

# Japanese Iron and Steel Certified Reference Materials

March 28, 2023

## I. CRMs for Chemical Analysis

### I-1. Pure iron series

| (μg/g)  |       | C                      | Si  | Mn  | P     | S     | Ni    | Cr   | Mo     | Cu     | W    | V     | Co     | Ti   | Al   | N    | As    |       |
|---------|-------|------------------------|-----|-----|-------|-------|-------|------|--------|--------|------|-------|--------|------|------|------|-------|-------|
| JSS No. |       |                        |     |     |       |       |       |      |        |        |      |       |        |      |      |      |       |       |
| △       | 001-8 | High grade pure iron 1 | 1.4 | <2  | <0.3  | <1    | (0.5) | 0.7  | (0.04) | <0.1   | 0.44 | <0.5  | <0.1   | 0.13 | <0.5 | <1   | (2)   | <0.5  |
|         | 001-9 | High grade pure iron 1 | 2.0 | <1  | <0.10 | <0.42 | 0.24  | 0.87 | (0.04) | (0.03) | 0.43 | 0.04  | <0.2   | 0.18 | <0.1 | <1   | (1.4) | 0.03  |
|         | 003-7 | High grade pure iron 3 | 3.4 | 5.2 | 5.4   | 3.8   | 1.6   | 0.7  | 1.3    | 0.17   | 3.2  | (0.1) | (0.07) | 0.47 | <0.6 | 68.2 | 6.1   | <1    |
|         | 003-8 | High grade pure iron 3 | 4.0 | 6.4 | 10.9  | 4.0   | 1.6   | 0.7  | 1.2    | 0.20   | 3.9  | (0.1) | (0.06) | 0.46 | <0.6 | 66.7 | 6.8   | (0.1) |
| ×       | 009-3 | Pure iron (III) oxide  |     |     |       |       |       |      |        |        |      |       |        |      |      |      |       |       |

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| (μg/g)  |       | B                      | Bi   | Ca   | Mg   | Ce   | La   | Se   | Nb   | Pb     | Sb   | Sn   | Ta   | Te   | Zn    | Zr    | Cd   |  |
|---------|-------|------------------------|------|------|------|------|------|------|------|--------|------|------|------|------|-------|-------|------|--|
| JSS No. |       |                        |      |      |      |      |      |      |      |        |      |      |      |      |       |       |      |  |
| △       | 001-8 | High grade pure iron 1 | 0.12 | <0.1 | <3   | <1   |      | <0.5 | <0.5 | 0.19   | <0.2 | <0.2 | <0.1 | <1   | 3.4   | <0.5  |      |  |
|         | 001-9 | High grade pure iron 1 | <0.5 | <0.7 | <0.5 | <0.6 |      | <1   | <0.6 | 0.06   | <0.1 | 0.06 | <0.1 | <0.4 | 2.0   | <0.2  |      |  |
|         | 003-7 | High grade pure iron 3 | 0.18 | <0.7 | <1   | <1   | <0.5 | <0.5 | <1   | (0.02) | <2   | 0.17 | <0.7 | <1   | (0.2) | <0.5  | <0.5 |  |
|         | 003-8 | High grade pure iron 3 | 0.26 | <0.7 | <1   | <1   | <0.5 | <0.5 | <1   | 0.48   | 0.04 | <2   | 0.20 | <0.7 | <1    | (0.2) | <0.5 |  |
| ×       | 009-3 | Pure iron (III) oxide  |      |      |      |      |      |      |      |        |      |      |      |      |       |       |      |  |

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| (μg/g)  |       | Na                     | K | T.Fe | C.W. | LOI | Net weight |     |     |
|---------|-------|------------------------|---|------|------|-----|------------|-----|-----|
| JSS No. |       |                        |   |      |      |     |            | (g) |     |
| △       | 001-8 | High grade pure iron 1 |   |      |      |     |            |     | 100 |
|         | 001-9 | High grade pure iron 1 |   |      |      |     |            |     | 100 |
|         | 003-7 | High grade pure iron 3 |   |      |      |     |            |     | 150 |
|         | 003-8 | High grade pure iron 3 |   |      |      |     |            |     |     |
| ×       | 009-3 | Pure iron (III) oxide  |   |      |      |     |            |     |     |

