

# ALLOY GUIDE - Strip & Plate



NOTE: Following chart shows property in typical thickness and only serves as a general guideline. For exact specifications, please contact us.

| MSC Alloy Name            | OFC          | MOFC-HR                  | TC           | DC1B                   | C151              | C151S             | MZC1                                    | ZC                  | TAMAC4                       | TAMAC194 | B1                                     | B3             | MAX251         | MAX251C   | MSP1  | MSP5                         | MSP8              | HRSC                          | WNS7   |                                  |
|---------------------------|--------------|--------------------------|--------------|------------------------|-------------------|-------------------|---|---------------------|------------------------------|----------|--|----------------|----------------|---|---|------------------------------|-------------------|-------------------------------|--|----------------------------------|
| JIS No.                   | C1020        |                          | C1100        | C1220                  |                   |                   |   |                     |                              |          | C2600                                  | C2801          |                |   |   |                              |                   |                               |  |                                  |
| CDA No.                   | C10200       | C10850                   | C11000       | C12200                 | C15100            | C15100            | C18140(1/2H, H)<br>C18141(SH)           | C15150              |                              |          | C19400                                 | C28000         | C64725         | C64725  | C18665  | C18670                       | C18661            | C18625                        | C76800   |                                  |
| Nominal Composition [wt%] | Cu:99.96Min. | Cu:99.96Min.<br>Mg:0.006 | Cu:99.90Min. | Cu:99.90Min.<br>P:0.03 | Cu:99.9<br>Zr:0.1 | Cu:99.9<br>Zr:0.1 | Cu:99.6<br>Cr:0.25<br>Zr:0.1<br>Si:0.02 | Cu:99.98<br>Zr:0.02 | Cu:99.87<br>Fe:0.1<br>P:0.03 |          | Cu:97.6<br>Fe:2.3<br>Zn:0.12<br>P:0.03 | Cu:70<br>Zn:30 | Cu:60<br>Zn:40 | Cu:96.0<br>Ni:2.0<br>Zn:1.0<br>Sn:0.5<br>Si:0.5 | Cu:96.0<br>Ni:2.0<br>Zn:1.0<br>Sn:0.5<br>Si:0.5 | Cu:99.3<br>Mg:0.7<br>P:0.005 | Cu:98.4<br>Mg:1.6 | Cu:99.7<br>Mg:0.25<br>P:0.002 | Cu:99.5<br>Co:0.27<br>P:0.08<br>Sn:0.04<br>Ni:0.04 | Cu:49<br>Ni:9<br>Mn:6<br>Zn:Rem. |

NOTE: The physical properties are average.

|  |       |       |       |       |       |       |                             |       |       |       |       |       |       |       |       |       |       |       |       |       |
|--|-------|-------|-------|-------|-------|-------|-----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Specific Gravity   | 8.94  | 8.94  | 8.94  | 8.94  | 8.9   | 8.9   | 8.9                         | 8.9   | 8.9   | 8.9   | 8.8   | 8.53  | 8.39  | 8.9   | 8.9   | 8.8   | 8.5   | 8.9   | 8.9   | 8.3   |
| Coef. of Thermal Expansion<br>[ $\times 10^{-6}/k$ ]<br>(20~300°C) | 17.7  | 17.7  | 17.7  | 17.7  | 17.7  | 17.7  | 17.1                        | 17.7  | 17.7  | 17.7  | 17.6  | 19.9  | 20.8  | 17.1  | 17.1  | 17.3  | 18.2  | 17.8  | 17.7  | 17    |
| Thermal Conductivity<br>[W/(m·K)]<br>(20°C)                        | 391   | 391   | 391   | 339   | 360   | 347   | 1/2H,316<br>H:316<br>SH:287 | 373   | 347   | 347   | 262   | 121   | 121   | 194   | 160   | 264   | 174   | 340   | 330   | 29    |
| Electrical Resistivity<br>[ $\mu\Omega \cdot m$ ]                  | 0.017 | 0.017 | 0.017 | 0.020 | 0.018 | 0.020 | 1/2H,H: 0.021<br>SH: 0.023  | 0.018 | 0.019 | 0.026 | 0.062 | 0.062 | 0.062 | 0.038 | 0.047 | 0.027 | 0.042 | 0.021 | 0.022 | 0.392 |
| Electrical Conductivity<br>[%IACS]                                 | 101   | 101   | 101   | 85    | 95    | 88    | 1/2H,H: 82<br>SH: 74        | 97    | 90    | 66    | 28    | 28    | 28    | 46    | 37    | 63    | 43    | 82    | 80    | 4.4   |
| Modulus of Elasticity<br>[kN/mm <sup>2</sup> ]                     | 118   | 119   | 118   | 118   | 121   | 121   | 137                         | 121   | 118   | 121   | 110   | 103   | 130   | 130   | 125   | 115   | 131   | 125   | 114   | 114   |

