...    | 13.0   | 112    |           |
| CRM 193 B 2586     | 29.15  | 6.652  | 2.218  | 5.161 | 0.9760 | 1.707  | 0.1000 | 0.4680 | 0.1001 | 0.6050 | 8.7    | 413     | 2.71   | 58.0   | ...    | 301    |           |
| CRM 193 B 2587     | 33.13  | 5.860  | 0.927  | 2.813 | 1.583  | 0.669  | 0.0651 | 1.127  | 0.0970 | 0.3920 | 13.7   | 568     | 1.92   | ...    | ...    | 92     |           |
| CRM 193 B 2709     | 29.66  | 7.50   | 1.89   | 3.50  | 2.03   | 1.51   | 0.0538 | 1.16   | 0.062  | 0.342  | 17.7   | 968     | 0.38   | (42.0) | 13.4   | 130    | continued |
| CRM 193 B 2710     | 28.97  | 6.44   | 1.25   | 3.38  | 2.11   | 0.853  | 1.01   | 1.14   | 0.106  | 0.283  | 626    | 707     | 21.8   | (57)   | (10)   | (39)   |           |
| CRM 193 B 2711     | 30.44  | 6.53   | 2.88   | 2.89  | 2.45   | 1.05   | 0.0638 | 1.14   | 0.086  | 0.306  | 105    | 726     | 41.70  | (69)   | (10)   | (47)   |           |
| CRM 193 LI 12.1.07 | (25.0) | (9.0)  | (0.69) | 3.73  | 3.08   | (0.59) | 0.09   | (0.3)  | (0.13) | (0.55) | ...    | 582.0   | 0.214  | ...    | 15.4   | 79.8   |           |
| CRM 193 LI 12.1.08 | (31.0) | (5.77) | (0.49) | 2.7   | 1.85   | (0.63) | 0.091  | (0.8)  | (0.1)  | (0.5)  | ...    | 365.0   | 0.198  | ...    | 11.9   | 87.4   | continued |
| CRM 193 LI 12.1.09 | (20.0) | (7.48) | (6.34) | 3.73  | 2.63   | (1.19) | 0.073  | (0.45) | (0.14) | (0.38) | ...    | 315.0   | 0.285  | ...    | 15.6   | 75.3   |           |
| CRM 193 SA 42      | 34.61  | 5.31   | 0.64   | 3.27  | 0.37   | 1.16   | 0.08   | (0.11) | (0.02) | 0.22   | ...    | (250.0) | ...    | ...    | 35.0   | 430.0  | continued |

Continuation from above

All Elements ppm

|                 | Cu   | Hg    | Ni    | Pb     | Rb    | Sr     | V      | Zn    | Zr    | Y    | Others    | Type                      | Size |
|-----------------|------|-------|-------|--------|-------|--------|--------|-------|-------|------|-----------|---------------------------|------|
| 193 A SO-2      | 7    | 0.082 | 8     | 21     | 78    | 340    | 64     | 124   | ...   | ...  |           | Podzolic B Horizon        | 200g |
| 193 A SO-3      | 17   | 0.017 | 16    | 14     | 39    | 217    | 38     | 52    | ...   | ...  |           | Calcereous C Horizon      | 200g |
| 193 A TILL-1    | 47   | ...   | 24    | 22     | 44    | 291    | 99     | 98    | 502   | ...  |           | Soil                      | 100g |
| 193 A TILL-2    | 150  | ...   | 32    | 31     | 143   | 144    | 77     | 130   | 390   | ...  |           | Till                      | 100g |
| 193 A TILL-3    | 22   | ...   | 39    | 26     | 55    | 300    | 62     | 56    | 230   | ...  |           | Soil                      | 100g |
| 193 A TILL-4    | 237  | ...   | 17    | 50     | 161   | 109    | 67     | 70    | 385   | ...  |           | Till                      | 100g |
| 193 S JSO-1     | 169  | ...   | 39    | 13     | 14.5  | 196    | 300    | 105   | 96    | 24.9 |           |                           | 100g |
| 193 S JSO-2     | 1276 | ...   | 1070  | 1087   | 62.5  | 87     | 1345   | 1174  | 1161  | 1090 |           |                           | 100g |
| 193 S JSAC 0401 | 15.3 | ...   | 18.9  | 26     | (88)  | ...    | 65.0   | 66.8  | ...   | ...  | Se, Be    | Brown Soil                | 50g  |
| 193 S JSAC 0411 | 26.7 | ...   | 11    | 18.9   | (49)  | (60)   | 68.6   | 64.6  | ...   | ...  | Se, Be    | Volcanic Ash Soil         | 50g  |
| 193 CG 08302    | 24.6 | 0.018 | 31.1  | 14.2   | 135   | 163    | 77.5   | 58.0  | ...   | ...  | many      | Tibetan                   | 15g  |
| 193 CG 08303    | 120  | 2.15  | 40    | 73     | 60    | 405    | ...    | 260   | ...   | ...  | La, Th, U | Polluted farmland         | 40g  |
| 193 B 2586      | ...  | 0.367 | ...   | 432    | ...   | 84.1   | ...    | 352   | ...   | ...  | Nd, Yb    | Urban                     | 55g  |
| 193 B 2587      | ...  | 0.290 | ...   | 3242   | ...   | 126    | ...    | 335.8 | ...   | ...  |           | Urban (contaminated)      | 55g  |
| 193 B 2709      | 34.6 | 1.40  | 88    | 18.9   | (96)  | 231    | 112    | 106   | (160) | (18) | many      | San Joaquin               | 50g  |
| 193 B 2710      | 2950 | 32.6  | 14.3  | 5532   | (120) | (330)  | 76.6   | 6952  | ...   | (23) | many      | Montana - elevated traces | 50g  |
| 193 B 2711      | 114  | 6.25  | 20.6  | 1162   | (110) | 245.3  | 81.6   | 350.4 | (230) | (25) | many      | Montana - elevated traces | 50g  |
| 193 LI 12.1.07  | 30.0 | 0.171 | 30.8  | 19.6   | (200) | (82.0) | 98.3   | 88.8  | (350) | ...  | many      | Eutric Cambisol           | 50g  |
| 193 LI 12.1.08  | 21.2 | 0.078 | 40.0  | 18.9   | (100) | 107.0  | (87.5) | 63.7  | (500) | ...  | many      | Orthic Luvisol            | 50g  |
| 193 LI 12.1.09  | 30.9 | 0.087 | 37.4  | 41.3   | (100) | 274.0  | 89.7   | 119.0 | (200) | ...  | many      | Rendzina                  | 50g  |
| 193 A SA 42     | 17.0 | ...   | 125.0 | (10.0) | 22.0  | 37.0   | 94.0   | 44.0  | 192.0 | 11.0 | many      |                           | 100g |

SiO<sub>2</sub> Al<sub>2</sub>O<sub>3</sub> CaO Fe<sub>2</sub>O<sub>3</sub> K<sub>2</sub>O MgO MnO Na<sub>2</sub>O P<sub>2</sub>O<sub>5</sub> TiO<sub>2</sub> L.O.I.

|                |       |       |       |      |      |      |       |      |      |      |      |           |  |
|----------------|-------|-------|-------|------|------|------|-------|------|------|------|------|-----------|--|
| 193 BG COD 310 | 46.08 | 11.36 | 14.83 | 3.92 | 2.26 | 3.15 | 0.1   | 1.24 | 0.2  | 0.43 | ...  |           |  |
| 193 BG COD 311 | 66.7  | 13.72 | 2.9   | 4.09 | 2.72 | 1.68 | 0.097 | 2.19 | 0.15 | 0.5  | 4.98 | continued |  |
| 193 BG COD 312 | 56.52 | 13.78 | 7.39  | 4.56 | 2.34 | 2.3  | 0.099 | 1.92 | 0.2  | 0.52 | 9.64 |           |  |

Continuation from above

All Elements ppm

|                 | Be   | Cu    | Cr    | Cd   | As   | Co    | Li    | Pb     | Mo   | Ni    | V     | Zn     | Type        | Size |
|-----------------|------|-------|-------|------|------|-------|-------|--------|------|-------|-------|--------|-------------|------|
| 193 BG COD 310A | 2.39 | 49.82 | 103.5 | 4.59 | 9.24 | 11.34 | 21.95 | 120.27 | 5.74 | 63.11 | 85.75 | 269.75 | Meadow Soil | 50g  |
| 193 BG COD 311A | 2.4  | 72.0  | 68.0  | ...  | 7.02 | 10.7  | 21.25 | 51.0   | 1.48 | 39.0  | 87.2  | 74.0   | Meadow Soil | 50g  |
| 193 BG COD 312A | 2.52 | 88.15 | 52.5  | 0.67 | 6.54 | 12.5  | 24.1  | 88.0   | ...  | 52.0  | 85.35 | 126.3  | Meadow Soil | 50g  |



# 19. Soil/Clay

| 19.3 Soils (continued)  |  | SiO <sub>2</sub> | Al <sub>2</sub> O <sub>3</sub> | Fe <sub>2</sub> O <sub>3</sub> | FeO     | MgO              | CaO                           | Na <sub>2</sub> O | K <sub>2</sub> O | H <sub>2</sub> O  | CO <sub>2</sub>  | Organic |                 | Size   |                                      |            |      |
|-------------------------|--|------------------|--------------------------------|--------------------------------|---------|------------------|-------------------------------|-------------------|------------------|-------------------|------------------|---------|-----------------|--|--------------------------------------|------------|------|
|                         |  |                  |                                |                                |         |                  |                               |                   |                  |                   |                  | C       | L.O.I.          |  |                                      |            |      |
| 193 CG 07401            |  | 62.6             | 14.18                          | 5.19                           | (1.27)  | 1.81             | 1.72                          | 1.66              | 2.59             | (4.99)            | (1.13)           | (1.8)   | (8.59)          |  |                                      |            |      |
| 193 CG 07402            |  | 73.35            | 10.31                          | 3.52                           | (0.56)  | 1.04             | 2.36                          | 1.62              | 2.54             | (2.86)            | (0.97)           | (0.49)  | (4.41)          |  |                                      |            |      |
| 193 CG 07403            |  | 74.72            | 12.24                          | 2.0                            | (0.48)  | 0.58             | 1.27                          | 2.71              | 3.04             | (1.91)            | (0.13)           | 0.5     | (2.65)          |  |                                      |            |      |
| 193 CG 07404            |  | 50.95            | 23.45                          | 10.3                           | (0.41)  | 0.49             | 0.26                          | 0.11              | 1.03             | (10.13)           | (0.12)           | (0.62)  | (10.88)         | Plus another 61 elements<br>all certified at ppm levels  |                                      |            |      |
| 193 CG 07405            |  | 52.57            | 21.58                          | 12.62                          | (0.22)  | 0.61             | (0.095)                       | 0.122             | 1.5              | (8.81)            | (0.096)          | (0.32)  | (9.14)          |  |                                      |            |      |
| 193 CG 07406            |  | 56.93            | 21.23                          | 8.09                           | (0.57)  | 0.34             | 0.22                          | 0.19              | 1.7              | (8.9)             | (0.084)          | (0.806) | (10.0)          |  |                                      |            |      |
| 193 CG 07407            |  | 32.69            | 29.26                          | 18.76                          | (1.05)  | 0.26             | 0.16                          | 0.074             | 0.2              | (13.73)           | (0.11)           | (0.64)  | (14.3)          |  |                                      |            |      |
| 193 CG 07408            |  | 58.61            | 11.92                          | 4.48                           | (1.2)   | 2.38             | 8.27                          | 1.72              | 2.42             | (3.28)            | (5.97)           | 0.31    | (9.15)          |  |                                      |            |      |
| 193 CG 07409            |  | 73.28            | 12.91                          | 2.08                           | ...     | 0.49             | 1.35                          | 3.31              | 3.37             | ...               | ...              | ...     | ...             | Plus another ~50 elements<br>all certified at ppm levels |                                      |            |      |
| 193 CG 07410            |  | 65.64            | 14.55                          | 4.6                            | ...     | 1.25             | 1.42                          | 1.9               | 2.59             | ...               | ...              | ...     | ...             |  |                                      |            |      |
| 193 CG 07411            |  | 47.96            | 12.04                          | 7.97                           | ...     | 3.71             | 4.33                          | 1.1               | 2.03             | ...               | ...              | ...     | ...             |  |                                      |            |      |
|                         |  | All Elements ppm |                                |                                |         |                  |                               |                   |                  |                   |                  |         |                 |  |                                      |            |      |
|                         |  | Al               | Sb                             | As                             | Ba      | Be               | Cd                            | Ca                | Cr               | Co                | Cu               | Fe      | Pb              | Mg   | Mn                                   |            |      |
| 193 GL 021              |  | 2725             | 4955                           | 25                             | 586     | ...              | 1                             | 5426              | 11               | ...               | 4792             | 6481    | ...             | ...  | 174 continued                        |            |      |
| 193 GL 027              |  | 9149             | ...                            | 12.4                           | 166     | 2.73             | 12.0                          | 5970              | 26.9             | 4.7               | 9.87             | 11173   | 51.9            | 2755   | 259                                  |            |      |
| 193 GL 6135             |  | 22700            | ...                            | 70                             | 305     | 1.4              | ...                           | 23400             | 455              | 20                | 107              | 47500   | 411             | 9400   | 390 continued                        |            |      |
| Continuation from above |  | All Elements ppm |                                |                                |         |                  |                               |                   |                  |                   |                  |         |                 |  |                                      |            |      |
|                         |  | Hg               | Mo                             | Ni                             | K       | Se               | Ag                            | Na                | Sr               | Tl                | Sn               | V       | Zn              | Type   | Size                                 |            |      |
| 193 GL 021              |  | 4.7              | ...                            | 12.8                           | 1006    | ...              | 7                             | 380               | ...              | ...               | ...              | ...     | 546             | Metals in Natural Soil                                   | 100g                                 |            |      |
| 193 GL 027              |  | 3.80             | (1.05)                         | 10.5                           | 2115    | 14.0             | 5.88                          | 241               | 43.0             | (4.81)            | ...              | 21.4    | 61.3            | Metals in Natural Soil                                   | 50g                                  |            |      |
| 193 GL 6135             |  | 2.9              | ...                            | 291                            | 16300   | 0.9              | ...                           | 1700              | ...              | ...               | ...              | 139     | 345             | Brick Works Soil   | 50g                                  |            |      |
| 19.4 Clays              |  | SiO <sub>2</sub> | Al <sub>2</sub> O <sub>3</sub> | Fe <sub>2</sub> O <sub>3</sub> | FeO     | TiO <sub>2</sub> | P <sub>2</sub> O <sub>5</sub> | CaO               | MgO              | Na <sub>2</sub> O | K <sub>2</sub> O | S       | CO <sub>2</sub> | L.O.I.   | Others                               | Type       | Size |
| CRM 194 E 28            |  | 45.4             | 37.6                           | 0.84                           | ...     | 2.01             | 0.15                          | 0.1               | 0.04             | 0.01              | 0.02             | ...     | ...             | 13.7   |                                      | Para       | 50g  |
| CRM 194 E 32            |  | 51.8             | 28.5                           | 3.46                           | ...     | 1.49             | 0.13                          | 0.7               | 0.39             | 0.16              | 0.8              | ...     | ...             | 12.6   |                                      | Saracuruna | 50g  |
| CRM 194 E 42            |  | 51.9             | 32.2                           | 1.09                           | ...     | 0.96             | 0.07                          | 0.05              | 0.19             | 0.02              | 0.47             | ...     | ...             | 12.9   |                                      | Sao-Simao  | 50g  |
| CRM 194 B 679           |  | 52.1             | 20.8                           | 12.94                          | ...     | 0.96             | (0.17)                        | 0.23              | 1.25             | 0.18              | 2.93             | ...     | ...             | ...  | Trace Elements                       | Brick Clay | 75g  |
| 194 CG 03101a           |  | 49.98            | 26.27                          | 10.55                          | (0.08)  | 0.70             | 0.14                          | 0.13              | 0.46             | 0.06              | 0.79             | 0.049   | (0.041)         | 10.62  | Cl 0.0041                            |            | 50g  |
| 194 CG 03102a           |  | 53.67            | 31.32                          | 0.33                           | (0.052) | 0.03             | 0.053                         | 1.80              | 0.083            | 2.55              | 1.15             | 0.023   | (0.051)         | 8.81   | Cl 0.0029                            |            | 50g  |
| 194 CG 03103            |  | 66.64            | 13.28                          | 4.64                           | (0.8)   | 0.66             | 0.106                         | 3.23              | 1.84             | 1.81              | 2.50             | 0.027   | 1.66            | 5.1  | Cl 0.011                             |            | 60g  |
| 194 CG 03121            |  | 54.55            | 31.41                          | 0.50                           | ...     | 0.69             | 0.099                         | 0.052             | 0.12             | 0.015             | 0.34             | 0.53    | (0.026)         | 11.94  |                                      | Kaolin     | 50g  |
| 194 CG 03122            |  | 44.53            | 38.62                          | 0.72                           | ...     | 0.39             | 0.21                          | 0.16              | 0.068            | 0.069             | 0.049            | 0.12    | (0.06)          | 15.00  |                                      | Kaolin     | 50g  |
| 194 D KK                |  | 47.05            | 36.75                          | 0.975                          | ...     | 0.166            | 0.092                         | 0.26              | 0.196            | 0.03              | 1.07             | ...     | ...             | 13.12  | Trace Elements                       | Kaolin     | 100g |
| CRM 194 A 348           |  | 51.13            | 31.59                          | 1.04                           | ...     | 1.08             | 0.071                         | 0.173             | 0.305            | 0.344             | 2.23             | ...     | ...             | 11.75  | Cr <sub>2</sub> O <sub>3</sub> 0.016 | Ball Clay  | 100g |
| 194 GC 2CAS1            |  | 52.5             | 32.0                           | 1.03                           | ...     | 1.16             | ...                           | 0.2               | 0.28             | 0.34              | 2.25             | ...     | ...             | 9.8  | Li <sub>2</sub> O 0.03               | Ball Clay  | 100g |
| 194 GC AN41             |  | 54.8             | 41.5                           | 0.71                           | ...     | 0.05             | ...                           | 0.16              | 0.41             | <0.05             | 1.81             | ...     | ...             | ...  |                                      | China Clay | 100g |
| 194 BG COD 12B          |  | ...              | 35.1                           | 0.52                           | ...     | 0.18             | ...                           | ...               | ...              | ...               | ...              | ...     | ...             | ...  |                                      | Kaolin C1  | 70g  |
| 194 BG COD 13B          |  | ...              | 31.9                           | 0.95                           | ...     | 0.23             | ...                           | ...               | ...              | ...               | ...              | ...     | ...             | 11.3   |                                      | Kaolin B2  | 70g  |
| 194 BG COD 14B          |  | ...              | 32.5                           | 1.17                           | ...     | ...              | ...                           | ...               | ...              | ...               | ...              | ...     | ...             | 11.9   |                                      | Kaolin K2  | 70g  |
| 194 BG COD 52           |  | 51.28            | 29.69                          | 2.45                           | 0.89    | 1.16             | 0.044                         | 0.71              | 0.63             | 0.19              | 1.83             | 0.19    | 0.27            | 11.66  | Many at ppm levels                   | Fire Clay  | 50g  |