I-2. Carbon steel series

| Mass content in % |                        | C            | Si           | Mn           | P             | S              | Cu            | Al            | Sol. Al | N              | Net weight |
|-------------------|------------------------|--------------|--------------|--------------|---------------|----------------|---------------|---------------|---------|----------------|------------|
| JSS No.           |                        | (g)          |              |              |               |                |               |               |         |                |            |
| 023-10            | 11 Carbon steel        | 0.1255       | 0.201        | 0.675        | 0.0135        | 0.00345        | 0.0111        | 0.0420        | 0.0413  | 0.00311        | 150        |
| 030-10            | 21 Carbon steel        | 0.210        | 0.224        | 0.528        | 0.0175        | 0.0166         | 0.0091        | 0.00278       | 0.00185 | 0.00426        | 150        |
| 050-8             | 40 Carbon steel        | 0.410        | 0.207        | 0.762        | 0.0119        | 0.00278        | 0.0118        | 0.0307        | 0.0295  | 0.00442        | 150        |
| × 057-10          | 58 Carbon steel        |              |              |              |               |                |               |               |         |                |            |
| 061-10            | 64 Carbon steel        | 0.638        | 0.166        | 0.490        | 0.0214        | 0.0121         | 0.0085        | 0.00134       |         | 0.00283        | 150        |
| <b>○ 066-7</b>    | <b>83 Carbon steel</b> | <b>0.830</b> | <b>0.199</b> | <b>0.732</b> | <b>0.0151</b> | <b>0.00548</b> | <b>0.0103</b> | <b>0.0277</b> |         | <b>0.00524</b> | <b>150</b> |

( ) Non-certified value

※ In preparation

○ New/Renewal

△ Low Stock

X Sold out

I-3. Pig iron series

| Mass content in % |                           | C   | Si | Mn | P | S | Ni | Cr | Mo | Cu | V | Ti | As | N | Net weight |
|-------------------|---------------------------|-----|----|----|---|---|----|----|----|----|---|----|----|---|------------|
| JSS No.           |                           | (g) |    |    |   |   |    |    |    |    |   |    |    |   |            |
| × 102-9           | Pig iron for steel making |     |    |    |   |   |    |    |    |    |   |    |    |   |            |
| × 110-13          | Pig iron for casting      |     |    |    |   |   |    |    |    |    |   |    |    |   |            |
| × 120-2           | Cast Iron No. 1           |     |    |    |   |   |    |    |    |    |   |    |    |   |            |

\*(This value means the carbon content in the metal with removal of contaminated carbon on the surface of test portion)

( ) Non-certified value

※ In preparation

○ New/Renewal

△ Low Stock

X Sold out

I-4. Low alloy steel series

| Mass content in % |                      | C                    | Si     | Mn     | P       | S       | Ni     | Cr     | Mo     | Cu     | V      | Al     | Sol. Al | Net weight |     |
|-------------------|----------------------|----------------------|--------|--------|---------|---------|--------|--------|--------|--------|--------|--------|---------|------------|-----|
| JSS No.           |                      | (g)                  |        |        |         |         |        |        |        |        |        |        |         |            |     |
| 150-19            | Low alloy steel No.1 | 0.497                | 0.207  | 0.1012 | 0.0389  | 0.0292  | 4.00   | 0.310  | 0.195  | 0.0496 | 0.0190 | 0.0157 | 0.0153  | 150        |     |
| 151-20            | Low alloy steel No.2 | 0.397                | 0.1002 | 1.638  | 0.0316  | 0.0195  | 3.05   | 0.1491 | 0.0474 | 0.0998 | 0.0502 | 0.0110 | 0.0105  | 150        |     |
| △                 | 152-19               | Low alloy steel No.3 | 0.295  | 0.412  | 0.398   | 0.0202  | 0.0392 | 2.00   | 0.507  | 0.998  | 0.496  | 0.1016 | 0.0097  | 0.0092     | 150 |
| 153-19            | Low alloy steel No.4 | 0.198                | 0.305  | 0.806  | 0.0098  | 0.0102  | 1.003  | 1.010  | 1.289  | 0.307  | 0.200  | 0.0111 | 0.0102  | 150        |     |
| 154-18            | Low alloy steel No.5 | 0.0995               | 0.620  | 1.212  | 0.00460 | 0.00488 | 0.508  | 2.01   | 0.405  | 0.201  | 0.307  | 0.0093 | 0.0086  | 150        |     |
| 155-17            | Low alloy steel No.6 | 0.0500               | 0.498  | 0.205  | 0.00175 | 0.00217 | 0.1518 | 3.03   | 0.709  | 0.407  | 0.397  | 0.0102 | 0.0095  | 150        |     |