**Tensile Strength** [N/mm<sup>2</sup>] (MPa=N/mm<sup>2</sup>, 1N/mm<sup>2</sup>=0.1451ksi)

|      |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
|------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| O    | 195~255 |         | 195~255 | 195~255 |         |         |         | 285Max. | 255~335 | 345~415 | 275Min. | 325Min. |         |         | 390Max. |         |         | 280~320 | 470~550 |
| 1/4H | 215~275 | 215~275 | 215~275 | 215~275 | 275~315 |         |         |         | 275~355 |         | 325~410 | 355~440 |         |         | 365~450 |         | 270~370 | 310~380 |         |
| 1/2H | 245~315 | 245~315 | 245~315 | 245~315 | 295~355 |         | 500~600 | 245~295 | 295~375 | 365~435 | 355~440 | 410~490 | 450~550 | 540~640 | 420~510 | 485~585 | 320~420 | 430~520 | 530~630 |
| 3/4H |         |         |         |         | 325~380 |         |         |         |         |         | 375~470 |         |         |         |         |         |         |         |         |
| H    | 275~345 | 275~345 | 275~345 | 275~345 | 365~430 |         | 555~655 | 295~355 | 335~410 | 415~480 | 410~540 | 470~570 | 500~600 | 600~700 | 480~570 | 530~630 | 360~460 | 480~570 | 600~700 |
| EH   | 315Min. | 315~415 | 315Min. | 315Min. |         |         |         | 355~410 | 375Min. | 460~505 | 520~620 | 540Min. | 540~640 | 640~740 | 540~630 | 575~675 | 420~520 | 540Min. | 680Min. |
| SH   |         | 355~455 |         |         | 440~490 | 440~520 | 575~725 | 410~470 |         | 480~525 | 570~655 | 590Min. | 600~700 | 700~800 | 590Min. | 620~720 |         |         |         |
| ESH  |         |         |         |         |         |         |         |         |         | 530~575 | 620Min. | 700Min. | 760Min. |         |         |         |         |         |         |

**0.2% Yield Strength** [N/mm<sup>2</sup>] <Nominal 0.2% offset> (MPa=N/mm<sup>2</sup>, 1N/mm<sup>2</sup>=0.1451ksi) ※ Typical Values

|      |  |  |  |  |  |     |     |  |  |  |  |  |  |     |     |     |     |  |  |  |
|------|--|--|--|--|--|-----|-----|--|--|--|--|--|--|-----|-----|-----|-----|--|--|--|
| O    |  |  |  |  |  |     |     |  |  |  |  |  |  |     |     |     |     |  |  |  |
| 1/4H |  |  |  |  |  |     |     |  |  |  |  |  |  |     | 328 |     | 282 |  |  |  |
| 1/2H |  |  |  |  |  |     | 502 |  |  |  |  |  |  | 554 | 432 | 507 | 331 |  |  |  |
| 3/4H |  |  |  |  |  |     |     |  |  |  |  |  |  |     |     |     |     |  |  |  |
| H    |  |  |  |  |  |     | 567 |  |  |  |  |  |  | 584 | 494 | 543 | 399 |  |  |  |
| EH   |  |  |  |  |  |     |     |  |  |  |  |  |  | 663 | 560 | 585 | 434 |  |  |  |
| SH   |  |  |  |  |  | 454 | 611 |  |  |  |  |  |  |     |     | 636 |     |  |  |  |
| ESH  |  |  |  |  |  |     |     |  |  |  |  |  |  |     |     |     |     |  |  |  |

