

CR - Mill Specifications

■JIS G 3141(1987) Cold-Rolled Steel Coil and Sheet

| Classification | | Specification | Temper | Chemical Composition(%) | | | | | Tensile Strength kgf/mm ² (N/mm ²) | Elongation (Min.)(%) | | | | | | Hardness | | Bending Test (Inner Dia./ Thickness) |
|-----------------------|------------|---------------|--------------------|---------------------------|----|---------------------------|---------------------------|---------------------------|---|----------------------------------|--------------------------------------|--------------------------------|------------------------------------|------------------------------------|--------------------|--|--|---|
| | | | | C | Si | Mn | P | S | | 0.25and over under 0.40 | 0.40 and over under 0.60 | 0.6and over under 1.0 | 1.0 and over under 1.6 | 0.6 and over under 2.5 | 2.5 and over | HRB | HV | |
| Commercial Quality | Class 1 | SPCC | As annealed | 0.12 and under * | - | 0.50 and under * | 0.40 and under * | 0.45 and under * | (270 and over) | (32) | (34) | (36) | (37) | (38) | (39) | 57 and under * 67 and under * | 105 and under * 115 and under * | Closed |
| | | | Normal Refining | | | | | | - | 25 and over in all thicknesses | | | | | | 50 - 71 | 95 - 130 | Closed |
| | | | 1/8 hardening | | | | | | | 10 and over in all thicknesses | | | | | | 65 - 80 | 115 - 150 | 0.5 |
| | | | *1/4 hardening | | | | | | | - | | | | | | 74 - 89 | 135 - 185 | 1.0 |
| | | | *1/2 hardening | | | | | | | - | | | | | | 85 and over | 170and over | - |
| Drawing | Class 2 | SPCD | As annealed | 0.10 and under * | - | 0.45 and under * | 0.35 and under * | 0.35 and under * | 270 and over | 34 | 36 | 38 | 39 | 40 | 41 | 57 and under * 65 and under * | 105 and under * 115 and under * | Closed |
| | | | Normal Refining | | | | | | | | | | | | | | | |
| Deep Drawing | Class 3 | SPCE | As annealed | 0.08 and under * | - | 0.40 and under * | 0.30 and under * | 0.30 and under * | 270 and over | 36 | 38 | 40 | 41 | 42 | 43 | 57 and under * 65 and under * | 105 and under * 115 and under * | Closed |
| | | | Normal Refining | | | | | | | | | | | | | | | |

Remarks : 1. In principle, the values of tension test are not applied to Class 1 steels, both in annealed and normal refining states. However, when either one or both of the tension test value and Erichson value is guaranteed by designation, add a "T" at the end of the code like SPCCT. In such cases, values in parentheses will be applied.
2. The values with "*" are only for reference
3. When non-aging is guaranteed by designation, normally refined steel in Class 3 will have an "N" at the end of the specification code.
4. Tension test and elongation rate are applied to steel wider than 30mm.
5. For steels thinner than 0.6mm, the tension test is omitted in principle.
6. When normally refined steels in Class 3 are specified as "non-aging", they will have a six-month guarantee period after shipment.
7. The Erichen values of steels in Class 1 to 3 in annealed and normal refining states are as follows.

(Unit : mm)

| Class/Thickness | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 | 1.0 | 1.2 | 1.4 | 1.6 |
|-----------------|-----|-----|-----|-----|-----|------|------|------|------|------|
| Class 1 | 7.2 | 7.8 | 8.4 | 8.8 | 9.1 | 9.4 | 9.6 | 10.0 | 10.3 | 10.5 |
| Class 2 | 7.6 | 8.2 | 8.8 | 9.2 | 9.5 | 9.8 | 10.0 | 10.4 | 10.7 | 10.9 |
| Class3 | 8.0 | 8.6 | 9.2 | 9.6 | 9.9 | 10.2 | 10.4 | 10.8 | 11.1 | 11.3 |