I-5. Minor elements determination series B

| Mass content in % |                    | C                  | Si     | Mn    | Ni     | Cr     | Mo     | V      | Co     | Ti     | Al     | Sol. Al | As     | Ca     | Sn     | B       |
|-------------------|--------------------|--------------------|--------|-------|--------|--------|--------|--------|--------|--------|--------|---------|--------|--------|--------|---------|
| JSS No.           |                    |                    |        |       |        |        |        |        |        |        |        |         |        |        |        |         |
| 168-8             | Minor element No.1 | 0.0399             | 0.201  | 0.417 | 0.0226 | 0.0211 | 0.099  |        |        | 0.0701 | 0.038  | 0.037   | 0.0111 |        |        | 0.0052  |
| ×                 | 169-8              | Minor element No.2 |        |       |        |        |        |        |        |        |        |         |        |        |        |         |
| 170-8             | Minor element No.3 | 0.0397             | 0.194  | 0.398 | 0.076  | 0.0504 | 0.0100 |        |        | 0.099  | 0.035  | 0.034   | 0.0031 | 0.0017 | 0.0538 |         |
| △                 | 171-8              | Minor element No.4 | 0.0406 | 0.196 | 0.400  | 0.101  | 0.075  | 0.0296 |        | 0.0300 | 0.0374 | 0.0369  | 0.0011 | 0.0028 | 0.0317 |         |
| 172-8             | Minor element No.5 | 0.0391             | 0.190  | 0.395 |        |        |        | 0.0110 | 0.0493 |        | 0.010  | 0.009   |        |        |        | 0.00096 |
| 173-8             | Minor element No.6 | 0.0386             | 0.212  | 0.413 |        |        |        | 0.0396 | 0.0298 |        | 0.0199 | 0.0196  |        |        |        | 0.00187 |
| △                 | 174-8              | Minor element No.7 | 0.0402 | 0.204 | 0.397  |        |        | 0.0734 | 0.0196 |        | 0.0313 | 0.0307  |        |        |        | 0.0059  |
| 175-9             | Minor element No.8 | 0.0292             | 0.191  | 0.395 |        |        |        | 0.0982 | 0.0098 |        | 0.0524 | 0.0521  |        |        |        | 0.0111  |

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| Mass content in % |                    | Nb                 | Sb       | Zn     | Zr     | Net weight |
|-------------------|--------------------|--------------------|----------|--------|--------|------------|
| JSS No.           |                    | (g)                |          |        |        |            |
| 168-8             | Minor element No.1 |                    |          |        |        | 150        |
| ×                 | 169-8              | Minor element No.2 |          |        |        |            |
| 170-8             | Minor element No.3 |                    |          |        |        | 150        |
| △                 | 171-8              | Minor element No.4 |          |        |        | 150        |
| 172-8             | Minor element No.5 | 0.0497             | (0.0022) |        | 0.0081 | 150        |
| 173-8             | Minor element No.6 | 0.0301             | (0.0055) | 0.0012 | 0.0051 | 150        |
| △                 | 174-8              | Minor element No.7 | 0.0198   | 0.0113 | 0.027  | 150        |
| 175-9             | Minor element No.8 | 0.0099             | 0.0222   |        | 0.0453 | 150        |

( ) Non-certified value  
 ※ In preparation  
 ○ New/Renewal  
 △ Low Stock  
 X Sold out