# 19. Sediment / Sludge

Powders

| 19.5.1 Sediments (continued) |              | SiO <sub>2</sub> | Al <sub>2</sub> O <sub>3</sub> | Fe <sub>2</sub> O <sub>3</sub> | FeO    | MgO  | CaO  | Na <sub>2</sub> O | K <sub>2</sub> O | TiO <sub>2</sub> | P <sub>2</sub> O <sub>5</sub> | MnO  | S      | C    | H <sub>2</sub> O | L.O.I.<br>1000°C |
|------------------------------|--------------|------------------|--------------------------------|--------------------------------|--------|------|------|-------------------|------------------|------------------|-------------------------------|------|--------|------|------------------|------------------|
| CRM                          | 195 A SA 46  | 35.9             | 6.71                           | 28.16                          | (18.0) | 3.16 | 1.32 | 0.28              | 0.35             | 0.6              | 0.11                          | 1.14 | (0.17) | ...  | ...              | ...              |
| CRM                          | 195 A SA 51  | 33.81            | 11.87                          | 18.36                          | (3.0)  | 0.92 | 0.86 | 0.07              | 0.33             | 0.82             | 0.21                          | 0.21 | (0.24) | ...  | ...              | ...              |
| CRM                          | 195 A SA 52  | 57.81            | 9.38                           | 19.71                          | (4.0)  | 0.6  | 0.37 | (0.1)             | 0.25             | 1.3              | 0.09                          | 0.27 | (0.02) | ...  | ...              | ...              |
|                              | 195 A LKSD-1 | 40.1             | 7.8                            | 4.1                            | ...    | 1.7  | 10.8 | 2.0               | 1.1              | 0.5              | 0.2                           | 0.1  | 1.57   | 12.3 | 2.92             | 29.9             |
|                              | 195 A LKSD-2 | 58.9             | 12.3                           | 6.2                            | ...    | 1.7  | 2.2  | 1.9               | 2.6              | 0.6              | 0.3                           | 0.3  | 0.14   | 4.5  | 2.23             | 13.6             |
|                              | 195 A LKSD-3 | 58.5             | 12.5                           | 5.7                            | ...    | 2.0  | 2.3  | 2.3               | 2.2              | 0.5              | 0.2                           | 0.2  | 0.14   | 4.5  | 2.07             | 13.4             |
|                              | 195 A LKSD-4 | 41.6             | 5.9                            | 4.1                            | ...    | 0.9  | 1.8  | 0.7               | 0.8              | 0.4              | 0.3                           | 0.1  | 0.99   | 17.7 | 6.55             | 43.6             |
|                              | 195 A STSD-1 | 42.5             | 9.0                            | 6.5                            | ...    | 2.2  | 3.6  | 1.8               | 1.2              | 0.8              | 0.4                           | 0.5  | 0.18   | 12.3 | 4.46             | 31.6             |
|                              | 195 A STSD-2 | 53.7             | 16.1                           | 7.5                            | ...    | 3.1  | 4.0  | 1.7               | 2.1              | 0.8              | 0.3                           | 0.1  | 0.06   | 1.6  | 2.43             | 10.3             |
|                              | 195 A STSD-3 | 48.6             | 10.9                           | 6.2                            | ...    | 2.2  | 3.3  | 1.5               | 1.8              | 0.7              | 0.4                           | 0.3  | 0.14   | 8.4  | 3.47             | 23.6             |
|                              | 195 A STSD-4 | 58.9             | 12.1                           | 5.7                            | ...    | 2.1  | 4.0  | 2.7               | 1.6              | 0.8              | 0.2                           | 0.2  | 0.09   | 4.1  | 1.73             | 11.6             |

| Continuation from above |              | All Elements ppm |     |       |       |    |      |     |     |      |       |       |      |     |
|-------------------------|--------------|------------------|-----|-------|-------|----|------|-----|-----|------|-------|-------|------|-----|
|                         |              | Ag               | As  | Ba    | Ce    | Co | Cr   | Cs  | Cu  | Ga   | Ni    | Pb    | Rb   | Sb  |
|                         | 195 SA 46    | ...              | ... | (180) | (110) | 56 | 559  | ... | 566 | ...  | (125) | (1.3) | (20) | ... |
|                         | 195 SA 51    | ...              | ... | (335) | (120) | 60 | 509  | ... | 268 | (20) | 178   | 5200  | 37   | ... |
|                         | 195 SA 52    | ...              | ... | (410) | (210) | 81 | 1300 | ... | 219 | (15) | 182   | 1200  | 20   | ... |
|                         | 195 A LKSD-1 | 0.6              | 40  | 430   | 27    | 11 | 31   | 1.5 | 44  | ...  | 16    | 82    | 24   | 1.2 |
|                         | 195 A LKSD-2 | 0.8              | 11  | 780   | 108   | 17 | 57   | 3.0 | 37  | ...  | 26    | 44    | 85   | 1.1 |
|                         | 195 A LKSD-3 | 2.7              | 27  | 680   | 90    | 30 | 87   | 2.3 | 35  | ...  | 47    | 29    | 78   | 1.3 |
|                         | 195 A LKSD-4 | <0.5             | 16  | 330   | 48    | 11 | 33   | 17  | 31  | ...  | 31    | 91    | 28   | 1.7 |
|                         | 195 A STSD-1 | <0.5             | 23  | 630   | 51    | 17 | 67   | 1.8 | 36  | ...  | 24    | 35    | 30   | 3.3 |
|                         | 195 A STSD-2 | 0.5              | 42  | 540   | 93    | 19 | 116  | 12  | 47  | ...  | 53    | 66    | 104  | 4.8 |
|                         | 195 A STSD-3 | <0.5             | 28  | 1490  | 63    | 16 | 80   | 5.2 | 39  | ...  | 30    | 40    | 68   | 4.0 |
|                         | 195 A STSD-4 | <0.5             | 15  | 2000  | 44    | 13 | 93   | 1.9 | 65  | ...  | 30    | 16    | 39   | 7.3 |

| Continuation from above |              | All Elements ppm |     |     |     |      |      |      |      |      |     |        | Type   | Size |
|-------------------------|--------------|------------------|-----|-----|-----|------|------|------|------|------|-----|--------|--------|------|
|                         |              | Sc               | Se  | Sn  | Sr  | Th   | U    | V    | Y    | Zn   | Zr  | Others |        |      |
|                         | 195 SA 46    | ...              | ... | ... | 25  | ...  | ...  | 225  | (20) | 5900 | 101 |        | Stream | 100g |
|                         | 195 SA 51    | ...              | ... | ... | 44  | (10) | ...  | 1.81 | 21   | 2200 | 121 |        | Stream | 100g |
|                         | 195 SA 52    | ...              | ... | ... | 25  | (11) | ...  | 346  | 20   | 264  | 250 |        | Stream | 100g |
|                         | 195 A LKSD-1 | 9                | ... | 16  | 250 | 2.2  | 9.7  | 50   | 19   | 331  | 134 | many   | Lake   | 100g |
|                         | 195 A LKSD-2 | 13               | ... | 5   | 220 | 13.4 | 7.6  | 77   | 44   | 209  | 254 | many   | Lake   | 100g |
|                         | 195 A LKSD-3 | 13               | ... | 3   | 240 | 11.4 | 4.6  | 82   | 30   | 152  | 178 | many   | Lake   | 100g |
|                         | 195 A LKSD-4 | 7                | ... | 5   | 110 | 5.1  | 31.0 | 49   | 23   | 194  | 105 | many   | Lake   | 100g |
|                         | 195 A STSD-1 | 14               | ... | 4   | 170 | 3.7  | 8.0  | 98   | 42   | 198  | 218 | many   | Stream | 100g |
|                         | 195 A STSD-2 | 16               | ... | 5   | 400 | 17.2 | 18.6 | 101  | 37   | 246  | 185 | many   | Stream | 100g |
|                         | 195 A STSD-3 | 13               | ... | 4   | 230 | 5.5  | 10.5 | 134  | 36   | 204  | 196 | many   | Stream | 100g |
|                         | 195 A STSD-4 | 14               | ... | 2   | 350 | 4.3  | 3.0  | 106  | 24   | 107  | 190 | many   | Stream | 100g |

| 19.5.2 Sludges |            | % Ca  | % Fe  | % P    | % Si   | ppm As | ppm Cd | ppm Cu | ppm Pb | ppm Hg | ppm Mo | ppm Ni | ppm Se | ppm Zn | ppm Cr | ppm Ag | Type       | Size |
|----------------|------------|-------|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|------------|------|
| CRM            | 195 B 2781 | (3.9) | (2.8) | (2.42) | (5.1)  | 7.82   | 12.78  | 627.4  | 202.1  | 3.64   | 46.7   | 80.2   | 16.0   | 1273   | (202)  | (98)   | Domestic   | 40g  |
| CRM            | 195 B 2782 | 0.67  | 26.9  | 0.50   | (20.3) | 166    | 4.17   | 2594   | 574    | 1.10   | 10.07  | 154.1  | 0.44   | 1254   | 109    | 30.6   | Industrial | 70g  |