ASTM Standard

| Specification | Type | | Chemical Composition(%) | | | | | Cu | Test | | | | | | | | |
|---------------|------------------------------|------------|-------------------------|----|-----------------|-----------------|-----------------|-----------------------------|---------------------------|------------------------|----------------------|-------------|---------|------|--|--|--|
| | | | C | Si | Mn | P | S | | | | | | | | | | |
| ASTM A366-91 | Commercial Quality | Sheet Coil | 0.15 and under | - | 0.60 and under | 0.035 and under | 0.040 and under | If specified, 0.20 and over | Closed in Bending | | | | | | | | |
| ASTM A619-91 | Drawing Quality | Sheet Coil | 0.10and under | - | 0.50 and under | 0.025 and under | 0.035and under | - | - | | | | | | | | |
| ASTM A620-91 | Specially Killed for Drawing | Sheet Coil | 0.10 and under | - | 0.50and under | 0.025and under | 0.035and under | - | - | | | | | | | | |
| ASTM A424-92 | Porcelain Enameling | Type 1 | 0.008 and under | - | 0.40 and under | - | 0.020 and under | - | Closed in bending(L or C) | | | | | | | | |
| | | Type 2 | 0.05 and under | | 0.020 and under | | | | | | | | | | | | |
| | | Type 3 | 0.02 and under | | | | | | | | | | | | | | |
| ASTM A611-91 | Structural Cold-Rolled Steel | Grade A | 0.20 and under | - | 0.60 and under | 0.045 and under | 0.035 and under | If specified, 0.20 and over | Yield Point (Ksi) | Tensile Strength (Ksi) | Elongation (Min.)(%) | | Bending | | | | |
| | | Grade B | | | | 0.035 and under | | | 25 and over | 42 and over | (Test Piece) | 26 | 1/2 | | | | |
| | | Type 1 | 0.20 and under | | | | | | 30 and over | 45 and over | | 24 | 1 | | | | |
| | | Type 2 | 0.15 and under | | | | | | 0.020 and under | 33 and over | | 48 and over | 22 | 11/2 | | | |
| | | Type 1 | 0.20 and under | | 0.90 and under | 0.04 and under | | | 40 and over | 52 and over | or 50mm | 20 | 2 | | | | |
| | | Type 2 | 0.15 and under | | 0.60 and under | 0.20 and under | | | 80and over | 82 and over | | - | | | | | |
| | | E | 0.20 and under | | 0.60 and under | 0.04 and under | | | | | | | - | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |

Remarks : A366-91 : 1. General conditions are in accordance with A568
2. If not specified, hardness is under HRB60.
3. Prior consultation is required before ordering
A424-92 : 1. General conditions are in accordance with A568.
2. Type 1 : Open coiling Type 2 : Solution 3.Type 2 has an anti-sagging quality and B forming quality.
A619-91 : 1. Generally manufactured by rimmed steel.
2. General conditions are in accordance with A568.
A611-91 : 1. General conditions are in accordance with A568.
2. Type 1 : Open coiling
3. Type2 : Solution
A620-91 : 1. Manufactured by Al-killed steel.
2. General conditions are in accordance with A568.

■DIN 1623 Part 1(1983) Cold-Rolled Steel Sheet and Strip for Cold Forming

| Specification | Type of De-oxidation | Chemical Composition(%) | | | | | | Yield Point (N/mm²) | Tensile Strength (N/mm²) | Minimum Elongation (%) | Bending Test | Hardness (Max.) | | |
|---------------|----------------------|-------------------------|----|----|---|---|-----------------|---------------------|--------------------------|------------------------|--------------|-----------------|-----|-------|
| | | C | Si | Mn | P | S | N | | | Lo=80mm | | HRB | HRF | HR30T |
| St 12 | - | 0.10 and over | - | - | - | - | 0.007 and under | 280 and under | 270 - 410 | 28 | - | 65 | 94 | 60 |
| USt 13 | U | 0.10 and over | | | | | | 250 and under | 270 - 370 | 32 | | 57 | 90 | 55 |
| RRSt 13 | RR | 0.10 and over | | | | | - | 240 and under | 270 - 370 | 34 | | 55 | 88 | 53 |
| St 14 | RR | 0.08 and over | | | | | | 210 and under | 270 - 350 | 38 | | 50 | 86 | 50 |

■DIN 1623 Part2(1986) Cold-Rolled Steel Sheet and Strip for General Engineering Purposes

| Specification | Type of De-oxidation | Chemical Composition (%) | | | | | | Yield Point (N/mm²) | Tensile Strength (N/mm²) | Elongation (Min.)(%) | Bending Test | Hardness (Max.) | | |
|---------------|----------------------|--------------------------|----|----|-----------------|-----------------|-----------------|---------------------|--------------------------|----------------------|--------------|-----------------|---|---|
| | | C | Si | Mn | P | S | N | | | Lo=80mm | | P | S | N |
| St 37-2G | - | 0.17 and under | - | - | 0.040 and under | 0.035 and under | 0.009 and under | 215 and over | 360 - 510 | 20 | 0.5 | - | - | - |
| USt 37-2G | U | | | | | | 0.007 and under | | | | | | | |
| St 37-3G | RR | | | | | | - | | | | | | | |
| St 44-3G | RR | 0.20 and under | - | - | 0.040 and under | 0.035 and under | - | 245 and over | 430 - 580 | 18 | 1.0 | - | - | - |
| St 52-3G | RR | | | | | | | 325 and over | 510 - 680 | 16 | 1.0 | | | |
| St 50-2G | R | 0.40 and under | - | - | 0.050 and under | 0.050 and under | 0.009 and under | 295 and over | 490 - 660 | 14 | - | - | - | - |
| St 60-2G | R | 0.40 and under | | | | | | 335 and over | 590 - 770 | 10 | | | | |
| St 70-2G | R | 0.65 and under | | | | | | 365 and over | 690 - 900 | 6 | | | | |

Remarks :

1.U : Rimmed Steel, R: Killed Steel, RR: Specially Killed Steel

2.Prior consultation is required before ordering.