I-6. One element determination series

| Mass content in % |                             | C              | Si | P | S              | Al     | Sol.Al. | B | N     | O | O              | Net weight                            |  |
|-------------------|-----------------------------|----------------|----|---|----------------|--------|---------|---|-------|---|----------------|---------------------------------------|--|
| JSS No.           |                             |                |    |   |                |        |         |   |       |   |                |                                       | (g)  |
| 1201-4            | Steel for low carbon        | 0.00066        |    |   |                |        |         |   |       |   |                | 150                                   |  |
| 1202-4            | Steel for low carbon        | 0.00476        |    |   |                |        |         |   |       |   |                | 150                                   |  |
| △ 1203-5          | Steel for low carbon        | 0.00876        |    |   |                |        |         |   |       |   |                | 150                                   |  |
| <b>○ 1203-6</b>   | <b>Steel for low carbon</b> | <b>0.00899</b> |    |   |                |        |         |   |       |   |                | <b>150</b>                            |  |
| 1205-3            | Steel for low carbon        | 0.00081        |    |   |                |        |         |   |       |   |                | 150                                   |  |
| 1206-2            | Steel for low carbon        | 0.00192        |    |   |                |        |         |   |       |   |                | 150                                   |  |
| 1207-3            | Steel for low carbon        | 0.00221        |    |   |                |        |         |   |       |   |                | 150                                   |  |
| 201-15            | Steel for carbon            | 0.0439         |    |   |                |        |         |   |       |   |                | 150                                   |  |
| 201-16            | Steel for carbon            | 0.0413         |    |   |                |        |         |   |       |   |                | 150                                   |  |
| 202-2             | Steel for carbon            | 1.443          |    |   |                |        |         |   |       |   |                | 150                                   |  |
| 204-2             | Steel for carbon            | 0.0178         |    |   |                |        |         |   |       |   |                | 150                                   |  |
| 208-4             | Steel for carbon            | 1.017          |    |   |                |        |         |   |       |   |                | 150                                   |  |
| <b>○ 240-15</b>   | <b>Steel for sulfur</b>     |                |    |   | <b>0.00387</b> |        |         |   |       |   |                | <b>150</b>                            |  |
| 241-13            | Steel for sulfur            |                |    |   | 0.0202         |        |         |   |       |   |                | 150                                   |  |
| 242-13            | Steel for sulfur            |                |    |   | 0.0297         |        |         |   |       |   |                | 150                                   |  |
| 243-7             | Steel for sulfur            |                |    |   | 0.379          |        |         |   |       |   |                | 150                                   |  |
| 244-12            | Steel for sulfur            |                |    |   | 0.00177        |        |         |   |       |   |                | 150                                   |  |
| <b>○ 245-7</b>    | <b>Steel for sulfur</b>     |                |    |   | <b>0.0611</b>  |        |         |   |       |   |                | <b>150</b>                            |  |
| 252-4             | Steel for carbon and sulfur | 0.295          |    |   | 0.0404         |        |         |   |       |   |                | 150                                   |  |
| 330-4             | Steel for aluminium         |                |    |   |                | 0.0063 | 0.0053  |   |       |   |                | 150                                   |  |
| △ 332-3           | Steel for aluminium         |                |    |   |                | 0.049  |         |   |       |   |                | 150                                   |  |
| × 364-1           | Steel for boron             |                |    |   |                |        |         |   |       |   |                |                                       |  |
| × 366-9           | Steel for nitrogen          |                |    |   |                |        |         |   |       |   |                |                                       |  |
| × 367-9           | Steel for nitrogen          |                |    |   |                |        |         |   |       |   |                |                                       |  |
| 370-2             | Steel for nitrogen          |                |    |   |                |        |         |   | 0.415 |   |                | 150                                   |  |
| 371-2             | Steel for nitrogen          |                |    |   |                |        |         |   | 0.199 |   |                | 150                                   |  |
| 381-1             | Steel for Low Level Oxygen  |                |    |   |                |        |         |   |       |   | (0.00008)      | (6mm dia. x 230mm x 8pcs: appr. 430g) |  |
| 382-1             | Steel for Low Level Oxygen  |                |    |   |                |        |         |   |       |   | 0.00026        | (6mm dia. x 230mm x 8pcs: appr. 430g) |  |
| <b>○ 383-2</b>    | <b>Steel for Oxygen</b>     |                |    |   |                |        |         |   |       |   | <b>0.00119</b> | <b>0.00114</b>                        | <b>(5mm dia. x 230mm x 8pcs: appr. 280g)</b> |
| × 384-2           | Steel for Oxygen            |                |    |   |                |        |         |   |       |   |                |                                       |  |
| 390-1             | Steel for Oxygen            |                |    |   |                |        |         |   |       |   | 0.00042        |                                       | (6mm dia. x 230mm x 8pcs: appr. 380g)        |
| 386-1             | Steel for Oxygen            |                |    |   |                |        |         |   |       |   | 0.0142         |                                       | (5mm dia. x 230mm x 8pcs: appr. 280g)        |
| × 387-2           | Steel for Oxygen            |                |    |   |                |        |         |   |       |   |                |                                       |  |
| × 389-1           | Steel for Oxygen            |                |    |   |                |        |         |   |       |   |                |                                       |  |