# 20. Slag/Sinter/Fluospar/Flouride/ Cryolite

Powders

| 20.1 Slags (continued)    |                 | SiO <sub>2</sub> | Al <sub>2</sub> O <sub>3</sub> | Total Fe          |                                | TiO <sub>2</sub>               | Cr <sub>2</sub> O <sub>3</sub> | MnO     | CaO                            | MgO                            | S               | P <sub>2</sub> O <sub>5</sub> | V                 | B <sub>2</sub> O <sub>3</sub> | Type                               | Size    |      |
|---------------------------|-----------------|------------------|--------------------------------|-------------------|--------------------------------|--------------------------------|--------------------------------|---------|--------------------------------|--------------------------------|-----------------|-------------------------------|-------------------|-------------------------------|------------------------------------|---------|------|
| CRM                       | 201 LI 7-1-005  | 35.3             | 10.0                           | 0.21              | 0.32                           | ...                            | ...                            | 0.47    | 38.8                           | 12.0                           | ...             | ...                           | ...               | ...                           | Blast furnace                      | 75g     |      |
| CRM                       | 201 LI 7-1-006  | 38.5             | 7.05                           | 0.59              | 0.34                           | ...                            | ...                            | 1.24    | ...                            | 16.8                           | ...             | ...                           | ...               | ...                           | Blast furnace                      | 75g     |      |
| CRM                       | 201 LI 7-1-007  | 39.0             | 6.2                            | 0.55              | 0.39                           | ...                            | ...                            | 0.78    | 31.2                           | 18.9                           | ...             | ...                           | ...               | ...                           | Blast furnace                      | 75g     |      |
| CRM                       | 201 LI 7-1-008  | 39.1             | 8.4                            | 0.30              | 0.30                           | ...                            | ...                            | 0.73    | 42.1                           | 6.1                            | ...             | ...                           | ...               | ...                           | Blast furnace                      | 75g     |      |
| CRM                       | 201 LI 7-1-009  | 32.8             | 9.2                            | ...               | 0.38                           | ...                            | ...                            | 0.60    | 49.6                           | 1.1                            | 1.17            | ...                           | ...               | ...                           | Blast furnace                      | 75g     |      |
| CRM                       | 201 LI 7-1-010  | 44.0             | 7.94                           | 5.5               | 0.91                           | ...                            | ...                            | 3.40    | 31.2                           | 0.73                           | 0.14            | ...                           | ...               | ...                           | Blast furnace                      | 75g     |      |
| CRM                       | 201 LI 7-1-011  | 21.9             | 24.0                           | ...               | ...                            | ...                            | ...                            | ...     | 29.4                           | 17.5                           | ...             | ...                           | ...               | ...                           | Blast furnace                      | 75g     |      |
| CRM                       | 201 LI 7-1-012  | 51.4             | 45.2                           | ...               | ...                            | ...                            | ...                            | 0.06    | 0.57                           | ...                            | ...             | ...                           | ...               | ...                           | Blast furnace                      | 75g     |      |
| CRM                       | 201 LI 7-1-013  | 20.3             | 38.6                           | 1.12              | 0.78                           | ...                            | ...                            | 0.26    | 28.7                           | 8.0                            | ...             | ...                           | ...               | ...                           | Blast furnace                      | 75g     |      |
| CRM                       | 201 LI 7-1-014  | 33.57            | 24.0                           | ...               | ...                            | ...                            | ...                            | ...     | 30.1                           | 9.3                            | ...             | ...                           | ...               | ...                           | Blast furnace                      | 75g     |      |
| CRM                       | 201 LI 7-1-015  | ...              | 14.5                           | 1.68              | ...                            | ...                            | ...                            | 0.58    | 28.0                           | 9.2                            | ...             | ...                           | ...               | ...                           | Blast furnace                      | 75g     |      |
| CRM                       | 201 DB E826-1   | 8.96             | 1.31                           | ...               | ...                            | ...                            | ...                            | 0.26    | 46.48                          | ...                            | ...             | 14.65                         | 0.503             | ...                           | phosphate                          | 100g    |      |
| CRM                       | 201 DB E827-1   | 6.21             | ...                            | ...               | ...                            | ...                            | ...                            | ...     | 47.38                          | ...                            | ...             | 20.70                         | ...               | ...                           | phosphate                          | 100g    |      |
|                           | 201 SI XS-FCS   | 24.34            | 23.72                          | 8.42              | ...                            | ...                            | ...                            | 22.45   | 3.91                           | 15.39                          | ...             | ...                           | ...               | ...                           | Ferro-Chrome                       | 100g    |      |
|                           | 201 SI SAM-FMS1 | 30.21            | 4.95                           | 0.046             | ...                            | ...                            | ...                            | 22.53   | 30.26                          | 7.38                           | ...             | ...                           | ...               | 0.59                          | Ferro-Manganese                    | 100g    |      |
|                           | 201 SI SAM-SMS1 | 43.28            | 8.96                           | 0.125             | ...                            | ...                            | ...                            | 16.81   | 19.47                          | 5.16                           | ...             | ...                           | ...               | 0.26                          | Silico-Manganese                   | 100g    |      |
| 20.1.1 Titanium Slag      |                 | TiO <sub>2</sub> | Fe <sub>2</sub> O <sub>3</sub> | SiO <sub>2</sub>  | Al <sub>2</sub> O <sub>3</sub> | MgO                            | CaO                            | MnO     | Cr <sub>2</sub> O <sub>3</sub> | V <sub>2</sub> O <sub>5</sub>  |                 |                               |                   |                               |                                    | Size    |      |
|                           | 201A SA 57      | 85.4             | 11.8                           | 1.72              | 1.23                           | 0.98                           | 0.16                           | 1.76    | 0.16                           | 0.39                           |                 |                               |                   |                               |                                    | 100g    |      |
|                           | 201 A SA 58     | 84.1             | 9.6                            | 2.95              | 2.17                           | 0.69                           | 0.22                           | 1.44    | ...                            | 0.4                            |                 |                               |                   |                               |                                    | 100g    |      |
| 20.3 Sinters              |                 | Si               | Al                             | Total Fe          |                                | Ti                             | Mn                             | Ca      | Mg                             | S                              | P               | Na                            | K                 | F                             | V                                  | Size    |      |
|                           | 203 M BS 104    | 3.72             | 0.55                           | 54.6              | ...                            | 0.06                           | 0.81                           | 7.4     | 0.78                           | 0.014                          | 0.044           | 0.02                          | 0.12              | ...                           | ...                                | 100g    |      |
| CRM                       | 203 TI E611-1   | 2.07             | 0.69                           | 62.22             | (13.8)                         | 0.033                          | 1.97                           | 2.85    | 0.32                           | (0.008)                        | 0.03            | ...                           | ...               | ...                           | ...                                | 100g    |      |
| CRM                       | 203 TI E612-1   | 5.94             | 3.0                            | 42.4              | (9.2)                          | 0.151                          | 0.363                          | 12.06   | 1.2                            | 0.053                          | 0.885           | ...                           | ...               | ...                           | ...                                | 100g    |      |
| CRM                       | 203 A E676-1    | 6.40             | 3.4                            | 39.76             | ...                            | 0.19                           | 0.83                           | 12.78   | 1.16                           | 0.12                           | 0.59            | 0.095                         | 0.43              | 0.1                           | 0.07                               | 100g    |      |
|                           |                 | Total            |                                |                   |                                |                                |                                |         |                                |                                |                 |                               |                   |                               |                                    | Size    |      |
|                           | 203 CG 07219    | 6.38             | 2.45                           | 54.24             | 0.087                          | 0.066                          | 11.03                          | 3.21    | 0.014                          | 0.06                           | 0.005           | 0.084                         | 0.054             | (9.06)                        |                                    | 100g    |      |
| 20.4.1 Fluospar           |                 | CaF <sub>2</sub> | CaCO <sub>3</sub>              | MgCO <sub>3</sub> | SiO <sub>2</sub>               | Fe <sub>2</sub> O <sub>3</sub> | K <sub>2</sub> O               | P       | S                              | Al <sub>2</sub> O <sub>3</sub> | Ba              | Pb                            | Na <sub>2</sub> O | F                             | Others                             | Type    | Size |
|                           | 204 DH X2703    | 85.94            | 0.587                          | 0.052             | 12.35                          | 0.151                          | 0.133                          | ...     | ...                            | 0.392                          | 0.046           | 0.003                         | 0.009             | 41.83                         | CO <sub>2</sub> , H <sub>2</sub> O |         | 100g |
|                           | 204 DH X2704    | 74.31            | 0.591                          | 0.052             | 24.33                          | 0.103                          | 0.067                          | ...     | ...                            | 0.332                          | 0.005           | ...                           | 0.007             | 36.17                         | CO <sub>2</sub> , H <sub>2</sub> O |         | 100g |
|                           | 204 DH X2707    | 86.03            | 6.44                           | 0.146             | 6.16                           | 0.257                          | 0.042                          | ...     | ...                            | 0.371                          | 0.005           | 0.003                         | 0.061             | 41.87                         | CO <sub>2</sub> , H <sub>2</sub> O |         | 100g |
|                           | 204 DH X2709    | 77.84            | 0.019                          | 0.033             | 0.77                           | 15.77                          | 0.028                          | ...     | ...                            | 0.310                          | 0.007           | 0.005                         | 0.030             | 37.91                         | CO <sub>2</sub> , H <sub>2</sub> O |         | 100g |
|                           | 204 DH X2712    | 82.85            | 2.96                           | 1.55              | 0.373                          | 0.373                          | 0.125                          | ...     | ...                            | 1.01                           | 0.009           | 0.095                         | ...               | 40.32                         | CO <sub>2</sub> , H <sub>2</sub> O |         | 100g |
| CRM                       | 204 A SA 14     | 97.32            | (0.3)                          | (0.03)            | (0.57)                         | 0.06                           | ...                            | (0.079) | ...                            | ...                            | ...             | ...                           | ...               | ...                           |                                    | Buffalo | 100g |
| CRM                       | 204 A SA 15     | 97.84            | 0.95                           | 0.55              | (0.26)                         | (0.23)                         | ...                            | 0.007   | ...                            | ...                            | ...             | ...                           | ...               | ...                           | Mn 0.0213                          | Marico  | 100g |
| CRM                       | 204 J C         | 76.91            | ...                            | ...               | 8.2                            | 0.7                            | ...                            | 0.026   | 1.75                           | 0.66                           | 8.2             | 0.07                          | ...               | 37.43                         |                                    |         | 100g |
| CRM                       | 204 J D         | 97.07            | ...                            | ...               | (1.5)                          | 0.2                            | ...                            | 0.035   | 0.004                          | 0.04                           | ...             | <0.001                        | ...               | 47.24                         |                                    |         | 100g |
|                           | 204 GB 39       | ...              | ...                            | ...               | ...                            | ...                            | ...                            | ...     | ...                            | ...                            | (0.44)          | ...                           | ...               | 46.85                         | Sr (0.014)                         |         | 50g  |
| CRM                       | 204 S 883-1     | 75.24            | 0.29                           | ...               | 20.16                          | ...                            | ...                            | 0.008   | 0.39                           | ...                            | ...             | ...                           | ...               | ...                           | As 0.0012                          | China   | 70g  |
| CRM                       | 204 A 392       | 97.2             | 1.0                            | ...               | 0.67                           | ...                            | ...                            | ...     | 0.12                           | ...                            | 0.33            | 0.18                          | ...               | ...                           |                                    |         | 100g |
| CRM                       | 204 E 95        | 85.4             | ...                            | ...               | 8.3                            | 0.36                           | ...                            | ...     | ...                            | ...                            | ...             | ...                           | ...               | ...                           |                                    |         | 100g |
| CRM                       | 204 CG 07250    | 94.91            | (0.02)                         | ...               | 4.72                           | 0.096                          | 0.019                          | 0.0025  | 0.029                          | ...                            | ...             | ...                           | 0.005             | ...                           |                                    |         | 65g  |
| CRM                       | 204 CG 07251    | 90.87            | (0.02)                         | ...               | 8.35                           | 0.124                          | 0.026                          | 0.0031  | 0.090                          | ...                            | ...             | ...                           | 0.005             | ...                           |                                    |         | 65g  |
| CRM                       | 204 CG 07252    | 92.57            | (0.02)                         | ...               | 6.84                           | 0.124                          | 0.029                          | 0.0024  | 0.043                          | ...                            | ...             | ...                           | 0.006             | ...                           |                                    |         | 65g  |
| CRM                       | 204 CG 07253    | 85.21            | (0.02)                         | ...               | 14.15                          | 0.209                          | 0.044                          | 0.0013  | 0.045                          | ...                            | ...             | ...                           | 0.005             | ...                           |                                    |         | 65g  |
| CRM                       | 204 CG 07254    | 98.59            | 0.27                           | ...               | 0.87                           | 0.087                          | ...                            | 0.007   | 0.011                          | ...                            | ...             | ...                           | ...               | ...                           |                                    |         | 65g  |
| 20.4.2 Aluminium Fluoride |                 | F                | Na                             | Si                | Fe                             | Ca                             | P                              | S       | L.O.I.                         |                                |                 |                               |                   |                               |                                    |         | Size |
|                           | 204 CA ALF-01   | 62.0             | 0.32                           | 0.070             | 0.009                          | 0.017                          | 0.0100                         | 0.28    | ...                            |                                |                 |                               |                   |                               |                                    |         | 100g |
|                           | 204 CA ALF-02   | 63.0             | 0.26                           | 0.130             | 0.010                          | 0.014                          | 0.0100                         | 0.26    | ...                            |                                |                 |                               |                   |                               |                                    |         | 100g |
|                           | 204 CA ALF-03   | 64.3             | 0.27                           | 0.120             | 0.009                          | 0.014                          | 0.0090                         | 0.25    | ...                            |                                |                 |                               |                   |                               |                                    |         | 100g |
|                           | 204 CA ALF-04   | 63.0             | 0.29                           | 0.100             | 0.007                          | 0.016                          | 0.0090                         | 0.31    | ...                            |                                |                 |                               |                   |                               |                                    |         | 100g |
|                           | 204 CA ALF-05   | 63.3             | 0.29                           | 0.090             | 0.006                          | 0.015                          | 0.0060                         | 0.10    | ...                            |                                |                 |                               |                   |                               |                                    |         | 100g |
|                           | 204 ML SRP-8    | 62.4             | 0.21                           | 0.16              | 0.010                          | ...                            | 0.030                          | 0.14    | 0.69                           |                                |                 |                               |                   |                               |                                    |         | 50g  |
| 20.4.3 Cryolite           |                 | F                | Na                             | Al                | Si                             | Fe                             | S                              | Ca      | Cl                             | P                              | CO <sub>2</sub> | L.O.I.                        |                   |                               | Type                               | Size    |      |
|                           | 204 CA CAA      | 40.5             | 30.6                           | 13.5              | 0.26                           | 0.053                          | 1.71                           | ...     | ...                            | ...                            | ...             | ...                           |                   |                               |                                    | 100g    |      |
|                           | 204 CA CAB      | 44.3             | 30.1                           | 11.9              | 0.16                           | 0.067                          | 2.59                           | ...     | ...                            | ...                            | ...             | ...                           |                   |                               |                                    | 100g    |      |
|                           | 204 CA CAC      | 44.7             | 32.9                           | 11.9              | 0.24                           | 0.039                          | 2.16                           | ...     | ...                            | ...                            | ...             | ...                           |                   |                               |                                    | 100g    |      |
|                           | 204 CA CAG      | 47.7             | 31.9                           | 12.2              | 0.035                          | 0.013                          | 1.28                           | ...     | ...                            | ...                            | ...             | ...                           |                   |                               |                                    | 100g    |      |
|                           | 204 ML SRP-2    | 50.8             | 31.2                           | 14.0              | 0.61                           | 0.035                          | 0.36                           | 0.05    | 0.02                           | ...                            | ...             | 0.40                          |                   |                               | Synthetic                          | 50g     |      |
|                           | 204 ML SRP-9    | 49.0             | 31.7                           | 12.4              | 0.12                           | 0.014                          | 0.67                           | 0.02    | ...                            | 0.002                          | 1.52            | 2.84                          |                   |                               | Synthetic                          | 50g     |      |
|                           | 204 ML SRM-3    | 54.3             | 32.8                           | 12.9              | 0.07                           | 0.008                          | ...                            | 0.018   | ...                            | ...                            | ...             | 0.08                          |                   |                               | Natural (greenland)                | 200g    |      |









# 20. Various Ores

| 20.6 Ores (continued)          |                 | Cu               | S                              | Zn                             | Al <sub>2</sub> O <sub>3</sub> | SiO <sub>2</sub>               | CaO               | TiO <sub>2</sub>               | Fe <sub>2</sub> O <sub>3</sub> | MnO                            | MgO                           | Na <sub>2</sub> O | K <sub>2</sub> O  | F                              | Size   |   |                                  |           |
|--------------------------------|-----------------|------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|-------------------|--------------------------------|--------------------------------|--------------------------------|-------------------------------|-------------------|-------------------|--------------------------------|--|---|----------------------------------|-----------|
| <b>(Cu) Copper (continued)</b> |                 |                  |                                |                                |                                |                                |                   |                                |                                |                                |                               |                   |                   |                                |  |   |                                  |           |
|                                | 206 CG 07233    | 1.15             | 0.72                           | 0.059                          | 1.73                           | 9.27                           | 9.61              | 0.079                          | 55.58                          | 0.60                           | 3.91                          | 0.044             | 0.071             | 0.079                          | Plus a further 37 elements analysed all at ppm | 100g  |                                  |           |
|                                | 206 CG 07234    | 0.19             | 0.14                           | 0.013                          | 15.18                          | 53.26                          | 4.95              | 0.50                           | 12.25                          | 0.12                           | 1.30                          | 3.21              | 2.71              | 0.080                          |  | 100g  |                                  |           |
|                                |                 | SiO <sub>2</sub> | TiO <sub>2</sub>               | Al <sub>2</sub> O <sub>3</sub> | Fe <sub>2</sub> O <sub>3</sub> | MnO                            | MgO               | CaO                            | Na <sub>2</sub> O              | K <sub>2</sub> O               | P <sub>2</sub> O <sub>5</sub> | S                 | Cu                | Zn                             | Pb   | Ba  | FeO                              |           |
|                                | 206 BG COD 260A | 48.46            | 0.49                           | 10.84                          | 15.79                          | 0.022                          | 0.19              | 0.38                           | 0.08                           | 0.62                           | 0.19                          | 13.96             | 2.75              | 0.2                            | 0.16   | 2.19  | ...                              |           |
|                                | 206 BG COD 53B  | 67.21            | 0.48                           | 14.85                          | 4.34                           | 0.044                          | 2.33              | 1.1                            | 3.76                           | 1.88                           | 0.144                         | 0.85              | 0.361             | 0.415                          | 0.0288   | 0.0247  | 1.89                             | continued |
| <b>Continuation from above</b> |                 |                  |                                |                                |                                |                                |                   |                                |                                |                                |                               |                   |                   |                                |  |   |                                  |           |
| <b>All Elements ppm</b>        |                 |                  |                                |                                |                                |                                |                   |                                |                                |                                |                               |                   |                   |                                |  |   |                                  |           |
|                                |                 | As               | Au                             | Ag                             | Co                             | Cd                             | Cr                | La                             | Li                             | Ni                             | Rb                            | Sc                | F                 | V                              | Zr   | L.O.I.  |                                  |           |
|                                | 206 BG COD 260  | 7000             | 3.3                            | 33.7                           | 20                             | 14                             | ...               | ...                            | 130                            | ...                            | ...                           | ...               | ...               | ...                            | ...  | ...   | 50g                              |           |
|                                | 206 BG COD 53A  | ...              | 0.27                           | ...                            | 7                              | ...                            | 21                | 17                             | 16                             | 12                             | 59                            | 9                 | ...               | 123                            | 120  | 3.29  | 50g                              |           |
|                                |                 | ppm Au           | ppm Ag                         | % S                            |                                |                                |                   |                                |                                |                                |                               |                   |                   |                                |  |   | Type                             | Size      |
| <b>(Au) Gold</b>               |                 |                  |                                |                                |                                |                                |                   |                                |                                |                                |                               |                   |                   |                                |  |   |                                  |           |
| CRM                            | 206 A SA 54     | 0.215            | ...                            | ...                            |                                |                                |                   |                                |                                |                                |                               |                   |                   |                                |  |   |                                  | 500g      |
| CRM                            | 206 A SA 56     | 2.69             | (1.7)                          | ...                            |                                |                                |                   |                                |                                |                                |                               |                   |                   |                                |  |   | Tails                            | 500g      |
| CRM                            | 206 A GTS-2     | 0.346            | ...                            | (1.1)                          |                                |                                |                   |                                |                                |                                |                               |                   |                   |                                |  |   | Tails                            | 400g      |
| CRM                            | 206 A MA1B      | 17.0             | (4.0)                          | (1.17)                         |                                |                                |                   |                                |                                |                                |                               |                   |                   |                                |  |   | Au Ore                           | 200g      |
| CRM                            | 206 A MA2C      | 3.02             | (0.051)                        | (0.23)                         |                                |                                |                   |                                |                                |                                |                               |                   |                   |                                |  |   | Au Ore                           | 400g      |
| CRM                            | 206 A MA3A      | 7.49             | (1.5)                          | (0.56)                         |                                |                                |                   |                                |                                |                                |                               |                   |                   |                                |  |   | Au Ore                           | 200g      |
| CRM                            | 206 B 886       | 8.25             | ...                            | 1.466                          |                                |                                |                   |                                |                                |                                |                               |                   |                   |                                |  |   | Calcined                         | 200g      |
|                                | 206 CG 07203    | 3.59             | 5.41                           | ...                            |                                |                                |                   |                                |                                |                                |                               |                   |                   |                                |  |   |                                  | 1kg       |
|                                | 206 CG 07204    | 7.16             | 3.34                           | ...                            |                                |                                |                   |                                |                                |                                |                               |                   |                   |                                |  |   |                                  | 1kg       |
|                                | 206 CG 07205    | 14.0             | 19.4                           | ...                            |                                |                                |                   |                                |                                |                                |                               |                   |                   |                                |  |   |                                  | 1kg       |
|                                | 206 CG 07206    | 19.4             | 24.6                           | ...                            |                                |                                |                   |                                |                                |                                |                               |                   |                   |                                |  |   |                                  | 1kg       |
|                                | 206 CG 07207    | 0.008            | 0.33                           | ...                            |                                |                                |                   |                                |                                |                                |                               |                   |                   |                                |  |   |                                  | 1kg       |
|                                | 206 CG 07208    | 0.051            | 2.06                           | ...                            |                                |                                |                   |                                |                                |                                |                               |                   |                   |                                |  |   |                                  | 1kg       |
|                                | 206 CG 07209    | 0.421            | 9.08                           | ...                            |                                |                                |                   |                                |                                |                                |                               |                   |                   |                                |  |   |                                  | 1kg       |
|                                |                 | ppm Au           | ppm Ag                         | Al <sub>2</sub> O <sub>3</sub> | SiO <sub>2</sub>               | Fe <sub>2</sub> O <sub>3</sub> | MnO               | CaO                            | K <sub>2</sub> O               | MgO                            | TiO <sub>2</sub>              | Cu                | Pb                | Zn                             | S  |   |                                  |           |
|                                | 206 BG 325      | 11.2             | 6                              | 12.03                          | 52.76                          | 10.42                          | 0.26              | 3.31                           | 5.17                           | 3.56                           | 0.51                          | 0.204             | 2.03              | 0.50                           | 4.7  |   |                                  |           |
|                                | 206 BG 326      | 4.3              | 17.2                           | 7.09                           | 42.32                          | 8.36                           | 0.50              | 10.27                          | ...                            | 2.54                           | 0.23                          | 0.510             | 5.47              | 4.06                           | 6.06   | continued   |                                  |           |
|                                | 206 BG 327      | 0.46             | 20.0                           | 6.53                           | 28.81                          | 34.43                          | 0.14              | 0.63                           | 0.94                           | 3.09                           | 0.30                          | 6.65              | 0.053             | 0.028                          | 21.14  |   |                                  |           |
|                                | 206 BG 328      | 93               | 1700                           | 3.64                           | 40.52                          | 17.96                          | 0.128             | 2.81                           | ...                            | 0.79                           | 0.16                          | 2.11              | 13.62             | 0.18                           | 12.52  |   |                                  |           |
| <b>Continuation from above</b> |                 |                  |                                |                                |                                |                                |                   |                                |                                |                                |                               |                   |                   |                                |  |   |                                  |           |
| <b>All Elements ppm</b>        |                 |                  |                                |                                |                                |                                |                   |                                |                                |                                |                               |                   |                   |                                |  |   |                                  |           |
|                                |                 | Cd               | Co                             | Ni                             | Bi                             | As                             | Pd                | Pt                             |                                |                                |                               |                   |                   |                                |  |   | Type                             | Size      |
|                                | 206 BG 325      | 32.6             | 21.5                           | 17.0                           | ...                            | ...                            | ...               | ...                            |                                |                                |                               |                   |                   |                                |  |   | gold-pyrite Zidarovo             | 50g       |
|                                | 206 BG 326      | 212              | 13.5                           | 12                             | 90                             | ...                            | ...               | ...                            |                                |                                |                               |                   |                   |                                |  |   | polymetallic gold ore Zidarovo   | 50g       |
|                                | 206 BG 327      | 2                | 229                            | 38                             | 879                            | 100                            | ...               | ...                            |                                |                                |                               |                   |                   |                                |  |   | copper-pyrite Zidarovo           | 50g       |
|                                | 206 BG 328      | 38.8             | 71                             | 174                            | ...                            | 578                            | 0.028             | 0.048                          |                                |                                |                               |                   |                   |                                |  |   | polymetallic gravity concentrate | 50g       |
|                                |                 | Pb               | Cu                             | Zn                             | S                              | F                              | SiO <sub>2</sub>  | Al <sub>2</sub> O <sub>3</sub> | TiO <sub>2</sub>               | CaO                            | MgO                           | Na <sub>2</sub> O | K <sub>2</sub> O  | Fe <sub>2</sub> O <sub>3</sub> | MnO  |   |                                  |           |
| <b>(Pb) Lead</b>               |                 |                  |                                |                                |                                |                                |                   |                                |                                |                                |                               |                   |                   |                                |  |   |                                  |           |
|                                | 206 CG 07235    | 4.17             | 0.2                            | 0.062                          | 0.86                           | 0.27                           | 43.63             | 12.88                          | 0.53                           | 19.51                          | 1.62                          | 1.61              | 1.42              | 4.37                           | 1.40   | Plus a further ~40 elements analysed all at ppm levels        |                                  |           |
|                                | 206 CG 07236    | 0.61             | 0.035                          | 0.092                          | 0.38                           | 0.23                           | 30.51             | 8.95                           | 0.44                           | 34.56                          | 2.06                          | 0.066             | 0.82              | 3.79                           | 1.53   |   |                                  |           |
|                                | 206 CG 07269    | 84.26            | 0.0127                         | 0.0533                         | 13.30                          | ...                            | ...               | ...                            | ...                            | ...                            | ...                           | ...               | ...               | ...                            | ...  | Plus 12 other associated elements                             |                                  |           |
| CRM                            | 206 PN KO12     | 61.43            | ...                            | 2.48                           | 17.95                          | ...                            | 0.58              | 0.12                           | ...                            | 1.91                           | 0.89                          | ...               | ...               | 12.04                          | ...  | Plus 6 other associated elements                              |                                  |           |
|                                |                 | Pb               | Cu                             | Zn                             | S                              | Fe                             | SiO <sub>2</sub>  | Al <sub>2</sub> O <sub>3</sub> | CaO                            | MgO                            | C                             | Mn                | As                | Cd                             | ppm Ni   | ppm Ag  | Type                             | Size      |
|                                | 206 SI RPZ-PF   | 3.85             | 0.29                           | 12.85                          | 12.57                          | 5.16                           | 14.32             | 1.66                           | 14.12                          | 8.48                           | 5.77                          | 1.35              | 0.023             | 0.026                          | 7.1  | 70  | Feed stock                       | 120g      |
|                                | 206 SI RPZ-PC   | 52.13            | 0.66                           | 7.05                           | 16.76                          | 5.03                           | 1.26              | 0.22                           | 4.06                           | 2.30                           | 3.45                          | 0.39              | 0.059             | 0.015                          | 5.2  | 660   | Concentrate                      | 120g      |
|                                |                 | SiO <sub>2</sub> | Al <sub>2</sub> O <sub>3</sub> | CaO                            | MgO                            | Na <sub>2</sub> O              | K <sub>2</sub> O  | Fe <sub>2</sub> O <sub>3</sub> | P <sub>2</sub> O <sub>5</sub>  | Be                             | F                             | Li <sub>2</sub> O | Cs <sub>2</sub> O | Rb <sub>2</sub> O              | L.O.I.   | Others  | Size                             |           |
| <b>(Li) Lithium</b>            |                 |                  |                                |                                |                                |                                |                   |                                |                                |                                |                               |                   |                   |                                |  |   |                                  |           |
|                                | 206 CG 07152    | 74.37            | 14.76                          | 0.335                          | 0.054                          | 4.19                           | 3.17              | 0.394                          | 0.173                          | 0.018                          | 0.667                         | 0.460             | 0.037             | 0.145                          | 1.48   | Plus a further ~20 elements, mostly rare-earths at ppm levels |                                  |           |
|                                | 206 CG 07153    | 64.64            | 19.12                          | 0.076                          | 0.036                          | 2.33                           | 4.80              | 0.301                          | 0.237                          | 0.026                          | 3.12                          | 2.29              | 0.177             | 0.735                          | 4.06   |   |                                  |           |
|                                |                 | Mn               | Al                             | SiO <sub>2</sub>               | CaO                            | MgO                            | Na <sub>2</sub> O | K <sub>2</sub> O               | Fe                             | As <sub>2</sub> O <sub>3</sub> | BaO                           | P                 | S                 | TiO <sub>2</sub>               | Others   | Type  | Size                             |           |
| <b>(Mn) Manganese</b>          |                 |                  |                                |                                |                                |                                |                   |                                |                                |                                |                               |                   |                   |                                |  |   |                                  |           |
|                                | 206 GB 29       | 58.96            | ...                            | (2.21)                         | ...                            | ...                            | ...               | ...                            | ...                            | ...                            | 0.66                          | ...               | ...               | ...                            | Cu (0.185)                                     | Pyrolusite (Morocco)  | 40g                              |           |
| CRM                            | 206 E 52        | 46.1             | 5.62                           | 3.06                           | 0.15                           | 0.25                           | 0.1               | 1.6                            | 2.4                            | 0.0026                         | 0.32                          | 0.035             | 0.018             | 0.28                           | Ni, Co, Cu, Pb                                 |   | 120g                             |           |
| CRM                            | 206 S 861-1     | 49.22            | 2.04                           | 5.46                           | (0.1)                          | ...                            | ...               | ...                            | 3.15                           | ...                            | 1.44                          | 0.087             | (0.006)           | ...                            | O 13.45  |   | 100g                             |           |
| CRM                            | 206 A SA 16     | 49.17            | (0.16)                         | 5.04                           | 4.7                            | 0.76                           | (0.03)            | 0.02                           | 11.48                          | ...                            | 0.6                           | 0.033             | 0.17              | ...                            | Zn 0.0364                                      | Wessels   | 100g                             |           |
| CRM                            | 206 A SA 17     | 38.81            | 0.13                           | 4.69                           | (14.4)                         | 3.03                           | 0.09              | 0.09                           | 4.27                           | ...                            | (0.08)                        | 0.018             | (0.01)            | ...                            | CO <sub>2</sub> 15.4                           | Mamataran   | 100g                             |           |
| CRM                            | 206 A 176/2     | 47.5             | 2.75                           | 2.53                           | 0.09                           | 0.04                           | 0.11              | 1.30                           | 6.86                           | 0.22                           | 0.19                          | 0.087             | 0.018             | 0.30                           |  |   | 100g                             |           |
| CRM                            | 206 DB E633-1   | 47.85            | 0.92                           | 10.39                          | 2.02                           | 0.58                           | ...               | ...                            | 1.64                           | ...                            | 1.13                          | 0.170             | 0.227             | 0.079                          |  |   | 100g                             |           |
| CRM                            | 206 B 25d       | 51.78            | 2.82                           | 2.52                           | ...                            | ...                            | ...               | 0.93                           | 2.74                           | ...                            | ...                           | 0.06              | ...               | 0.13                           | O 14.28  |   |                                  | 60g       |



