



STEELS TABLE

CHEMICAL ANALYSIS AND MECHANICAL PROPERTIES

| NORM | GRADE | CHEMICAL ELEMENTS (% on mass) | | | | | | | | | | | | | | | | Yield strength (Mpa) | Tensile strength (Mpa) | Elongation % |
|---------------------------|--------------------------|-------------------------------|------|------|------|------|-------|-------|-------|------|-------|------|------|------|------|------|------|----------------------|------------------------|--------------|
| | | C | | Mn | | Si | | P | S | Cr | | Mo | | V | | Ni | Cu | | | |
| | | min. | max. | min. | max. | min. | max. | max. | max. | min. | max. | min. | max. | min. | max. | max. | max. | | | |
| ASTM A106 ASME SA 106 | A | - | 0.25 | 0.27 | 0.93 | - | 0.10 | 0.035 | 0.035 | - | 0.40 | - | 0.15 | - | 0.08 | 0.40 | 0.40 | 205 | 330 | 35 |
| | B | - | 0.30 | 0.29 | 1.06 | - | 0.10 | 0.035 | 0.035 | - | 0.40 | - | 0.15 | - | 0.08 | 0.40 | 0.40 | 240 | 415 | 30 |
| | C | - | 0.35 | 0.29 | 1.06 | - | 0.10 | 0.035 | 0.035 | - | 0.40 | - | 0.15 | - | 0.08 | 0.40 | 0.40 | 275 | 485 | 30 |
| ASTM A 335 ASME SA 335 | P1 | 0.10 | 0.20 | 0.30 | 0.80 | 0.10 | 0.50 | 0.025 | 0.025 | - | - | 0.44 | 0.65 | - | - | - | - | 205 | 380 | 30 |
| | P2 | 0.10 | 0.20 | 0.30 | 0.61 | 0.10 | 0.30 | 0.025 | 0.025 | 0.50 | 0.81 | 0.44 | 0.65 | - | - | - | - | 205 | 380 | 30 |
| | P5 | - | 0.15 | 0.30 | 0.60 | - | 0.50 | 0.025 | 0.025 | 4.00 | 6.00 | 0.45 | 0.65 | - | - | - | - | 205 | 415 | 30 |
| | P9 | - | 0.15 | 0.30 | 0.60 | 0.25 | 1.00 | 0.025 | 0.025 | 8.00 | 10.00 | 0.90 | 1.10 | - | - | - | - | 205 | 415 | 30 |
| | P11 | 0.05 | 0.15 | 0.30 | 0.60 | 0.50 | 1.00 | 0.025 | 0.025 | 1.00 | 1.50 | 0.44 | 0.65 | - | - | - | - | 205 | 415 | 30 |
| | P12 | 0.05 | 0.15 | 0.30 | 0.61 | - | 0.50 | 0.025 | 0.025 | 0.80 | 1.25 | 0.44 | 0.65 | - | - | - | - | 220 | 415 | 30 |
| | P15 | 0.05 | 0.15 | 0.30 | 0.60 | 1.15 | 1.65 | 0.025 | 0.025 | - | - | 0.44 | 0.65 | - | - | - | - | 205 | 415 | 30 |
| | P21 | 0.05 | 0.15 | 0.30 | 0.60 | - | 0.50 | 0.025 | 0.025 | 2.65 | 3.35 | 0.80 | 1.06 | - | - | - | - | 205 | 415 | 30 |
| | P22 | 0.05 | 0.15 | 0.30 | 0.60 | - | 0.50 | 0.025 | 0.025 | 1.90 | 2.60 | 0.87 | 1.13 | - | - | - | - | 205 | 415 | 30 |
| | P91* | 0.08 | 0.12 | 0.30 | 0.60 | 0.20 | 0.50 | 0.020 | 0.010 | 8.00 | 9.50 | 0.85 | 1.05 | 0.18 | 0.25 | 0.40 | - | 415 | 585 | 20 |
| P92" | 0.07 | 0.13 | 0.30 | 0.60 | - | 0.50 | 0.020 | 0.010 | 8.50 | 9.50 | 0.30 | 0.60 | 0.15 | 0.25 | 0.40 | - | 440 | 620 | 20 | |
| EN 10216-2 | P195GH (+N) ¹ | - | 0.13 | - | 0.70 | - | 0.35 | 0.025 | 0.020 | - | 0.30 | - | 0.08 | - | 0.02 | 0.30 | 0.30 | T ≤ 16 195 | 320-440 | 27 |
| | P235GH (+N) ¹ | - | 0.16 | - | 1.20 | - | 0.35 | 0.025 | 0.020 | - | 0.30 | - | 0.08 | - | 0.02 | 0.30 | 0.30 | T ≤ 16 235 | 360-500 | 25 |
| | | | | | | | | | | | | | | | | | | 16 < T ≤ 40 225 | | |
| 40 < T ≤ 60 215 | | | | | | | | | | | | | | | | | | | | |
| EN 10217-2 | P265GH (+N) ¹ | - | 0.20 | - | 1.40 | - | 0.40 | 0.025 | 0.020 | - | 0.30 | - | 0.08 | - | 0.02 | 0.30 | 0.30 | T ≤ 16 265 | 410-570 | 23 |
| | | | | | | | | | | | | | | | | | | 16 < T ≤ 40 255 | | |
| | | | | | | | | | | | | | | | | | | 40 < T ≤ 60 245 | | |

Note: the impact test is optional for tubes according to EN 10216-2 and EN 10217-2, therefore it has to be explicitly required in the purchase order (Min. 28 J at - 10° C or Min. 40 J at 0°C on the longitudinal sample).

The yield strength, tensile strength and elongation values stated in the table here above are the minimum requirements foreseen by the norm, that does not foresee maximum values.

T=tube w.t. in mm - the minimum elongation values refer to longitudinal samples.

* 0.030 ≤ N ≤ 0.070, Al ≤ 0.020, 0.060 ≤ Cb ≤ 0.10, Ti ≤ 0.010, Zr ≤ 0.010 (% on mass).

" 0.030 ≤ N ≤ 0.070, Al ≤ 0.020, 0.040 ≤ Cb ≤ 0.090, 1.50 ≤ W ≤ 2.00, 0.001 ≤ B ≤ 0.006, Ti ≤ 0.010, Zr ≤ 0.010 (% on mass).

¹ Al ≥ 0.020, Nb ≤ 0.010, Ti ≤ 0.030, Cr + Cu + Mo + Ni ≤ 0.70 (% on mass).