( ) Non-certified value  
 ※ In preparation  
 ○ New/Renewal  
 △ Low Stock  
 X Sold out

I-7. High tensile structural steel series A

| Mass content in % | C     | Si    | Mn    | P      | S      | Ni     | Cr    | Mo    | Cu     | V      | Ti    | Al     | Sol. Al | N      | Net weight |     |
|-------------------|-------|-------|-------|--------|--------|--------|-------|-------|--------|--------|-------|--------|---------|--------|------------|-----|
| JSS No.           |       |       |       |        |        |        |       |       |        |        |       |        |         |        |            | (g) |
| 501-7 SCM 430     | 0.299 | 0.249 | 0.760 | 0.0202 | 0.0106 | 0.1014 | 1.047 | 0.216 | 0.1479 |        | 0.104 | 0.0248 | 0.0237  | 0.0087 | 150        |     |
| 502-7 SCM 440     | 0.299 | 0.248 | 0.759 | 0.0187 | 0.0106 | 0.1104 | 1.048 | 0.218 | 0.1509 | 0.0056 |       | 0.0234 | 0.0222  | 0.0079 | 150        |     |

I-8. Case hardening steel series

| Mass content in %             | C            | Si           | Mn           | P             | S             | Ni          | Cr          | Mo           | Cu            | V             | Al            | Sol. Al       | N             | Pb    | Net weight |     |
|-------------------------------|--------------|--------------|--------------|---------------|---------------|-------------|-------------|--------------|---------------|---------------|---------------|---------------|---------------|-------|------------|-----|
| JSS No.                       |              |              |              |               |               |             |             |              |               |               |               |               |               |       |            | (g) |
| 514-9 SCM 420                 | 0.209        | 0.185        | 0.769        | 0.0114        | 0.0194        | 0.0124      | (1.120)     | 0.160        | 0.0092        | 0.00264       | 0.0309        | 0.0298        | 0.0133        |       | 150        |     |
| <b>○ 517-8 SNCM 616</b>       | <b>0.159</b> | <b>0.246</b> | <b>1.056</b> | <b>0.0205</b> | <b>0.0101</b> | <b>3.02</b> | <b>1.61</b> | <b>0.517</b> | <b>0.1507</b> | <b>0.0057</b> | <b>0.0223</b> | <b>0.0206</b> | <b>0.0111</b> |       | <b>150</b> |     |
| 519-2 Lead free cutting steel | 0.451        | 0.313        | 0.852        | 0.0089        | 0.0207        | 0.00494     | 0.0941      | -            | 0.1133        |               |               |               |               | 0.087 | 150        |     |

I-9. Tool steel series

| Mass content in %     | C            | Si           | Mn           | P             | S             | Ni          | Cr           | Mo           | Cu            | W             | V             | N             | Net weight |     |
|-----------------------|--------------|--------------|--------------|---------------|---------------|-------------|--------------|--------------|---------------|---------------|---------------|---------------|------------|-----|
| JSS No.               |              |              |              |               |               |             |              |              |               |               |               |               |            | (g) |
| 601-12 SKS 21         | 1.052        | 0.248        | 0.302        | 0.0211        | 0.0101        | 0.1539      | 0.355        | 0.0544       | 0.1499        | 0.770         | 0.177         | 0.0090        | 150        |     |
| 602-12 SKS 11         | 1.256        | 0.250        | 0.298        | 0.0173        | 0.0086        | 0.1579      | 0.355        | 0.0501       | 0.1513        | 3.68          | 0.219         | 0.0116        | 150        |     |
| 604-10 SKD 6          | 0.374        | 0.976        | 0.297        | 0.0179        | 0.0092        | 0.1502      | 4.99         | 1.250        | 0.1491        | 0.0104        | 0.399         | 0.0202        | 150        |     |
| <b>○ 605-12 SKT 4</b> | <b>0.543</b> | <b>0.250</b> | <b>0.750</b> | <b>0.0192</b> | <b>0.0101</b> | <b>1.64</b> | <b>0.984</b> | <b>0.451</b> | <b>0.1493</b> | <b>0.0105</b> | <b>0.0105</b> | <b>0.1017</b> | <b>150</b> |     |