# 20. Various Ores

# Powders

| 20.6 Ores (continued)   |                   |                                |                                |                                |                                 |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |           |
|---|-------------------|--------------------------------|--------------------------------|--------------------------------|---------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|-----------|
|   | REO               | ThO <sub>2</sub>               | La <sub>2</sub> O <sub>3</sub> | CeO <sub>2</sub>               | Pr <sub>6</sub> O <sub>11</sub> | Nd <sub>2</sub> O <sub>3</sub> | Sm <sub>2</sub> O <sub>3</sub> | Eu <sub>2</sub> O <sub>3</sub> | Gd <sub>2</sub> O <sub>3</sub> | Tb <sub>4</sub> O <sub>7</sub> | Dy <sub>2</sub> O <sub>3</sub> | Ho <sub>2</sub> O <sub>3</sub> | Er <sub>2</sub> O <sub>3</sub> | Tm <sub>2</sub> O <sub>3</sub> | Lu <sub>2</sub> O <sub>3</sub> |           |
| <b>(R.E.) Rare Earths</b>   |                   |                                |                                |                                |                                 |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |           |
| 206 GB 40   | 7.78              | (0.023)                        | 2.43                           | (3.96)                         | 0.33                            | 0.97                           | (0.06)                         | (0.010)                        | (0.019)                        | (0.0067)                       | (0.0028)                       | (0.0050)                       | (0.00097)                      | (0.0003)                       | (0.0129)                       | continued |
| 206 GB 41   | 64.21             | (0.121)                        | 20.9                           | (32.24)                        | 2.74                            | (7.61)                         | (0.52)                         | (0.075)                        | (0.151)                        | (0.0068)                       | (0.0157)                       | (0.0034)                       | (0.0049)                       | (0.00105)                      | (0.050)                        |           |
| 206 CG 07158  | 0.092             | 0.0028                         | 0.000003                       | 0.0092                         | 0.0049                          | 0.02                           | 0.0034                         | 0.0008                         | 0.0032                         | 0.0005                         | 0.0027                         | ...                            | 0.0016                         | 0.0002                         | 0.0002                         |           |
| 206 CG 07159  | 0.085             | 0.0047                         | 0.0020                         | 0.0022                         | 0.0006                          | 0.0028                         | 0.0016                         | 0.00004                        | 0.0032                         | 0.0008                         | 0.0056                         | ...                            | 0.0036                         | 0.0006                         | 0.0006                         |           |
| 206 CG 07160  | 0.486             | 0.0045                         | 0.00001                        | 0.0035                         | 0.0045                          | 0.02                           | 0.02                           | 0.0002                         | 0.03                           | 0.0058                         | 0.04                           | ...                            | 0.02                           | 0.0032                         | 0.0030                         |           |
| 206 CG 07161  | 0.784             | 0.0027                         | 0.00003                        | 0.02                           | 0.05                            | 0.19                           | 0.03                           | 0.0075                         | 0.03                           | 0.0041                         | 0.02                           | ...                            | 0.01                           | 0.0015                         | 0.0014                         |           |
| <b>Continuation from above</b>  |                   |                                |                                |                                |                                 |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |           |
|   |                   | Y <sub>2</sub> O <sub>3</sub>  | Yb <sub>2</sub> O <sub>4</sub> | SiO <sub>2</sub>               | Al <sub>2</sub> O <sub>3</sub>  | Fe <sub>2</sub> O <sub>3</sub> | MgO                            | CaO                            | Na <sub>2</sub> O              | K <sub>2</sub> O               | Rb <sub>2</sub> O              | Sc <sub>2</sub> O <sub>3</sub> | Others                         | Type                           | Size                           |           |
| 206 GB 40   |                   | (0.00047)                      | (0.014)                        | (16.59)                        | 2.1                             | 3.28                           | (4.02)                         | (16.99)                        | (0.12)                         | (1.28)                         | ...                            | ...                            | several                        | Bastnazite                     | 90g                            |           |
| 206 GB 41   |                   | (0.080)                        | (0.066)                        | (0.82)                         | (0.073)                         | (0.42)                         | (0.26)                         | (4.52)                         | (0.13)                         | (0.01)                         | ...                            | ...                            | several                        | Bastnazite conc.               | 90g                            |           |
| 206 CG 07158  |                   | 0.0014                         | 0.02                           | 67.28                          | 19.04                           | 3.49                           | 0.229                          | 0.033                          | 0.062                          | 2.13                           | 0.012                          | 0.0011                         |                                |                                | 100g                           |           |
| 206 CG 07159  |                   | 0.0037                         | 0.057                          | 74.55                          | 14.70                           | 1.15                           | 0.077                          | 90.026                         | 0.158                          | 4.98                           | 0.069                          | 0.0010                         |                                |                                | 100g                           |           |
| 206 CG 07160  |                   | 0.02                           | 0.30                           | 74.34                          | 14.65                           | 1.13                           | 0.08                           | 0.031                          | 0.155                          | 4.92                           | 0.067                          | 0.0009                         |                                |                                | 100g                           |           |
| 206 CG 07161  |                   | 0.0100                         | 0.12                           | 66.72                          | 19.00                           | 3.46                           | 0.231                          | 0.029                          | 0.064                          | 2.11                           | 0.011                          | 0.0012                         |                                |                                | 100g                           |           |
| <b>ppm Ag</b>   |                   |                                |                                |                                |                                 |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |           |
| <b>(Ag) Silver</b>  |                   |                                |                                |                                |                                 |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |           |
| 206 CG 07255  | 46.9              |                                |                                |                                |                                 |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                | 500g      |
| 206 CG 07256  | 112               |                                |                                |                                |                                 |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                | 500g      |
| 206 CG 07257  | 298               |                                |                                |                                |                                 |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                | 500g      |
| 206 CG 07258  | 446               |                                |                                |                                |                                 |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                | 500g      |
| 206 CG 07259  | 559               |                                |                                |                                |                                 |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                | 500g      |
| 206 CG 07260  | 732               |                                |                                |                                |                                 |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                | 500g      |
| <b>Ta</b>   |                   |                                |                                |                                |                                 |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |           |
| <b>(Ta) Tantalum</b>  |                   |                                |                                |                                |                                 |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |           |
| 206 A TAN1-1  | 0.236             | (8.2)                          | (71.5)                         | (0.5)                          | (0.02)                          | (4.6)                          | (1.5)                          | (0.2)                          | (0.02)                         | (0.02)                         | (0.01)                         | ...                            |                                | Ta ore                         | 200g                           |           |
| <b>Sn</b>   |                   |                                |                                |                                |                                 |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |           |
| <b>(Sn) Tin</b>   |                   |                                |                                |                                |                                 |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |           |
| CRM 206 F 010   | 76.59             | ...                            | ...                            | ...                            | ...                             | ...                            | ...                            | ...                            | ...                            | ...                            | ...                            | ...                            | ...                            | ...                            | ...                            | 225g      |
| 206 GB 26   | 33.36             | ...                            | ...                            | ...                            | ...                             | 12.03                          | ...                            | ...                            | 2.11                           | ...                            | ...                            | ...                            | 13.52                          | ...                            | Sn-W ore                       | 40g       |
| CRM 206 A 355   | 31.42             | 4.12                           | 7.14                           | 2.63                           | 0.35                            | 17.08                          | 0.14                           | 0.015                          | 0.085                          | 2.07                           | 0.5                            | 0.37                           | 0.35                           | 0.059                          |                                | 100g      |
| 206 CG 07231  | 45.8              | ...                            | ...                            | ...                            | ...                             | 21.33                          | 0.574                          | 0.034                          | ...                            | ...                            | 0.183                          | ...                            | ...                            | ...                            | continued                      |           |
| 206 CG 07232  | 62.49             | ...                            | ...                            | ...                            | ...                             | 9.53                           | 0.306                          | 0.016                          | 0.043                          | ...                            | 0.09                           | ...                            | ...                            | ...                            |                                |           |
| <b>Continuation from above</b>  |                   |                                |                                |                                |                                 |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |           |
|   |                   | Pb                             | Sb                             | Zn                             | Ag                              | SiO <sub>2</sub>               | WO <sub>2</sub>                |                                |                                |                                |                                |                                |                                | Type                           | Size                           |           |
| 206 CG 07231  |                   | 2.89                           | 0.024                          | 0.264                          | 0.00255                         | ...                            | ...                            |                                |                                |                                |                                |                                |                                | Concentrate                    | 100g                           |           |
| 206 CG 07232  |                   | 1.62                           | 0.016                          | 0.12                           | ...                             | 0.93                           | 0.182                          |                                |                                |                                |                                |                                |                                | Concentrate                    | 100g                           |           |
| <b>Total</b>  |                   |                                |                                |                                |                                 |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |           |
|   | TiO <sub>2</sub>  | Fe <sub>2</sub> O <sub>3</sub> | SiO <sub>2</sub>               | Al <sub>2</sub> O <sub>3</sub> | MgO                             | CaO                            | MnO                            | Cr <sub>2</sub> O <sub>3</sub> | V <sub>2</sub> O <sub>5</sub>  | Ti                             | Fe                             |                                | Others                         | Type                           | Size                           |           |
| <b>(Ti) Titanium</b>  |                   |                                |                                |                                |                                 |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |           |
| CRM 206 A SA 59   | 48.8              | 50.3                           | 0.75                           | 0.61                           | 0.56                            | 0.05                           | 1.05                           | 0.1                            | 0.25                           | ...                            | ...                            | ...                            | ...                            | Ilmenite                       | 100g                           |           |
| CRM 206 A SA 61   | 93.3              | 0.68                           | 2.03                           | 0.93                           | ...                             | ...                            | ...                            | 0.11                           | 0.42                           | ...                            | ...                            | ...                            | ...                            | Rutile                         | 100g                           |           |
| 206 GB 32   | ...               | ...                            | ...                            | ...                            | ...                             | ...                            | ...                            | ...                            | ...                            | 57.19                          | ...                            | ...                            | Nb (0.26)                      | Rutile                         | 40g                            |           |
| CRM 206 B 670   | 96.16             | 0.86                           | 0.51                           | ...                            | ...                             | ...                            | ...                            | 0.23                           | 0.66                           | ...                            | ...                            | ...                            | ZrO <sub>2</sub> 0.84          | Rutile                         | 90g                            |           |
| 206 DH X6703  | 28.74             | ...                            | 5.67                           | 3.40                           | 2.47                            | 0.99                           | ...                            | 0.108                          | 0.25                           | ...                            | 40.92                          | ...                            | many                           | Ilmenite                       | 100g                           |           |
| 206 DH X6704  | 31.92             | ...                            | 7.93                           | 4.64                           | 2.81                            | 1.30                           | ...                            | 0.109                          | 0.286                          | ...                            | 36.23                          | ...                            | many                           | Ilmenite                       | 100g                           |           |
| 206 DH X5802  | 93.76             | 0.629                          | 2.04                           | 0.449                          | ...                             | 0.048                          | 0.007                          | 0.113                          | 0.454                          | ...                            | ...                            | ...                            | many                           | Rutile                         | 100g                           |           |
| 206 DH X5803  | 91.47             | 1.22                           | 3.07                           | 0.668                          | ...                             | 0.131                          | 0.056                          | 0.213                          | 0.455                          | ...                            | ...                            | ...                            | many                           | Rutile                         | 100g                           |           |
| <b>W</b>  |                   |                                |                                |                                |                                 |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |           |
| <b>(W) Tungsten</b>   |                   |                                |                                |                                |                                 |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |           |
| CRM 206 A CT-1  | 1.04              | (0.03)                         | ...                            | ...                            | ...                             | (2.9)                          | (36.82)                        | (12.2)                         | (2.0)                          | (17.5)                         | ...                            | ...                            | ...                            | Scheelite Ore                  | 200g                           |           |
| CRM 206 A BH-1  | 0.422             | (0.02)                         | ...                            | ...                            | ...                             | (3.5)                          | (81.34)                        | (0.5)                          | (0.4)                          | (3.2)                          | ...                            | ...                            | ...                            | Wolframite Ore                 | 200g                           |           |
| CRM 206 A TLG-1   | 0.083             | (<0.01)                        | ...                            | ...                            | ...                             | (3.0)                          | (46.02)                        | (166.0)                        | (2.7)                          | (8.6)                          | ...                            | ...                            | ...                            | Scheelite Ore                  | 200g                           |           |
| CRM 206 A MP=2  | 0.65              | 0.281                          | 0.245                          | 0.00049                        | 0.043                           | (5.4)                          | (76.1)                         | (2.7)                          | (0.04)                         | (3.7)                          | (0.7)                          | (0.9)                          | (0.4)                          | (0.2)                          | W-Mo-Bi Ore                    | 200g      |
| <b>W</b>  |                   |                                |                                |                                |                                 |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |           |
|   | W                 | Cu                             | Pb                             | Zn                             | Bi                              | Sn                             | S                              | F                              | Al <sub>2</sub> O <sub>3</sub> | SiO <sub>2</sub>               | Fe <sub>2</sub> O <sub>3</sub> | CaO                            | MgO                            | K <sub>2</sub> O               | Type                           | Size      |
| 206 CG 07240  | 0.015             | 0.079                          | 0.26                           | 0.29                           | 0.011                           | 0.14                           | 3.12                           | 9.91                           | 8.24                           | 32.27                          | 7.79                           | 37.73                          | 1.45                           | 1.94                           | Tailings                       | 100g      |
| 206 CG 07241  | 0.22              | 0.096                          | 0.00812                        | 0.010                          | 0.068                           | 0.17                           | 1.90                           | 4.48                           | 11.15                          | 71.27                          | 5.60                           | 4.17                           | 0.14                           | 1.58                           | Tailings                       | 100g      |
| Each sample is also certified for ~30 other elements, all at ppm levels |                   |                                |                                |                                |                                 |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |           |
|   | % WO <sub>2</sub> | ppm As                         | ppm Bi                         | ppm Mo                         | ppm P                           | ppm S                          | ppm Ca                         | ppm Fe                         | ppm Pb                         | ppm Mn                         | ppm Nb                         | ppm Si                         | ppm Sn                         | ppm Ti                         | Ore Type                       | Size      |
| CRM 206 B 277   | 67.4              | (0.015)                        | (0.07)                         | (0.06)                         | (0.03)                          | (0.25)                         | (0.37)                         | (7.4)                          | (0.07)                         | (10.0)                         | (1.00)                         | (0.85)                         | (0.54)                         | (2.2)                          | Concentrate                    | 100g      |
| CRM 206 B 2430  | 70.26             | 0.002                          | 0.078                          | 0.22                           | 0.017                           | 0.26                           | ...                            | ...                            | ...                            | ...                            | ...                            | ...                            | ...                            | ...                            | Scheelite Ore                  | 100g      |