**Elongation** [%min]

|      |    |    |    |    |    |   |   |   |    |    |    |    |    |    |   |    |    |   |    |    |
|------|----|----|----|----|----|---|---|---|----|----|----|----|----|----|---|----|----|---|----|----|
| O    | 35 |    | 35 | 35 |    |   |   |   |    | 35 | 30 | 15 | 40 | 35 |   |    | 25 |   | 30 | 40 |
| 1/4H | 25 | 25 | 25 | 25 | 13 |   |   |   |    | 20 | 20 | 35 | 25 |    |   |    | 15 |   | 10 | 20 |
| 1/2H | 15 | 8  | 15 | 15 | 6  |   | 6 | 6 | 10 | 5  | 28 | 15 |    | 8  | 8 | 10 | 5  | 6 | 5  | 25 |
| 3/4H |    |    |    |    | 5  |   |   |   |    |    | 20 |    |    |    |   |    |    |   |    |    |
| H    |    |    |    |    | 4  |   | 3 | 4 | 5  | 2  |    |    |    | 6  | 5 | 7  | 4  | 3 | 2  | 15 |
| EH   |    |    |    |    |    |   |   | 2 |    |    |    |    |    | 4  | 3 | 5  | 3  | 2 | 1  | 3  |
| SH   |    |    |    |    | 2  | 5 | 2 | 2 |    |    | 4  |    |    | 2  | 2 |    | 3  |   |    |    |
| ESH  |    |    |    |    |    |   |   |   |    | 5  |    |    |    |    |   |    |    |   |    |    |

**Vickers Hardness** [HV] \* For reference

|      |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |
|------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| O    | (60Max.)  |           | (60Max.)  | (60Max.)  |           |           |           | (70Max.)  | (90Min.)  | (100~125) | (60~80)   | (85Min.)  |           |           | (100Max.) |           |           | (70~95)   | (110~130) |
| 1/4H | (55~75)   | (50~90)   | (55~75)   | (55~75)   | (70~100)  |           |           |           | (90~115)  |           | (80~105)  | (90~125)  |           |           | (90~140)  |           |           | (70~130)  | (90~115)  |
| 1/2H | (75~90)   | (60~100)  | (75~90)   | (75~90)   | (80~110)  |           | (130~190) | (75~110)  | (100~125) | (115~137) | (100~130) | (120~140) | (125~185) | (150~215) | (120~170) | (145~205) | (85~145)  | (135~160) | (155~190) |
| 3/4H |           |           |           |           | (100~120) |           |           |           |           |           | (120~145) |           |           |           |           |           |           |           |           |
| H    | (90~105)  | (85~125)  | (90~105)  | (90~105)  | (110~130) |           | (160~220) | (100~120) | (110~135) | (125~145) | (135~160) | (140~160) | (140~200) | (165~230) | (150~190) | (160~220) | (100~160) | (145~170) | (180~210) |
| EH   | (100Min.) | (95~135)  | (100Min.) | (100Min.) |           |           |           | (110~130) | (115Min.) | (135~150) | (155~175) | (160~190) | (150~215) | (180~240) | (170~210) | (175~235) | (110~170) | (160Min.) | (200Min.) |
| SH   |           | (105~145) |           |           | (130Min.) | (130Min.) | (170Min.) | (125Min.) |           | (140~155) | (170~190) | (180Min.) | (165~230) | (200~250) | (180Min.) | (190~250) |           |           |           |
| ESH  |           |           |           |           |           |           |           |           |           | (150~170) | (180Min.) |           | (200Min.) | (230Min.) |           |           |           |           |           |