I-10. High speed steel series

| Mass content in % | C     | Si    | Mn    | P      | S       | Ni     | Cr   | Mo    | Cu     | W     | V     | Co     | N        | Net weight |     |
|-------------------|-------|-------|-------|--------|---------|--------|------|-------|--------|-------|-------|--------|----------|------------|-----|
| JSS No.           |       |       |       |        |         |        |      |       |        |       |       |        |          |            | (g) |
| 606-9 SKH 2       | 0.794 | 0.285 | 0.304 | 0.0219 | 0.00432 | 0.0400 | 4.00 | 0.163 | 0.0226 | 17.17 | 0.837 | 0.0820 | 0.0157   | 150        |     |
| 607-10 SKH 3      | 0.787 | 0.196 | 0.313 | 0.0155 | 0.00161 | 0.0591 | 3.96 | 0.456 | 0.0325 | 17.25 | 0.849 | 4.78   | 0.00328  | 150        |     |
| 609-11 SKH 55     | 0.897 | 0.252 | 0.287 | 0.0246 | 0.00059 | 0.1234 | 3.96 | 4.83  | 0.0494 | 6.15  | 1.87  | 4.72   | (0.0215) | 150        |     |
| 610-11 SKH 57     | 1.252 | 0.310 | 0.301 | 0.0171 | 0.00014 | 0.0463 | 4.04 | 3.05  | 0.0239 | 9.22  | 3.32  | 9.72   | 0.0349   | 150        |     |
| 611-12 SKH 51     | 0.888 | 0.263 | 0.335 | 0.0213 | 0.00063 | 0.1114 | 4.00 | 5.00  | 0.0495 | 6.15  | 1.86  | 0.206  | 0.00181  | 150        |     |

( ) Non-certified value

※ In preparation

○ New/Renewal

△ Low Stock

X Sold out

I-11. Stainless steel series

| Mass content in % | C      | Si    | Mn    | P      | S       | Ni     | Cr    | Mo     | Cu     | V      | Co     | Al      | N      | Ti | Nb | Net weight |
|-------------------|--------|-------|-------|--------|---------|--------|-------|--------|--------|--------|--------|---------|--------|----|----|------------|
| JSS No.           |        |       |       |        |         |        |       |        |        |        |        |         |        |    |    | (g)        |
| 650-16 SUS 430    | 0.0334 | 0.238 | 0.493 | 0.0268 | 0.00387 | 0.1191 | 16.27 | 0.0330 | 0.0153 | 0.0267 | 0.0110 | 0.00143 | 0.0454 |    |    | 150        |
| 651-16 SUS 304    | 0.0514 | 0.557 | 0.925 | 0.0353 | 0.00384 | 8.04   | 18.12 | 0.278  | 0.3502 | 0.0746 | 0.217  | 0.00172 | 0.0604 |    |    | 150        |
| 652-16 SUS 316    | 0.0369 | 0.628 | 0.938 | 0.0327 | 0.00148 | 10.06  | 16.80 | 2.06   | 0.272  | 0.0892 | 0.209  | 0.00222 | 0.0224 |    |    | 150        |
| 653-16 SUS 309S   | 0.0387 | 0.610 | 1.426 | 0.0252 | 0.00034 | 14.26  | 23.18 | 0.1192 | 0.1064 | 0.0714 | 0.167  | 0.00221 | 0.0384 |    |    | 150        |
| 654-16 SUS 310S   | 0.0486 | 0.663 | 0.924 | 0.0210 | 0.00051 | 19.16  | 24.61 | 0.0603 | 0.0634 | 0.0552 | 0.0996 | 0.00230 | 0.0345 |    |    | 150        |
| × 656-1 SUS 315   |        |       |       |        |         |        |       |        |        |        |        |         |        |    |    |            |

I-12. Heat resisting steel series

| Mass content in % | C      | Si    | Mn    | P      | S      | Ni    | Cr    | Mo     | Cu     | Ti    | Al     | N      | Net weight |
|-------------------|--------|-------|-------|--------|--------|-------|-------|--------|--------|-------|--------|--------|------------|
| JSS No.           |        |       |       |        |        |       |       |        |        |       |        |        | (g)        |
| 670-4 SUH 409     | 0.0480 | 0.731 | 1.489 | 0.0201 | 0.0093 | 0.201 | 11.15 | 0.0996 | 0.1093 | 0.384 | 0.0278 | 0.0110 | 150        |