# 20. Various Ores

Powders

## 20.6 Ores (continued)

|                    | U                      | Th                                 | Al                     | Si         | Ca         | Mg                                 | Na                                 | K                                  | Fe                                | S                      | Ti                     | Pb                    | L.O.I         | H <sub>2</sub> O                     | Others   | Type             | Size        |
|--------------------|------------------------|------------------------------------|------------------------|------------|------------|------------------------------------|------------------------------------|------------------------------------|-----------------------------------|------------------------|------------------------|-----------------------|---------------|--------------------------------------|--|------------------|-------------|
| <b>(U) Uranium</b> |                        |                                    |                        |            |            |                                    |                                    |                                    |                                   |                        |                        |                       |               |                                      |  |                  |             |
| CRM 206 A DL-1A    | 0.0116                 | 0.0076                             | (5.3)                  | (39.95)    | (0.3)      | (0.2)                              | (0.09)                             | (0.2)                              | (0.93)                            | (0.41)                 | (0.09)                 | ...                   | (1.4)         | (0.2)                                |  | U-Th Ore         | 200g        |
| CRM 206 A DH-1A    | 0.2629                 | 0.091                              | (3.44)                 | (37.3)     | (0.04)     | (0.07)                             | (0.04)                             | (1.43)                             | (5.17)                            | (4.82)                 | ...                    | ...                   | ...           | (0.07)                               |  | U-Th Ore         | 200g        |
| CRM 206 A BL-1     | 0.022                  | 0.0015                             | ...                    | ...        | ...        | ...                                | ...                                | ...                                | ...                               | ...                    | ...                    | ...                   | ...           | ...                                  |  | U-Th-Ore         | 100g        |
| CRM 206 A BL-2A    | 0.426                  | ...                                | (6.62)                 | (27.6)     | (4.06)     | (1.5)                              | (3.42)                             | (0.33)                             | (4.75)                            | (0.36)                 | ...                    | (0.09)                | (5.16)        | (0.19)                               |  | U. Ore           | 200g        |
| CRM 206 A BL-3     | 1.02                   | ...                                | ...                    | ...        | ...        | ...                                | ...                                | ...                                | ...                               | ...                    | ...                    | ...                   | ...           | ...                                  |  | U. Ore           | 100g        |
| CRM 206 A BL-4A    | 0.125                  | ...                                | (6.75)                 | (28.6)     | (3.27)     | (1.38)                             | (3.24)                             | (0.36)                             | (5.26)                            | (0.28)                 | ...                    | (0.031)               | (4.44)        | (0.16)                               |  | U. Ore           | 200g        |
| CRM 206 A BL-5     | 7.09                   | (0.004)                            | (6.0)                  | (22.0)     | (4.0)      | (1.5)                              | (3.6)                              | (0.4)                              | (5.9)                             | (0.3)                  | (0.4)                  | (1.5)                 | ...           | ...                                  |  | Concentrate      | 100g        |
| CRM 206 A OKA-2    | 0.02186                | 2.893                              | ...                    | ...        | ...        | ...                                | ...                                | (0.34)                             | ...                               | ...                    | ...                    | ...                   | ...           | ...                                  |  | R.E.-Th Ore      | 100g        |
| CRM 206 A RL-1     | 0.201                  | ...                                | (6.5)                  | (25.3)     | (1.8)      | (9.2)                              | (0.06)                             | (0.22)                             | (2.3)                             | (0.13)                 | (0.25)                 | ...                   | (10.2)        | (0.9)                                | As, Ni   | U Ore            | 100g        |
| CRM 206 A UTS-1    | 0.0049                 | 0.0138                             | 6.24                   | ...        | 5.24       | ...                                | ...                                | ...                                | 4.87                              | 1.00                   | 0.54                   | ...                   | ...           | ...                                  | Ba, SO <sub>3</sub>                            | U Ore Tailings   | 200g        |
| CRM 206 A UTS-2    | 0.0056                 | 0.0174                             | 2.71                   | ...        | 0.42       | ...                                | ...                                | ...                                | 3.20                              | 3.23                   | 0.18                   | ...                   | ...           | ...                                  | Ba, SO <sub>3</sub>                            | U Ore Tailings   | 200g        |
| CRM 206 A UTS-3    | 0.0513                 | 0.0010                             | 5.80                   | ...        | 4.03       | ...                                | ...                                | ...                                | 3.25                              | 0.23                   | 0.23                   | ...                   | ...           | ...                                  | Ba, SO <sub>3</sub>                            | U Ore Tailings   | 200g        |
| CRM 206 A UTS-4    | 0.1010                 | 0.0015                             | 6.29                   | ...        | 1.75       | ...                                | ...                                | ...                                | 2.61                              | 1.00                   | 0.24                   | ...                   | ...           | ...                                  | Ba, SO <sub>3</sub>                            | U Ore Tailings   | 100g        |
| CRM 206 GB 37      | 0.148                  | 0.0345                             | ...                    | ...        | ...        | ...                                | ...                                | ...                                | ...                               | ...                    | ...                    | ...                   | ...           | ...                                  |  | Canada           | 40g         |
|                    | <b>Zn</b>              | <b>Cu</b>                          | <b>Pb</b>              | <b>S</b>   | <b>Cd</b>  | <b>SiO<sub>2</sub></b>             | <b>Fe<sub>2</sub>O<sub>3</sub></b> | <b>Al<sub>2</sub>O<sub>3</sub></b> | <b>MgO</b>                        | <b>CaO</b>             | <b>Na<sub>2</sub>O</b> | <b>K<sub>2</sub>O</b> | <b>F</b>      | <b>Others</b>                        | <b>Type</b>                                    | <b>Size</b>      |             |
| <b>(Zn) Zinc</b>   |                        |                                    |                        |            |            |                                    |                                    |                                    |                                   |                        |                        |                       |               |                                      |  |                  |             |
| CRM 206 CG 07237   | 2.75                   | 0.71                               | 0.25                   | 2.87       | ...        | 82.95                              | 3.50                               | 2.80                               | 0.082                             | 1.91                   | 0.56                   | 0.99                  | 1.20          | ~30 at ppm levels                    | Tailings                                       | 100g             |             |
| CRM 206 A 362      | 2.08                   | (0.004)                            | 2.44                   | 1.48       | 0.020      | 9.03                               | 0.483                              | 0.667                              | 0.068                             | 44.21                  | 0.084                  | 0.14                  | ...           | Mn <sub>3</sub> O <sub>4</sub> 0.829 | Tailings                                       | 100g             |             |
|                    | <b>Zn</b>              | <b>Al</b>                          | <b>Si</b>              | <b>Ca</b>  | <b>Mg</b>  | <b>Fe</b>                          | <b>Ag</b>                          | <b>Pb</b>                          | <b>Cd</b>                         | <b>Cu</b>              | <b>S</b>               | <b>ppm Hg</b>         | <b>As</b>     | <b>Sn</b>                            | <b>H<sub>2</sub>O</b>                          | <b>Type</b>      | <b>Size</b> |
| CRM 206 B 113b     | 56.49                  | ...                                | ...                    | 0.8196     | 0.4460     | 2.077                              | 0.04607                            | 2.731                              | 0.7804                            | 0.2953                 | 30.032                 | (0.55)                | ...           | ...                                  | ...  | Concentrate      | 100g        |
| 206 SI RPZ-ZC      | 55.26                  | 0.074                              | 0.25                   | 1.29       | 0.53       | 4.02                               | 0.031                              | 3.53                               | 0.11                              | 0.65                   | 31.75                  | ...                   | 0.023         | 0.012                                | ...  | Concentrate      | 120g        |
| CRM 206 A CZN-3    | 50.92                  | ...                                | (0.44)                 | ...        | ...        | 9.97                               | 0.0045                             | 0.113                              | 0.248                             | 0.685                  | 31.6                   | (0.0005)              | 0.039         | ...                                  | ...  | Concentrate      | 200g        |
| CRM 206 A KC-1A    | 34.65                  | (0.1)                              | (10.4)                 | 0.3        | 0.05       | (10.9)                             | 0.167                              | 2.24                               | ...                               | 0.629                  | (27.5)                 | ...                   | ...           | 0.61                                 | (0.09)   | Zn-Pb-Sn-Ag      | 200g        |
| CRM 206 A PD-1     | (35.9)                 | ...                                | (3.05)                 | ...        | ...        | (12.2)                             | ...                                | 2.75                               | (0.28)                            | (7.03)                 | (8.23)                 | 389                   | 0.77          | ...                                  | (0.4)  | Non-ferrous Dust | 200g        |
|                    | <b>Zn</b>              | <b>S</b>                           | <b>Cd</b>              | <b>Cu</b>  | <b>Fe</b>  | <b>Pb</b>                          | <b>ppm Ag</b>                      | <b>ppm As</b>                      | <b>ppm Bi</b>                     | <b>ppm Co</b>          | <b>ppm Ga</b>          | <b>ppm Ge</b>         | <b>ppm In</b> | <b>ppm Mn</b>                        | <b>ppm Ni</b>                                  | <b>ppm Sb</b>    | <b>Size</b> |
| 206 CG 07270       | 62.51                  | 32.33                              | 0.15                   | 2.14       | 2.14       | 0.10                               | 5.0                                | 3.3                                | 6.1                               | 491                    | 251                    | 6.0                   | 21.0          | 169                                  | 43.2   | 249              | 10g         |
|                    | <b>Zn</b>              | <b>Cu</b>                          | <b>Pb</b>              | <b>Fe</b>  | <b>Cd</b>  | <b>Mg</b>                          | <b>Al<sub>2</sub>O<sub>3</sub></b> | <b>SiO<sub>2</sub></b>             | <b>CaO</b>                        | <b>MgO</b>             | <b>S</b>               | <b>F</b>              | <b>Cl</b>     | <b>ppm Hg</b>                        | <b>Type</b>                                    | <b>Size</b>      |             |
| CRM 206 PN RB7     | 3.07                   | ...                                | (0.26)                 | 8.28       | 0.033      | ...                                | ...                                | (0.8)                              | 24.35                             | 15.26                  | (10.3)                 | ...                   | ...           | ...                                  | Blende   | 170g             |             |
| CRM 206 PN RG8     | 5.40                   | ...                                | 0.84                   | 6.34       | 0.047      | ...                                | 0.90                               | 2.64                               | 26.45                             | 12.16                  | 0.57                   | ...                   | ...           | ...                                  | Galmei Ore                                     | 130g             |             |
| CRM 206 PN TC9     | 53.4                   | ...                                | 3.77                   | 5.64       | 0.0049     | ...                                | ...                                | 5.47                               | 6.96                              | 3.50                   | 0.52                   | 0.055                 | 0.033         | ...                                  | Roasted oxide                                  | 220g             |             |
| CRM 206 PN TCP/10  | 60.6                   | ...                                | 2.31                   | 6.7        | ...        | ...                                | 0.14                               | 0.56                               | 2.54                              | 1.38                   | 3.07                   | ...                   | ...           | ...                                  | Roasted oxide                                  | 240g             |             |
| CRM 206 PN Kc11    | 54.51                  | ...                                | 1.21                   | 6.53       | ...        | ...                                | 0.069                              | 0.26                               | 0.72                              | 0.30                   | 32.36                  | ...                   | ...           | ...                                  | Concentrate                                    | 280g             |             |
| CRM 206 F 109      | ...                    | 0.946                              | 0.738                  | 14.51      | 0.46       | 0.020                              | ...                                | ...                                | ...                               | ...                    | ...                    | 0.0081                | ...           | 0.96                                 | ...  | Blende           | 200g        |
| CRM 206 F 110      | ...                    | 1.628                              | 9.78                   | 0.55       | 1.051      | 0.136                              | ...                                | ...                                | ...                               | ...                    | ...                    | 0.0055                | ...           | 148.4                                | ...  | Blende           | 200g        |
|                    | <b>ZrO<sub>2</sub></b> | <b>Al<sub>2</sub>O<sub>3</sub></b> | <b>SiO<sub>2</sub></b> | <b>CaO</b> | <b>MgO</b> | <b>Fe<sub>2</sub>O<sub>3</sub></b> | <b>Na<sub>2</sub>O</b>             | <b>K<sub>2</sub>O</b>              | <b>P<sub>2</sub>O<sub>5</sub></b> | <b>TiO<sub>2</sub></b> | <b>HfO<sub>2</sub></b> | <b>MnO</b>            | <b>F</b>      | <b>L.O.I.</b>                        | <b>Size</b>                                    |                  |             |
| 206 CG 07156       | 0.187                  | 14.74                              | 66.02                  | 2.70       | 2.10       | 4.80                               | 3.83                               | 3.37                               | 0.163                             | 0.420                  | 0.0042                 | 0.085                 | 0.080         | 1.55                                 | Plus a further 16 elements, mostly rare-earths | 100g             |             |
| 206 CG 07157       | 1.25                   | 14.70                              | 65.66                  | 2.64       | 2.01       | 4.69                               | 3.74                               | 3.31                               | 0.167                             | 0.410                  | 0.03                   | 0.083                 | 0.082         | 1.51                                 |  |                  |             |





