

MECHANICAL PROPERTIES

The table below lists the nominal/typical mechanical properties of more commonly used grades of stainless steel. Refer to note 1.

Grade of stainless steel	Condition (3)	Tensile Strength MPa (min)	0.2% Proof Strength MPa (min)	Elongation % in 50mm (min)	Hardness Brinell (max)
Plain carbon steel ie for comparison purposes only	Hot rolled	460	240	25	180
Austenitic stainless steels 301, 304, 304H, 304LN, 309S, 310S, 316, 316H, 316TI, 321 301L 304L, 316L 304N 316N N08904 {904L™, 1925LC™, 2RK65™}	Annealed Annealed Annealed Annealed Annealed	515 550 485 550 550	205 220 170 240 240	40 45 40 40 35	200 200 200 200 200
Duplex stainless steels S32304 (2304) S32205 (2205) S32750 (2507)	Annealed Annealed Annealed	600 620 795	400 450 500	25 25 15	290 290 310
Ferritic stainless steels 409 430 3CR12™	Annealed Annealed Annealed	380 450 460	170 205 300	20 22 20	180 180 220
Martensitic stainless steels (2) & (4) 410, 420, 431, 440B	Q & T (5)	Dependant on heat treatment			
Precipitation hardenable (PH) stainless steels (4) S17400, S17700, S15700	Ppt. hard. (Aged) (6)	Dependant on heat treatment			

Notes :

1. It is **stressed** the values given in the above table are typical/nominal for plate material with respect to those as in the American ASTM Specifications (with the exception of 3CR12™). Therefore they **must not** be used for design or specification purposes.

Specified values can differ in different specifications, and/or for different product forms (plate, sheet, coil, bar, forgings, castings, etc), and will differ for different conditions of supply as per note 3. Therefore, the values as stipulated in the specifications to which the stainless steel is ordered/supplied **must** be used for design or specification purposes.

2. Martensitic stainless steel are usually available only as bar, forgings, or as similar (not equivalent) cast grades.

3. The different conditions of supply include :

- Annealed, i.e. fully softened and thus lowest strength, hardness
- Cold worked, e.g. by temper rolling, by cold drawing
- Heat treated, e.g. by quenching and tempering, by precipitation hardening (ageing).

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4. Martensitic stainless steels and precipitation hardenable stainless steels are usually supplied in the annealed condition. After machining, forming and, in the case of precipitation hardenable stainless steels welding, they **must** be heat treated to give the required properties.

Martensitic stainless steels can be ordered/supplied in the quench and tempered condition (Ref Note 5). As such the tempering temperature employed would normally have been at the higher temperatures to give a tensile strength of -900 ± 50 MPa.

5. Quenching and tempering. The steel is rapidly cooled from a high temperature (925° - 1060° C dependant on grade) and subsequently tempered at a specific elevated temperature (in the range of 150° - 720° C) to give the required interrelated combination of strength/harness and associated ductility/toughness.

6. Precipitation hardening (ageing). The steel is heated to a specific intermediate temperature (in range of -480° - 620° C) to give the required interrelated combination of strength/harness and associated ductility/toughness.