I-13. Ferroalloy series

| Mass content in %                  | C        | Si      | Mn      | P      | S        | N      | B       | Cr    | Mo | Cu | V     | Co | Al     | Sn | Ta | Nb | Net weight |
|------------------------------------|----------|---------|---------|--------|----------|--------|---------|-------|----|----|-------|----|--------|----|----|----|------------|
| JSS No.                            |          |         |         |        |          |        |         |       |    |    |       |    |        |    |    |    | (g)        |
| ○ 701-7 High carbon ferromanganese | 6.89     | 0.111   | 74.34   | 0.141  | 0.00242  | 0.0107 | 0.00280 |       |    |    |       |    |        |    |    |    | 150        |
| 705-5 Silicon manganese            | 1.941    | 14.99   | 62.69   | 0.239  | (0.0087) |        | 0.0231  |       |    |    |       |    |        |    |    |    | 150        |
| ○ 720-5 FERRO-SILICONFSi2          | (0.08)   | 74.00   | (0.066) | 0.022  | (0.002)  |        |         |       |    |    |       |    | 1.45   |    |    |    | 100        |
| 733-1 High carbon ferro chromium   | 8.35     | (0.262) |         | 0.0219 | 0.0248   |        |         | 69.24 |    |    |       |    |        |    |    |    | 150        |
| 750-3 Ferro vanadium               | (0.1282) | 0.290   |         | 0.0148 | 0.0079   |        |         |       |    |    | 52.83 |    | (3.04) |    |    |    | 150        |

( ) Non-certified value

※ In preparation

○ New/Renewal

△ Low Stock

X Sold out

I-14. Iron ore series

| Mass content in % |                               | CW     | T.Fe  | Fe(II) | Si    | Mn     | P      | S      | Ti     | Al    | Ca     | Mg     | Na      | K       | Cu      | Ni     |
|-------------------|-------------------------------|--------|-------|--------|-------|--------|--------|--------|--------|-------|--------|--------|---------|---------|---------|--------|
| JSS No.           |                               |        |       |        |       |        |        |        |        |       |        |        |         |         |         |        |
| ×                 | 801-6 Indian hematite         |        |       |        |       |        |        |        |        |       |        |        |         |         |         |        |
|                   | 803-8 Pilibara Blend Iron Ore | (5.06) | 62.47 | 0.183  | 1.52  | 0.090  | 0.089  | 0.0153 | 0.037  | 0.797 | 0.0277 | 0.029  | 0.00633 | 0.00561 | 0.00068 | 0.0012 |
|                   | 804-3 South african hematite  | 0.391  | 64.91 | 0.220  | 2.47  | 0.0199 | 0.056  | 0.0073 | 0.026  | 0.473 | 0.109  | 0.0119 |         |         |         | 0.0026 |
| △                 | 805-2 MBR hematite            | 1.72   | 66.22 |        | 0.552 | 0.596  | 0.047  | 0.0077 | 0.0409 | 0.565 | 0.0071 | 0.021  | 0.0026  | 0.012   | 0.0094  |        |
|                   | 806-1 Australian Hematite     | (4.4)  | 62.77 | 0.15   | 1.55  | 0.125  | 0.083  | 0.019  | 0.044  | 0.96  | 0.0197 | 0.034  | 0.0115  | 0.0091  | 0.0012  | 0.0013 |
|                   | 820-5 Robe river limonite     | 8.78   | 56.17 |        | 2.81  | 0.067  | 0.031  | 0.0182 | 0.092  | 1.63  | 0.112  | 0.073  | 0.0132  | 0.0172  | 0.00068 | 0.0023 |
|                   | 821-1 Australian Limonite     | 9.16   | 57.05 |        | 2.28  | 0.085  | 0.0415 | 0.0108 | 0.0718 | 1.24  | 0.159  | 0.113  | 0.0095  | 0.0055  | 0.0007  | 0.0035 |
|                   | 831-2 Taharoa iron sand       | (0.11) | 56.64 | 21.82  | 1.93  | 0.501  | 0.153  | 0.0049 | 4.51   | 1.97  | 1.05   | 2.09   | 0.082   | 0.061   | 0.0068  | 0.0077 |
| △                 | 851-5 Sintered ore            | (0.04) | 56.67 | 5.99   | 2.48  | 0.241  | 0.060  | 0.016  | 0.065  | 0.89  | 7.94   | 0.48   |         |         | 0.0034  | 0.0058 |