| 21.1 Ferro Alloys               |                | C      | Si      | S       | P       | Mn    | Ni      | Cr    | Mo    | Cu      | V     | Ti    | Fe     | Al      | Others                              | Size |
|---------------------------------|----------------|--------|---------|---------|---------|-------|---------|-------|-------|---------|-------|-------|--------|---------|-------------------------------------|------|
| <b>(Si/Mn) Silico-Manganese</b> |                |        |         |         |         |       |         |       |       |         |       |       |        |         |                                     |      |
|                                 | 211 S 705-4    | 2.11   | 14.76   | 0.014   | 0.081   | 61.56 | 0.014   | 0.016 | ...   | 0.02    | 0.015 | 0.236 | ...    | 0.05    | Ca 0.028, Mg 0.015                  | 100g |
| CRM                             | 211 TI E586-1  | 0.025  | 34.0    | ...     | 0.041   | 62.5  | ...     | 0.044 | ...   | ...     | 0.041 | ...   | 2.89   | 0.022   | Ca 0.039, Co 0.007                  | 100g |
|                                 | 211 DH L0101   | 1.764  | 17.42   | ...     | 0.11    | 69.46 | 0.053   | 0.032 | ...   | 0.034   | ...   | 0.183 | 10.06  | ...     | Co 0.065                            | 50g  |
|                                 | 211 DH L0102   | 1.407  | 18.19   | ...     | 0.166   | 73.02 | 0.102   | 0.046 | ...   | 0.042   | ...   | 0.184 | 6.11   | ...     | Co 0.108                            | 50g  |
|                                 | 211 DH L0103   | 1.716  | 17.79   | ...     | 0.1     | 68.25 | 0.032   | 0.009 | ...   | 0.032   | ...   | 0.191 | 11.11  | ...     | Co 0.066                            | 50g  |
|                                 | 211 DH L0104   | 1.165  | 19.47   | ...     | 0.148   | 68.2  | 0.093   | 0.045 | ...   | 0.042   | ...   | 0.208 | 9.88   | ...     | Co 0.109                            | 50g  |
|                                 | 211 DH L0105   | 1.693  | 17.22   | ...     | 0.147   | 67.02 | 0.068   | 0.032 | ...   | 0.069   | ...   | 0.201 | 12.64  | ...     | Co 0.143                            | 50g  |
|                                 | 211 DH L0106   | 0.015  | 30.16   | ...     | 0.05    | 59.06 | 0.033   | 0.035 | ...   | 0.019   | ...   | 0.471 | 9.91   | 0.016   | Co 0.028                            | 50g  |
|                                 | 211 CG 01427   | 0.922  | 19.34   | 0.0125  | 0.217   | 66.66 | ...     | ...   | ...   | ...     | ...   | ...   | ...    | ...     | ...                                 | 50g  |
|                                 | 211 CM 1642    | 1.08   | 18.56   | 0.013   | 0.178   | 64.95 | ...     | ...   | ...   | ...     | ...   | ...   | ...    | ...     | ...                                 | 50g  |
|                                 | 211 CM 1643    | 2.19   | 14.42   | 0.012   | 0.305   | 64.29 | ...     | ...   | ...   | ...     | ...   | ...   | ...    | ...     | ...                                 | 50g  |
|                                 | 211 RU F23/2   | 1.43   | 18.08   | 0.022   | 0.488   | 73.0  | ...     | ...   | ...   | ...     | ...   | ...   | ...    | ...     | ...                                 | 250g |
| <b>(Si/Zr) Silico-Zirconium</b> |                |        |         |         |         |       |         |       |       |         |       |       |        |         |                                     |      |
| CRM                             | 211 RU F27/2   | 0.111  | 26.1    | (0.001) | 0.044   | ...   | ...     | ...   | ...   | 1.47    | ...   | 0.215 | (12)   | 7.48    | Zr 51.5                             | 200g |
| <b>(Ti) Ferro Titanium</b>      |                |        |         |         |         |       |         |       |       |         |       |       |        |         |                                     |      |
| CRM                             | 211 A E584-1   | 0.044  | 1.80    | 0.030   | 0.032   | 1.13  | ...     | ...   | ...   | ...     | ...   | 37.17 | ...    | 7.19    | Soluble Al (6.0)                    | 100g |
| CRM                             | 211 TI E510-1  | 0.058  | 4.65    | ...     | (0.035) | ...   | ...     | ...   | ...   | ...     | ...   | 26.95 | ...    | (4.9)   | N (0.014)                           | 100g |
| CRM                             | 211 DB E589-1  | 0.132  | (0.412) | 0.0152  | (0.011) | 0.151 | 0.663   | 0.506 | 0.934 | 0.146   | 2.32  | 68.4  | 16.93  | 5.34    | Co 0.115, Sn 0.55, Zr 0.866, N 0.64 | 100g |
|                                 | 211M BS FeTi-1 | 0.57   | 2.9     | 0.009   | 0.05    | 7.7   | 0.17    | 0.33  | 0.06  | 0.6     | 0.69  | 19.9  | ...    | 12.5    | Zr 3.6                              | 100g |
|                                 | 211M BS FeTi-2 | 0.46   | 3.2     | ...     | 0.053   | 7.91  | 0.16    | 0.3   | 0.15  | 0.43    | 0.81  | 19.4  | ...    | 12.7    | N 0.16, Sn 0.16                     | 100g |
|                                 | 211 DH L2403   | ...    | 0.325   | ...     | 0.01    | 0.102 | 0.412   | 0.439 | 0.238 | 0.185   | 3.167 | 69.39 | 17.12  | 5.47    | Sn 0.418                            | 50g  |
|                                 | 211 DH L2404   | ...    | 0.265   | ...     | 0.007   | 0.116 | 1.82    | 1.007 | 0.4   | 0.115   | 2.24  | 66.74 | 19.19  | 4.92    | Sn 0.530                            | 50g  |
|                                 | 211 DH L2405   | ...    | 0.087   | ...     | 0.011   | 0.049 | 0.13    | 0.087 | 0.086 | 0.047   | 0.838 | 66.8  | 27.87  | 1.497   | Sn 0.016                            | 50g  |
|                                 | 211 DH L2407   | ...    | 0.359   | ...     | 0.0     | 0.075 | 0.645   | 0.397 | 0.295 | 0.682   | 3.158 | 70.61 | 13.26  | 6.51    | Sn 0.434                            | 50g  |
|                                 | 211 CG 01430   | 0.023  | 4.68    | 0.012   | 0.040   | 2.54  | ...     | ...   | ...   | 0.012   | ...   | 28.76 | ...    | 5.08    | ...                                 | 50g  |
| CRM                             | 211 RU F16/3   | 0.051  | 6.44    | 0.024   | 0.053   | 0.68  | ...     | 0.127 | 0.112 | 1.46    | 0.208 | 33.11 | ...    | 8.45    | Zr 0.022, Zn 0.122, Sn 0.023        | 250g |
| CRM                             | 211 RU F30/2   | 0.132  | 0.191   | 0.0061  | 0.0036  | 0.156 | 0.046   | 0.107 | 0.96  | 0.040   | 0.86  | 71.2  | 21.28  | 3.76    | Sn 0.023, N 0.48,                   | 250g |
| <b>(W) Ferro Tungsten</b>       |                |        |         |         |         |       |         |       |       |         |       |       |        |         |                                     |      |
| CRM                             | 211 A E555-1   | 0.025  | 1.75    | (0.018) | (0.02)  | ...   | ...     | ...   | ...   | ...     | ...   | ...   | ...    | 0.14    | W 79.9, Sn 0.034                    | 100g |
| CRM                             | 211 A E590-1   | 0.0250 | 1.05    | (0.07)  | ...     | 0.136 | ...     | ...   | 0.101 | 0.0484  | ...   | ...   | (17.9) | (0.37)  | W 79.55, Sn 0.045                   | 100g |
|                                 | 211 J 17       | 0.74   | 0.2     | ...     | ...     | ...   | ...     | ...   | ...   | ...     | ...   | ...   | ...    | ...     | W 80.8, Sn 0.045                    | 100g |
|                                 | 211 CG 01428   | 0.055  | 0.34    | 0.048   | 0.028   | 0.12  | ...     | ...   | ...   | 0.043   | ...   | ...   | ...    | ...     | W 76.66                             | 150g |
| CRM                             | 211 RU F18/2   | 0.075  | 0.35    | 0.071   | 0.042   | 0.095 | ...     | ...   | 0.56  | 0.105   | ...   | ...   | ...    | ...     | W 74.7, Sn 0.038, As 0.028          | 300g |
| <b>(V) Ferro Vanadium</b>       |                |        |         |         |         |       |         |       |       |         |       |       |        |         |                                     |      |
| CRM                             | 211 J 18A      | 0.080  | 0.48    | 0.008   | 0.025   | 0.32  | (0.008) | 0.58  | (0.1) | (0.005) | 80.8  | ...   | 15.3   | 1.58    | N 0.149                             | 100g |
| CRM                             | 211 S 750-2    | 0.14   | 0.52    | 0.1     | 0.018   | ...   | ...     | ...   | ...   | ...     | 53.4  | ...   | ...    | 3.2     | ...                                 | 150g |
| CRM                             | 211 A E577-1   | 0.089  | 1.79    | 0.034   | 0.035   | 0.158 | 0.053   | ...   | ...   | 0.054   | 50.16 | ...   | ...    | 0.414   | Soluble Al (0.21)                   | 100g |
| CRM                             | 211 TI E511-1  | 0.049  | 0.341   | 0.018   | (0.016) | ...   | ...     | ...   | ...   | ...     | 80.7  | ...   | ...    | ...     | ...                                 | 100g |
| CRM                             | 211 DB E591-1  | 0.141  | 0.847   | 0.0153  | 0.0299  | 0.307 | 0.0141  | ...   | ...   | 0.0596  | 79.72 | ...   | 14.59  | 3.19    | ...                                 | 100g |
|                                 | 211 DH L2501   | 502.0  | 0.53    | 0.011   | 0.033   | 0.165 | 0.011   | 0.141 | 0.014 | 0.007   | 79.56 | 0.034 | 17.12  | 1.318   | ...                                 | 50g  |
|                                 | 211 DH L2502   | 0.062  | 1.38    | 0.041   | 0.037   | 0.247 | 0.021   | 0.313 | 0.022 | 0.034   | 81.59 | 0.032 | 14.0   | 1.15    | ...                                 | 50g  |
|                                 | 211 DH L2503   | 0.092  | 1.418   | 0.019   | 0.011   | 0.08  | 0.018   | 0.099 | 0.051 | 0.018   | 83.73 | 0.024 | 12.0   | 0.794   | ...                                 | 50g  |
|                                 | 211 DH L2504   | 0.093  | 0.797   | 0.019   | 0.034   | 0.422 | 0.076   | 0.753 | 0.004 | 0.07    | 79.96 | 0.017 | 15.25  | 1.87    | ...                                 | 50g  |
|                                 | 211 DH L2505   | 0.216  | 0.805   | 0.021   | 0.036   | 0.326 | 0.022   | 0.119 | 0.201 | 0.219   | 76.12 | 0.034 | 19.99  | 0.845   | ...                                 | 50g  |
|                                 | 211 DH L2506   | 0.118  | 1.42    | 0.019   | 0.041   | 0.172 | 0.03    | 0.191 | 0.171 | 0.084   | 82.13 | 0.121 | 10.89  | 3.72    | ...                                 | 50g  |
|                                 | 211 DH L2507   | 0.289  | 0.959   | 0.108   | 0.03    | 0.106 | 0.033   | 0.986 | 0.017 | 0.055   | 76.65 | 0.045 | 15.97  | 4.06    | ...                                 | 50g  |
|                                 | 211 DH L2508   | 0.294  | 1.34    | ...     | 0.072   | 3.16  | 0.049   | 0.596 | 0.004 | 0.189   | 51.54 | 0.011 | 41.26  | 0.026   | ...                                 | 50g  |
|                                 | 211 DH L2509   | 0.216  | 3.73    | ...     | 0.034   | 2.41  | 0.327   | 2.16  | 0.136 | 0.315   | 37.63 | 0.345 | 52.05  | 0.48    | ...                                 | 50g  |
|                                 | 211 M BS FeV42 | 0.30   | 3.81    | 0.31    | 0.12    | 3.37  | 3.85    | 5.21  | 0.024 | 0.31    | 42.35 | 0.033 | 39.45  | (0.06)  | N 0.20                              | 100g |
|                                 | 211 M BS FeV45 | 0.24   | 4.86    | 0.33    | 0.12    | 4.14  | 4.28    | 5.82  | 0.01  | 0.41    | 45.27 | 0.022 | 33.8   | (0.013) | N 0.26                              | 100g |













# 23. Glass/Glass Sand

Powders/Pieces/Discs

| 23.1 Glass |              | SiO <sub>2</sub> | TiO <sub>2</sub> | Al <sub>2</sub> O <sub>3</sub> | Fe <sub>2</sub> O <sub>3</sub> | B <sub>2</sub> O <sub>3</sub> | CaO   | MgO    | Na <sub>2</sub> O | K <sub>2</sub> O | Li <sub>2</sub> O | SO <sub>3</sub> | ZnO   | ZrO <sub>2</sub> | P <sub>2</sub> O <sub>5</sub> | MnO       |
|------------|--------------|------------------|------------------|--------------------------------|--------------------------------|-------------------------------|-------|--------|-------------------|------------------|-------------------|-----------------|-------|------------------|-------------------------------|-----------|
| CRM        | 231 B 89     | 65.35            | 0.01             | 0.18                           | 0.049                          | ...                           | 0.21  | 0.03   | 5.70              | 8.40             | ...               | 0.03            | ...   | 0.005            | 0.23                          | 0.088     |
| CRM        | 231 B 92     | (75.0)           | ...              | ...                            | ...                            | 0.70                          | (8.3) | (0.1)  | (13.1)            | (0.6)            | ...               | ...             | (0.2) | ...              | ...                           | ...       |
| CRM        | 231 B 93a    | 80.8             | 0.014            | 2.28                           | 0.028                          | 12.56                         | 0.01  | 0.005  | 3.98              | 0.014            | ...               | ...             | ...   | 0.042            | ...                           | ...       |
| CRM        | 231 B 620    | 72.08            | 0.018            | 1.80                           | 0.043                          | ...                           | 7.11  | 3.69   | 14.39             | 0.41             | ...               | 0.28            | ...   | ...              | ...                           | ...       |
| CRM        | 231 B 621    | 71.13            | 0.014            | 2.76                           | 0.040                          | ...                           | 10.71 | 0.27   | 12.74             | 2.01             | ...               | 0.13            | ...   | 0.007            | ...                           | continued |
| CRM        | 231 B 1411   | 58.04            | 0.02             | 5.68                           | 0.050                          | 10.94                         | 2.18  | 0.33   | 10.14             | 2.97             | ...               | ...             | 3.85  | ...              | ...                           | ...       |
| CRM        | 231 B 1412   | 42.38            | ...              | 7.52                           | (0.031)                        | 4.53                          | 4.53  | (4.69) | 4.69              | 4.14             | (4.50)            | ...             | 4.48  | ...              | ...                           | ...       |
| CRM        | 231 B 1830   | 73.07            | 0.011            | 0.12                           | 0.121                          | ...                           | 8.56  | 3.90   | 13.75             | 0.04             | ...               | 0.26            | ...   | ...              | ...                           | ...       |
| CRM        | 231 B 1831   | 73.08            | 0.019            | 1.21                           | 0.087                          | ...                           | 8.20  | 3.51   | 13.32             | 0.33             | ...               | 0.25            | ...   | ...              | ...                           | ...       |
|            | 231 GR EC1.1 | 71.97            | 0.04             | 1.08                           | 0.103                          | ...                           | 8.63  | 3.78   | 13.41             | 0.59             | ...               | 0.23            | ...   | ...              | ...                           | continued |
|            | 231 GS 4     | 69.49            | 0.041            | 3.02                           | 0.099                          | 0.19                          | 4.24  | <0.05  | 15.45             | 0.57             | ...               | <0.05           | 3.28  | ...              | ...                           | ...       |
|            | 231 GS 5     | 72.74            | 0.034            | 1.12                           | 0.043                          | ...                           | 6.55  | 2.75   | 15.65             | 0.42             | ...               | 0.21            | ...   | ...              | ...                           | ...       |
|            | 231 GS 6     | 73.06            | 0.02             | 1.7                            | 0.034                          | ...                           | 9.97  | <0.1   | 14.65             | <0.1             | ...               | 0.2             | ...   | ...              | ...                           | ...       |
|            | 231 GS 7     | 72.64            | 0.042            | 1.5                            | 0.044                          | ...                           | 11.03 | 0.14   | 13.9              | 0.43             | ...               | 0.19            | ...   | ...              | ...                           | continued |
|            | 231 GS 8     | 56.34            | 0.02             | 0.05                           | 0.01                           | 0.36                          | <0.02 | <0.02  | 0.23              | 11.85            | ...               | ...             | ...   | ...              | ...                           | ...       |
|            | 231 GS 9     | 56.7             | 0.03             | 1.4                            | 0.045                          | ...                           | 0.1   | ...    | 4.0               | 8.4              | ...               | ...             | ...   | ...              | ...                           | ...       |
|            | 231 GS 10    | 72.7             | 0.097            | 1.62                           | 0.325                          | ...                           | 10.7  | 1.81   | 12.2              | 0.35             | ...               | 0.05            | ...   | ...              | ...                           | ...       |
|            | 231 GS 11    | 70.7             | 0.068            | 1.83                           | 0.342                          | ...                           | 10.3  | 2.14   | 13.6              | 0.69             | ...               | 0.06            | ...   | ...              | ...                           | ...       |
| CRM        | 231 F 126A   | 57.80            | ...              | 0.128                          | 0.0055                         | ...                           | 1.033 | 0.512  | 3.58              | 10               | 0.495             | ...             | 1.02  | ...              | ...                           | continued |

| Continuation from above |              | Sb <sub>2</sub> O <sub>3</sub> | F    | Cl    | PbO   | BaO   | As <sub>2</sub> O <sub>3</sub> | CdO  | SrO  | L.O.I. 550°C | R.I.   | Density | Form             | Type              | Size    |
|-------------------------|--------------|--------------------------------|------|-------|-------|-------|--------------------------------|------|------|--------------|--------|---------|------------------|-------------------|---------|
|                         | 231 B 89     | ...                            | ...  | 0.05  | 17.50 | 1.40  | 0.03                           | ...  | ...  | 0.32         | ...    | ...     | powder           | lead-barium       | 45g     |
|                         | 231 B 92     | ...                            | ...  | ...   | ...   | ...   | ...                            | ...  | ...  | ...          | ...    | ...     | powder           | low boron         | 45 g    |
|                         | 231 B 93a    | ...                            | ...  | 0.060 | ...   | ...   | ...                            | ...  | ...  | ...          | ...    | ...     | 3 x disc         | borosilicate      | 32 x 6  |
|                         | 231 B 620    | ...                            | ...  | ...   | ...   | ...   | 0.056                          | ...  | ...  | ...          | ...    | ...     | 3 x disc         | soda-lime         | 32 x 6  |
|                         | 231 B 621    | ...                            | ...  | ...   | ...   | 0.12  | 0.030                          | ...  | ...  | ...          | ...    | ...     | 3 x disc         | soda-lime         | 32 x 6  |
|                         | 231 B 1411   | ...                            | ...  | ...   | ...   | 5.00  | ...                            | ...  | ...  | ...          | ...    | ...     | 10 x platelet    | soft borosilicate | 32x32x3 |
|                         | 231 B 1412   | ...                            | ...  | ...   | 4.40  | 4.67  | ...                            | 4.38 | 4.55 | ...          | ...    | ...     | 8 x platelet     | multicomponent    | 32x32x3 |
|                         | 231 B 1830   | ...                            | ...  | ...   | ...   | ...   | ...                            | ...  | ...  | ...          | ...    | ...     | 3 x square plate | soda lime         | 38 x 38 |
|                         | 231 B 1831   | ...                            | ...  | ...   | ...   | ...   | ...                            | ...  | ...  | ...          | ...    | ...     | 3 x square plate | soda lime         | 38 x 38 |
|                         | 231 GR EC1.1 | ...                            | ...  | ...   | ...   | ...   | ...                            | ...  | ...  | ...          | ...    | ...     | ...              | Float             | 25g     |
|                         | 231 GS 4     | ...                            | 4.96 | ...   | ...   | ...   | ...                            | ...  | ...  | 0.22         | ...    | ...     | Powder           | Fluoride opal     | 25g     |
|                         | 231 GS 5     | ...                            | ...  | ...   | ...   | ...   | ...                            | ...  | ...  | ...          | ...    | ...     | ...              | Na-Ca-Mg-Si       | 25g     |
|                         | 231 GS 6     | ...                            | ...  | ...   | ...   | ...   | ...                            | ...  | ...  | ...          | ...    | ...     | ...              | Na-Ca-Si          | 25g     |
|                         | 231 GS 7     | ...                            | ...  | ...   | ...   | ...   | ...                            | ...  | ...  | 0.07         | ...    | ...     | ...              | Na-Ca-Si          | 25g     |
|                         | 231 GS 8     | ...                            | ...  | ...   | 30.59 | ...   | 0.32                           | ...  | ...  | 0.21         | ...    | ...     | ...              | Pb-K-Si           | 25g     |
|                         | 231 GS 9     | ...                            | ...  | ...   | 28.4  | ...   | 0.4                            | ...  | ...  | 0.4          | ...    | ...     | ...              | ...               | 25g     |
|                         | 231 GS 10    | ...                            | ...  | ...   | ...   | 0.02  | ...                            | ...  | ...  | ...          | ...    | ...     | Powder           | ...               | 25g     |
|                         | 231 GS 11    | ...                            | ...  | ...   | ...   | 0.03  | ...                            | ...  | ...  | ...          | ...    | ...     | ...              | ...               | 25g     |
|                         | 231 F 126A   | 0.29                           | ...  | ...   | 23.98 | 1.036 | ...                            | ...  | ...  | ...          | 1.5597 | 2.99    | ...              | Lead Crystal      | 300g    |

Note: 231 GS4 231, GS10 and 231 GS11 are also available in disc form, 40mmØ x 6mm

| 23.2 Glass Sand |             | SiO <sub>2</sub> | TiO <sub>2</sub> | Al <sub>2</sub> O <sub>3</sub> | Fe <sub>2</sub> O <sub>3</sub> | ppm Cr <sub>2</sub> O <sub>3</sub> | CaO     | MgO     | Na <sub>2</sub> O | K <sub>2</sub> O | ZrO <sub>2</sub> | L.O.I. | MnO    | Others         | Type         | Size |
|-----------------|-------------|------------------|------------------|--------------------------------|--------------------------------|------------------------------------|---------|---------|-------------------|------------------|------------------|--------|--------|----------------|--------------|------|
| CRM             | 232 B 81a   | ...              | 0.12             | 0.66                           | 0.082                          | 46                                 | ...     | ...     | ...               | ...              | 0.034            | ...    | ...    | ...            | ...          | 75g  |
| CRM             | 232 B 165a  | ...              | 0.011            | 0.059                          | 0.012                          | (1.0)                              | ...     | ...     | ...               | ...              | 0.006            | ...    | ...    | ...            | Low Iron     | 75g  |
| CRM             | 232 B 1413  | 82.77            | 0.11             | 9.90                           | 0.24                           | ...                                | 0.74    | 0.06    | 1.75              | 3.94             | ...              | ...    | ...    | BaO 0.12       | High-Alumina | 75g  |
| CRM             | 232 E 61    | 99.79            | 0.026            | 0.054                          | 0.014                          | ...                                | (0.004) | (0.003) | (0.002)           | (0.007)          | 0.01             | 0.06   | ...    | ...            | ...          | 100g |
| CRM             | 232 E 62    | 99.62            | 0.036            | 0.11                           | 0.072                          | ...                                | (0.004) | (0.004) | (0.002)           | (0.007)          | 0.01             | 0.1    | ...    | ...            | ...          | 100g |
| CRM             | 232 D SPS   | 99.32            | 0.035            | 0.248                          | 0.037                          | ...                                | 0.029   | 0.0071  | 0.045             | 0.058            | ...              | 0.167  | ...    | Trace elements | ...          | 100g |
| CRM             | 232 A SA 49 | 99.6             | (0.01)           | (0.05)                         | (0.05)                         | ...                                | (0.01)  | (0.05)  | (0.05)            | (0.01)           | ...              | ...    | (0.01) | Sr (5ppm)      | Quartz       | 100g |
|                 | 232 GS SS1  | 99.74            | 0.026            | 0.061                          | 0.014                          | 3.0                                | <0.02   | <0.02   | <0.02             | <0.02            | ...              | 0.12   | ...    | ...            | ...          | 200g |
|                 | 232 GS SS6  | 98.66            | 0.024            | 0.6                            | 0.032                          | (2.5)                              | <0.02   | <0.02   | <0.02             | 0.4              | ...              | 0.14   | ...    | ...            | ...          | 200g |
|                 | 232 GS SS8  | 95.63            | 0.073            | 2.07                           | 0.26                           | (11.0)                             | 0.06    | 0.12    | 0.2               | 1.06             | ...              | 0.48   | ...    | ...            | ...          | 200g |
|                 | 232 GS SS9  | 97.24            | 0.044            | 1.35                           | 0.103                          | (3.0)                              | 0.02    | 0.06    | 0.1               | 0.82             | ...              | 0.24   | ...    | ...            | ...          | 200g |



# 24. Coal & Coke

Powders

| 24.2             | C,H,S,N |      |            |      |        |       | GCV    | GCV    | % Volatile |                         |      |  |  |
|------------------|---------|------|------------|------|--------|-------|--------|--------|------------|-------------------------|------|--|--|
| Coal & Coke      | C       | H    | S          | N    | Ash    | MJ/Kg | BTU/lb | Matter | Moisture   | Type                    | Size |  |  |
| CRM 24 F 331     | ...     | ...  | 0.499      | ...  | ...    | ...   | ...    | ...    | ...        | Steam                   | 20g  |  |  |
| CRM 24 F 332     | ...     | ...  | 0.961      | ...  | ...    | ...   | ...    | ...    | ...        | High vol. Ind.          | 20g  |  |  |
| CRM 24 F 333     | ...     | ...  | 1.344      | ...  | ...    | ...   | ...    | ...    | ...        | Coking Steam            | 20g  |  |  |
| CRM 24 F 334     | ...     | ...  | 1.609      | ...  | ...    | ...   | ...    | ...    | ...        | Anthracite              | 20g  |  |  |
| CRM 24 F 335     | ...     | ...  | 5.08       | ...  | ...    | ...   | ...    | ...    | ...        | Flame                   | 20g  |  |  |
| CRM 24 F 336     | ...     | ...  | 3.29       | ...  | ...    | ...   | ...    | ...    | ...        | High Vol. Steam         | 20g  |  |  |
| CRM 24 B 2775    | ...     | ...  | 0.5816     | ...  | (5.77) | ...   | ...    | (1.31) | ...        | Foundry Coke            | 50g  |  |  |
| CRM 24 B 2776    | ...     | ...  | 0.825      | ...  | (8.06) | ...   | ...    | (0.98) | ...        | Furnace Coke            | 50g  |  |  |
| CRM 24 MI 20025A | 51.35   | ...  | 0.249      | ...  | 5.57   | ...   | 12,224 | 43.45  | 22.06      | Coal                    | 50g  |  |  |
| CRM 24 MI 20075A | 59.41   | ...  | 0.760      | ...  | 6.28   | ...   | 14,004 | 34.27  | 2.62       | Coal                    | 50g  |  |  |
| CRM 24 MI 20100A | 57.79   | ...  | 1.03       | ...  | 6.88   | ...   | 13,882 | 35.46  | 1.78       | Coal                    | 50g  |  |  |
| CRM 24 MI 20150A | 58.38   | ...  | 1.56       | ...  | 4.44   | ...   | 14,314 | 37.08  | 1.62       | Coal                    | 50g  |  |  |
| CRM 24 MI 20300A | 54.66   | ...  | 2.92       | ...  | 7.70   | ...   | 12,488 | 37.62  | 8.35       | Coal                    | 50g  |  |  |
| CRM 24 MI 20500A | 50.78   | ...  | 4.811      | ...  | 12.38  | ...   | 11,482 | 37.09  | 7.81       | Coal                    | 50g  |  |  |
| 24 MA 1905       | 71.24   | 5.1  | ...        | 1.56 | ...    | ...   | ...    | ...    | ...        | Coal                    | 25g  |  |  |
| 24 MA 1906       | 72.6    | 4.83 | ...        | 1.49 | ...    | ...   | ...    | ...    | ...        | Coal                    | 25g  |  |  |
| 24 MA 1907       | 67.95   | 5.06 | ...        | 1.49 | ...    | ...   | ...    | ...    | ...        | Coal                    | 25g  |  |  |
| 24 MA 1908       | 70.8    | 5.16 | ...        | 1.06 | ...    | ...   | ...    | ...    | ...        | Coal                    | 25g  |  |  |
| 24 MA 2713       | ...     | ...  | 0.4        | ...  | ...    | ...   | ...    | ...    | ...        | Green Petroleum Coke    | 50g  |  |  |
| 24 MA 2714       | ...     | ...  | 0.9        | ...  | ...    | ...   | ...    | ...    | ...        | Green Petroleum Coke    | 50g  |  |  |
| 24 MA 2715       | ...     | ...  | 1.63       | ...  | ...    | ...   | ...    | ...    | ...        | Green Petroleum Coke    | 50g  |  |  |
| 24 MA 2716       | ...     | ...  | 2.01       | ...  | ...    | ...   | ...    | ...    | ...        | Green Petroleum Coke    | 50g  |  |  |
| 24 MA 2717       | ...     | ...  | 2.35       | ...  | ...    | ...   | ...    | ...    | ...        | Green Petroleum Coke    | 50g  |  |  |
| 24 MA 2719       | ...     | ...  | 1.85       | ...  | ...    | ...   | ...    | ...    | ...        | Calcined Petroleum Coke | 50g  |  |  |
| 24 MA 2720       | ...     | ...  | 5.25       | ...  | ...    | ...   | ...    | ...    | ...        | Green Petroleum Coke    | 50g  |  |  |
| 24 MA 2721       | ...     | ...  | 6.25       | ...  | ...    | ...   | ...    | ...    | ...        | Green Petroleum Coke    | 50g  |  |  |
| 24 MA 2722       | ...     | ...  | 2.85       | ...  | ...    | ...   | ...    | ...    | ...        | Calcined Petroleum Coke | 50g  |  |  |
| 24 MA 719        | ...     | ...  | 0.70 Range | ...  | ...    | ...   | ...    | ...    | ...        | Coke                    | 50g  |  |  |
| 24 MA 720        | ...     | ...  | 0.90 Range | ...  | ...    | ...   | ...    | ...    | ...        | Coke                    | 50g  |  |  |
| 24 MA 723        | ...     | ...  | 0.50 Range | ...  | ...    | ...   | ...    | ...    | ...        | Coke                    | 50g  |  |  |
| 24 MA 1700       | ...     | ...  | 0.25 Range | ...  | ...    | ...   | ...    | ...    | ...        | Coal                    | 50g  |  |  |
| 24 MA 1701       | ...     | ...  | 0.48 Range | ...  | ...    | ...   | ...    | ...    | ...        | Coal                    | 50g  |  |  |
| 24 MA 1702       | ...     | ...  | 0.71 Range | ...  | ...    | ...   | ...    | ...    | ...        | Coal                    | 50g  |  |  |
| 24 MA 1703       | ...     | ...  | 0.80 Range | ...  | ...    | ...   | ...    | ...    | ...        | Coal                    | 50g  |  |  |
| 24 MA 1704       | ...     | ...  | 0.97 Range | ...  | ...    | ...   | ...    | ...    | ...        | Coal                    | 50g  |  |  |
| 24 MA 1705       | ...     | ...  | 1.51 Range | ...  | ...    | ...   | ...    | ...    | ...        | Coal                    | 50g  |  |  |
| 24 MA 1706       | ...     | ...  | 2.06 Range | ...  | ...    | ...   | ...    | ...    | ...        | Coal                    | 50g  |  |  |
| 24 MA 1707       | ...     | ...  | 2.47 Range | ...  | ...    | ...   | ...    | ...    | ...        | Coal                    | 50g  |  |  |
| 24 MA 1708       | ...     | ...  | 3.10 Range | ...  | ...    | ...   | ...    | ...    | ...        | Coal                    | 50g  |  |  |
| 24 MA 1709       | ...     | ...  | 3.30 Range | ...  | ...    | ...   | ...    | ...    | ...        | Coal                    | 50g  |  |  |
| 24 MA 1710       | ...     | ...  | 4.75 Range | ...  | ...    | ...   | ...    | ...    | ...        | Coal                    | 50g  |  |  |
| 24 MA 1711       | ...     | ...  | 5.53 Range | ...  | ...    | ...   | ...    | ...    | ...        | Coal                    | 50g  |  |  |
| 24 MA 1712       | ...     | ...  | 6.50 Range | ...  | ...    | ...   | ...    | ...    | ...        | Coal                    | 50g  |  |  |

Values for "MA" coded products listed above are nominal. Exact chemistry is given on each bottle

|              | C     | H    | S     | N    | P     | Ash   | GCV   | % Volatile | Specific |      |      |
|--------------|-------|------|-------|------|-------|-------|-------|------------|----------|------|------|
|              |       |      |       |      |       |       | MJ/Kg | Matter     | Gravity  | Type | Size |
| 24 CG 11101d | 75.42 | 4.72 | 0.50  | 1.38 | ...   | 9.75  | 30.65 | 32.98      | 1.39     | Coal | 50g  |
| 24 CG 11102d | 52.73 | 3.35 | 1.45  | 0.92 | ...   | 34.76 | 21.22 | 23.67      | 1.67     | Coal | 50g  |
| 24 CG 11103c | 77.34 | 0.99 | 0.31  | 0.22 | ...   | 16.91 | 26.24 | 6.56       | 1.94     | Coal | 50g  |
| 24 CG 11104b | 68.61 | 0.67 | 1.00  | 0.21 | ...   | 26.33 | 23.06 | 5.99       | 2.10     | Coal | 50g  |
| 24 CG 11105a | 76.48 | 3.30 | 1.73  | 1.18 | ...   | 13.89 | 29.94 | 11.76      | 1.49     | Coal | 50g  |
| 24 CG 11107c | 76.83 | 4.63 | 0.92  | 1.40 | ...   | 8.49  | 31.23 | 34.05      | 1.39     | Coal | 50g  |
| 24 CG 11108b | 72.27 | 4.59 | 1.91  | 1.33 | ...   | 11.07 | 29.66 | 33.53      | 1.42     | Coal | 50g  |
| 24 CG 11109b | 68.59 | 4.48 | 3.03  | 1.17 | ...   | 13.88 | 28.33 | 34.17      | 1.45     | Coal | 50g  |
| 24 CG 11110c | 55.73 | 2.44 | 4.70  | 0.72 | ...   | 32.8  | 21.55 | 12.79      | 1.80     | Coal | 50g  |
| 24 CG 11111a | 78.69 | 4.54 | 1.38  | 1.38 | ...   | 10.02 | 32.18 | 25.26      | 1.38     | Coal | 50g  |
| 24 CG 11112a | 69.03 | 3.01 | 2.20  | 1.03 | ...   | 21.23 | 26.95 | 11.82      | 1.58     | Coal | 50g  |
| 24 CG 11113a | 50.03 | 2.18 | 3.40  | 0.65 | ...   | 40.82 | 19.25 | 10.55      | 1.85     | Coal | 50g  |
| 24 CG 11106a | ...   | ...  | 0.580 | ...  | 0.034 | 13.05 | 28.47 | 1.00       | ...      | Coke | 90g  |

|                | Ash  | % Volatile | Total | Total |      |      |      | C as            |       | Hardgrove    | Gross        |      |         |
|----------------|------|------------|-------|-------|------|------|------|-----------------|-------|--------------|--------------|------|---------|
|                |      | Matter     | C     | S     | H    | N    | P    | CO <sub>3</sub> | Cl    | Grindability | Calorific    | Type | Size    |
| 24 A AS 011-7  | ...  | ...        | ...   | ...   | ...  | ...  | ...  | ...             | ...   | 31 to 91     | ...          | Coal | 4 x 2kg |
| 24 A AS 012D-2 | ...  | ...        | ...   | 5.21  | ...  | ...  | ...  | ...             | ...   | ...          | ...          | Coal | 125g    |
| 24 A AS 013-9  | 9.97 | 20.29      | 80.01 | 0.578 | 4.41 | 1.73 | 0.03 | 0.039           | 0.038 | ...          | 32.524/MJ/kg | Coal | 250g    |