( ) Non-certified value

⊗ In preparation

○ New/Renewal

△ Low Stock

X Sold out

☆Continued

| Mass content in %<br>JSS No.  | Cr     | V      | As     | Zn     | Pb      | Net weight<br>(g) |
|-------------------------------|--------|--------|--------|--------|---------|-------------------|
| × 801-6 Indian hematite       |        |        |        |        |         |                   |
| 803-8 Pilibara Blend Iron Ore | 0.0029 | 0.0018 |        | 0.0023 |         | 100               |
| 804-3 South african hematite  | 0.0024 | 0.0025 | 0.0030 |        |         | 100               |
| △ 805-2 MBR hematite          |        | 0.0039 |        | 0.0047 |         | 100               |
| 806-1 Australian Hematite     | 0.0033 | 0.0018 |        | 0.0020 |         | 100               |
| 820-5 Robe river limonite     | 0.0032 | 0.0042 |        | 0.0032 | 0.00065 | 70                |
| 821-1 Australian Limonite     | 0.0027 | 0.0040 |        | 0.0074 | 0.0006  | 70                |
| 831-2 Taharoa iron sand       | 0.028  | 0.299  |        | 0.074  |         | 100               |
| △ 851-5 Sintered ore          | 0.0163 | 0.0084 |        | 0.0075 |         | 100               |

I-15. Ore series

| Mass content in %<br>JSS No. | Mn   | O (Active) | Cr | C.W.  | Fe    | Si   | P     | S      | Al   | Ca    | Mg | Cu     | Net weight<br>(g) |
|------------------------------|------|------------|----|-------|-------|------|-------|--------|------|-------|----|--------|-------------------|
| △ 861-2 Manganese ore        | 48.7 | 13.55      |    | (3.3) | (5.7) | 2.62 | 0.086 | 0.0084 | 1.57 | 0.063 |    | 0.0064 | 100               |

( ) Non-certified value

※ In preparation

○ New/Renewal

△ Low Stock

X Sold out



I-16. Blast Furnace slag series

| Mass content in %          | T.Fe  | SiO <sub>2</sub> | MnO   | P      | S     | TiO <sub>2</sub> | Al <sub>2</sub> O <sub>3</sub> | CaO   | MgO  | Na    | K     | Net weight (g) |
|----------------------------|-------|------------------|-------|--------|-------|------------------|--------------------------------|-------|------|-------|-------|----------------|
| JSS No.                    |       |                  |       |        |       |                  |                                |       |      |       |       |                |
| ○ 905-2 Blast furnace slag | 0.442 | 34.29            | 0.233 | 0.0151 | 0.831 | 0.592            | 13.12                          | 42.70 | 5.84 | 0.152 | 0.253 | 70             |

II. Setting-up sample for determination of gaseous elements in steel

| Mass content in (μg/g)                 | O             | N | H             | Size            |
|--|---------------|---|---------------|-----------------|
| JSS No.                                | (Uncertified) |   | (Uncertified) |                 |
| GS7-2 Steel for Hydrogen determination |               |   | 6.6           | (5mm φ x 230mm) |
| GS9-2 Steel for Hydrogen determination |               |   | 2.0           | (5mm φ x 245mm) |

III. Steel sample of isolation and determination of nonmetallic inclusion

III. Sulfide isolation series

| Mass content in %                      | S      | Size        |
|--|--------|-------------|
| JSS No.                                |        |             |
| △ 260-1 MnS                            | 0.0046 | 18 φ x 60mm |
| × 261-1 MnS                            | 0.023  | 17 φ x 60mm |
| △ 262-1 TiS                            | 0.049  | 18 φ x 55mm |
| △ 263-1 Zr <sub>3</sub> S <sub>4</sub> | 0.050  | 18 φ x 55mm |
| △ 264-1 CaS                            | 0.0016 | 18 φ x 60mm |
| △ 265-1 CeS, MnS                       | 0.018  | 18 φ x 60mm |

( ) Non-certified value

※ In preparation

○ New/Renewal

△ Low Stock

X Sold out