# 24. Coal & Coke

Powder

| 24.2 C,H,S,N |               |       |      |      |      |       |       | % Volatile |  |      |
|--------------|---------------|-------|------|------|------|-------|-------|------------|--|------|
| Coal & Coke  |               | C     | H    | S    | N    | P     | Ash   | Matter     |  | Size |
| CRM          | 24 SI CMT-001 | ...   | ...  | 0.50 | ...  | ...   | 14.50 | 24.50      |  | 150g |
| CRM          | 24 SI CMT-002 | ...   | ...  | 0.64 | ...  | ...   | 7.05  | 32.26      |  | 150g |
| CRM          | 24 SI CMT-003 | 67.35 | 3.83 | 0.93 | 1.64 | 0.120 | 17.51 | 28.02      |  | 150g |
| CRM          | 24 SI CMT-004 | 68.59 | 2.48 | 1.32 | 1.71 | 0.080 | 23.98 | 8.13       |  | 150g |
| CRM          | 24 SI CMT-005 | 72.72 | 4.46 | 0.81 | 1.87 | 0.070 | 10.94 | 32.02      |  | 150g |
| CRM          | 24 SI CMT-006 | 71.63 | 3.82 | 0.89 | 1.90 | 0.031 | 13.50 | 26.67      |  | 150g |
| CRM          | 24 SI CMT-007 | 73.13 | 4.04 | 0.54 | 1.77 | 0.100 | 13.24 | 26.75      |  | 150g |
| CRM          | 24 SI CMT-008 | 84.46 | 2.62 | 0.85 | 1.75 | 0.025 | 8.90  | 5.11       |  | 150g |
| CRM          | 24 SI CMT-009 | 73.60 | 3.91 | 0.70 | 1.76 | 0.114 | 13.48 | 25.21      |  | 150g |
| CRM          | 24 SI CMT-010 | 72.74 | 4.32 | 0.84 | 1.91 | 0.070 | 11.50 | 32.41      |  | 150g |
| CRM          | 24 SI CMT-011 | 77.20 | 3.45 | 1.60 | 2.17 | 0.029 | 13.72 | 11.73      |  | 150g |
| CRM          | 24 SI CMT-012 | 64.75 | 3.30 | 0.80 | 1.49 | 0.051 | 20.05 | 24.04      |  | 150g |
| CRM          | 24 SI CMT-013 | 73.83 | 4.64 | 0.70 | 1.93 | 0.005 | 10.90 | 32.48      |  | 150g |
| CRM          | 24 SI CMT-014 | 74.11 | 3.83 | 0.93 | 1.68 | 0.017 | 12.35 | 22.00      |  | 150g |
| CRM          | 24 SI CMT-015 | 72.02 | 3.56 | 0.33 | 1.62 | 0.051 | 14.41 | 23.34      |  | 150g |

| 24.9 Ultimate Series<br>for Coal & Coke | Proximate Analysis |        |         |       |      | Ultimate Analysis |      |      |      |       | Sulphur Forms |          |         |       |
|---|--------------------|--------|---------|-------|------|-------------------|------|------|------|-------|---------------|----------|---------|-------|
|   | % Volatile         |        | % Fixed | %     | %    | %                 | %    | %    | %    | %     | %             | %        | %       | %     |
|   | % Ash              | Matter | Carbon  | BTU   | S    | C                 | H    | N    | Cl   | Ash   | Pyritic       | Sulphate | Organic | Total |
| 24 MA 2771                              | 11.36              | 2.02   | 86.62   | 12236 | 0.71 | 88.16             | 0.06 | 1.17 | 0.03 | 11.36 | 0.1           | 0.01     | 0.6     | 0.71  |
| 24 MA 2772                              | 9.33               | 1.76   | 88.91   | 12211 | 0.85 | 88.1              | 0.25 | 1.38 | 0.0  | 9.33  | 0.01          | 0.0      | 0.84    | 0.85  |
| 24 MA 2773                              | 7.14               | 45.15  | 47.71   | 11738 | 0.5  | 68.71             | 4.75 | 0.92 | 0.03 | 7.14  | 0.08          | 0.0      | 0.42    | 0.51  |
| 24 MA 2775                              | 6.47               | 37.14  | 56.39   | 13513 | 0.66 | 77.16             | 4.87 | 1.45 | 0.03 | 6.47  | 0.05          | 0.0      | 0.61    | 0.66  |
| 24 MA 2776                              | 7.57               | 35.62  | 56.81   | 13413 | 0.94 | 76.17             | 4.83 | 1.46 | 0.34 | 7.57  | 0.37          | 0.0      | 0.57    | 0.94  |
| 24 MA 2778                              | 10.76              | 6.31   | 82.93   | 13191 | 0.63 | 83.44             | 2.11 | 0.92 | 0.03 | 10.76 | 0.06          | 0.0      | 0.57    | 0.63  |
| 24 MA 2780                              | 8.23               | 39.05  | 52.72   | 12748 | 3.58 | 70.87             | 5.05 | 1.58 | 0.0  | 8.23  | 0.83          | 0.04     | 2.71    | 3.58  |
| 24 MA 2782                              | 13.06              | 39.06  | 47.44   | 12226 | 5.82 | 67.61             | 4.82 | 1.39 | 0.0  | 13.12 | 3.42          | 0.91     | 1.49    | 5.82  |

continued

| Continuation<br>from above | All values %                  |                  |                                |                                |                  |       |      |                 |                  |                   |      |      |      |              |      | Type | Size |
|----------------------------|-------------------------------|------------------|--------------------------------|--------------------------------|------------------|-------|------|-----------------|------------------|-------------------|------|------|------|--------------|------|------|------|
|                            | P <sub>2</sub> O <sub>5</sub> | SiO <sub>2</sub> | Fe <sub>2</sub> O <sub>3</sub> | Al <sub>2</sub> O <sub>3</sub> | TiO <sub>2</sub> | CaO   | MgO  | SO <sub>3</sub> | K <sub>2</sub> O | Na <sub>2</sub> O | SrO  | BaO  | MnO  | Undetermined |      |      |      |
| 24 MA 2771                 | 0.38                          | 45.94            | 21.98                          | 21.98                          | 1.1              | 2.59  | 1.0  | 1.61            | 2.12             | 0.95              | 0.75 | 0.92 | 0.0  | ...          | Coke | 50g  |      |
| 24 MA 2772                 | 0.36                          | 46.12            | 18.98                          | 25.8                           | 1.22             | 2.74  | 0.8  | 1.49            | 1.49             | 0.52              | 0.12 | 0.92 | 0.0  | ...          | Coke | 50g  |      |
| 24 MA 2773                 | 0.98                          | 32.51            | 4.9                            | 16.93                          | 1.32             | 21.92 | 4.53 | 13.99           | 0.33             | 1.02              | 0.3  | 0.53 | 0.06 | 0.68         | Coal | 50g  |      |
| 24 MA 2775                 | 0.9                           | 62.7             | 2.27                           | 28.21                          | 1.48             | 0.96  | 0.38 | 0.46            | 1.41             | 0.28              | 0.3  | 0.06 | 0.0  | 0.59         | Coal | 50g  |      |
| 24 MA 2776                 | 0.16                          | 50.35            | 9.85                           | 29.73                          | 1.71             | 2.13  | 0.73 | 2.52            | 1.88             | 0.67              | 0.16 | 0.11 | 0.0  | ...          | Coal | 50g  |      |
| 24 MA 2778                 | 0.68                          | 51.24            | 4.78                           | 32.06                          | 2.09             | 2.17  | 1.04 | 1.77            | 2.0              | 0.84              | 0.19 | 0.25 | 0.0  | 0.94         | Coal | 50g  |      |
| 24 MA 2780                 | 0.11                          | 33.71            | 46.35                          | 14.4                           | 0.73             | 0.54  | 0.53 | 0.53            | 1.43             | 0.17              | 0.01 | 0.0  | 0.29 | 1.2          | Coal | 50g  |      |
| 24 MA 2782                 | 0.26                          | 29.12            | 45.87                          | 14.67                          | 0.51             | 4.5   | 0.54 | 2.82            | 1.05             | 0.54              | 0.01 | 0.09 | 0.02 | ...          | Coal | 50g  |      |

Ash Fusion Temperature, Softening Temperature & Fluid Temperature values are also certified

The following ASTM procedures were employed in the analysis of these samples: All analysis reported on a dried basis.

Preparation ASTM D2013  
Chlorine ASTM D2361

Ash ASTM D3174  
BTU ASTM D2015

Volatile Matter ASTM D3175  
Ash Analysis ASTM D 3682

Carbon, Hydrogen ASTM D3178  
Sulphur Forms ASTM D2492

Sulphur ASTM D3177  
Nitrogen ASTM D3179

| Petroleum Coke | % Moisture |  | % Ash Dry |  | Total % S Dry |  | Calorific Value |       | Size |
|----------------|------------|--|-----------|--|---------------|--|-----------------|-------|------|
|                |            |  |           |  |               |  | BTU/lb          | MJ/kg |      |
| 24 A PC-1      | <2         |  | 6.63      |  | 6.96          |  | 12940           | 30.08 | 75g  |
| 24 A PC-2      | <2         |  | 2.57      |  | 6.04          |  | 14737           | 34.23 | 75g  |

| Coal Ash      |                                |      |       |                                |                  |      |                                |                               |                  |                   |     |                 |                  | Size |
|---------------|--------------------------------|------|-------|--------------------------------|------------------|------|--------------------------------|-------------------------------|------------------|-------------------|-----|-----------------|------------------|------|
|               | Al <sub>2</sub> O <sub>3</sub> | BaO  | CaO   | Fe <sub>2</sub> O <sub>3</sub> | K <sub>2</sub> O | MgO  | Mn <sub>3</sub> O <sub>4</sub> | P <sub>2</sub> O <sub>5</sub> | SiO <sub>2</sub> | Na <sub>2</sub> O | SrO | SO <sub>3</sub> | TiO <sub>2</sub> |      |
| 24 A AS 010   | 29.8                           | 0.19 | 3.27  | 12.8                           | 0.9              | 2.11 | 0.22                           | 0.91                          | 47.3             | 0.36              | 0.1 | 0.62            | 1.69             | 100g |
| 24 SI SIBS101 | 22.80                          | ...  | 9.31  | 12.11                          | 1.03             | 2.52 | 0.06                           | 0.90                          | 41.00            | 1.18              | ... | 5.80            | 1.32             | 30g  |
| 24 SI SIBS102 | 17.41                          | ...  | 1.28  | 5.11                           | 1.10             | 0.60 | 0.06                           | 0.12                          | 69.92            | 0.16              | ... | 0.89            | 1.60             | 30g  |
| 24 SI SIBS103 | 34.35                          | ...  | 9.30  | 2.34                           | 0.82             | 2.05 | 0.06                           | 2.69                          | 39.88            | 0.22              | ... | 4.32            | 1.94             | 30g  |
| 24 SI SIBS104 | 28.34                          | ...  | 10.80 | 2.77                           | 0.55             | 2.93 | 0.07                           | 1.91                          | 44.80            | 0.14              | ... | 4.67            | 1.60             | 30g  |
| 24 SI SIBS105 | 25.48                          | ...  | 1.05  | 1.60                           | 1.38             | 0.77 | 0.01                           | 0.11                          | 66.85            | 0.13              | ... | 0.32            | 1.25             | 30g  |

| Electrode Carbon | % Moisture |  | % Ash |  | % Volatile Matter |  | Relative Size |          | Type             | Size  |
|------------------|------------|--|-------|--|-------------------|--|---------------|----------|------------------|-------|
|                  |            |  |       |  |                   |  | Density       | Fraction |                  |       |
| 24 A AS 003      | <1.0       |  | <5.0  |  | <1.5              |  | 2.2-2.3       | <5.0     | Electrode Carbon | 1.5kg |

# Information

## Definitions

The Reference Materials in this Catalogue have been categorised as Certified Reference Materials, Reference Materials or Setting-Up Samples. For these first two categories the definitions used in the ISO Guide 30 : 1992 issued by the International Standards Organisation have been used.

Certified Reference Material (CRM)

A Reference Material, accompanied by a certificate, one or more of whose property values are certified by a procedure which establishes its traceability to an accurate realization of the unit in which the property values are expressed and for which each certified value is accompanied by an uncertainty at a stated level of confidence

Reference Material

A material or substance one or more of whose property values are sufficiently homogeneous and well established to be used for the calibration of an apparatus, the assessment of a measurement method, or for assigning values to materials.

Setting up Samples

Samples which have been prepared to meet the daily setting up requirements of laboratories using direct reading spectrometers. Whilst analytical data are supplied with each sample they are not certified as accurate and are not intended to be used as Reference Materials

Materials identified as Certified Reference Materials are designated with CRM in the left hand margin against the catalogue number.

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Where other manufacturers have designated their products as CRMs, MBH has reported that designation. MBH cannot verify that other manufacturers' products are certified in accordance with the definitions above. Users wishing to confirm the accuracy of a designation should request a copy of the relevant certificate before ordering the material.

## Use of Reference Materials

*Whilst modern instrumental methods of analysis are capable of high accuracy and precision, they are mostly comparative techniques. Reference materials must be selected and used correctly for optimum instrumental performance to be achieved, and the following points should be considered.*

*The instrument manufacturer's recommendations and advice should be followed*

*Users should be aware of the possible effects of structure, sample preparation and physico-chemical interferences when using reference materials.*

## Validity of Information

IMPORTANT  
- Please Note

The majority of the analytical data in the following pages indicates actual values for the batch currently available. However some materials may be remade during the lifetime of this catalogue and the values achieved for the replacements may differ from those stated.

We recommend that customers verify the availability of any material where it is imperative that the material to be supplied has the elemental concentration values listed.

All concentrations in this catalogue are given in % by weight, unless stated otherwise.

## Abbreviations

CRM  
( )  
R.E. / R.E.O.  
L.O.I.  
rem  
ppm  
MJ/kg  
BTU/lb

This material is classified as a CRM.  
Concentration values stated within brackets are not certified and are listed for information only.  
Rare Earth / Rare Earth Oxide  
Loss on Ignition  
Remainder  
Parts per Million  
Mega Joules per Kilogram  
British Thermal Units per pound

C  
CC  
HIP  
Sc  
W

Cast  
Chill Cast  
Hot Isostatic Pressed  
Spun cast  
Wrought

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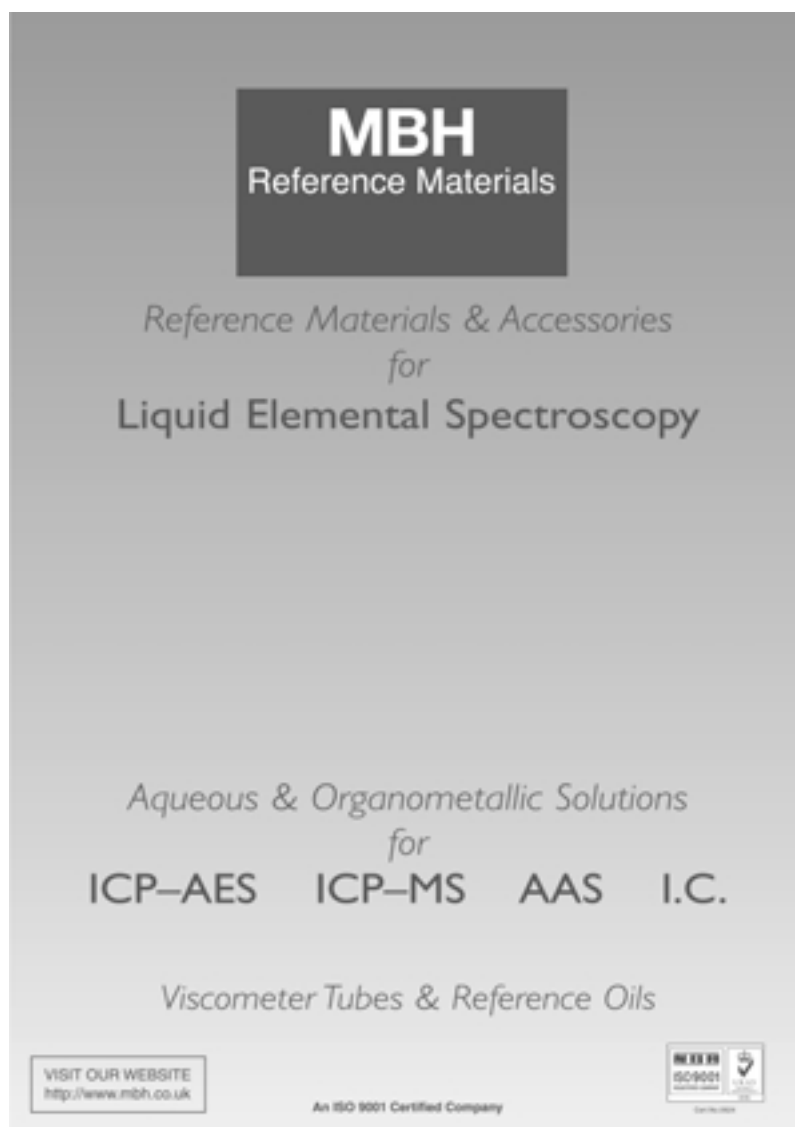
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**Notes**

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