

F51 (2205) Super Duplex Stainless Steel

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F53 (2507) SUPER DUPLEX STAINLESS STEEL DATASHEET

F51 (2205) Duplex Stainless Steel is an austenitic-ferritic (duplex) stainless steel. Consisting of 22% Chromium and 5% Nickel. F51 (2205) Duplex Stainless Steel is typically dual certified to UNS S31803 (318) / S32205 (2205). F51 (2205) Duplex Stainless Steel combines corrosion resistance and higher strength compared other austenitic stainless steels, while also having superior pitting resistance. It is also suitable in applications in environments of -50°F to +600°F temperature range. F51 (2205) Duplex Stainless Steel does suffer from embrittlement and loss of toughness, when exposed to prolonged use in applications or environments below -50°F or above +600°F, this is why duplex is not suitable for exposure outside of these ranges.

Common industry/applications for F51 (2205) Duplex Stainless Steel include: Pressure Vessels, Chemical and Biofluid processing, Rotors, Fans, Shafts, and Pulp and Paper Processing.

Product forms include round bar, plate & sheet, and forgings.



Standards

- UNS S31803
- UNS S32205

Physical Properties

- Density: 0.281LB/in³ (7.80g/cm³)
- Melting Point: 2570–2660°F (1410–1460°C)
- Modulus of Elasticity: 29.0x10⁶psi (200 GPa)
- Magnetic Permeability: <1.05 @ 68°F (20°C)

Characteristics

- For use in -50F to +600F temperatures.
- Excellent corrosion & pitting resistance.
- Good cryogenic (-50F) impact strength.

Chemical Composition

	C	Mn	S	P	Si	Cr	Ni	Mo	N
MIN	-	-	-	-	-	22.00	4.50	3.00	0.14
MAX	0.03	2.00	0.02	0.03	1.00	23.00	6.50	3.50	0.20

PREN: Pitting Resistance Equivalent Number: An Equation to correlate pitting resistances of product, based on chemistry. This equation is: $Cr + (3.3 \times Mo) + (16 \times N) - PREN = <40$

Mechanical Properties: Wrought & Forged Bars

Tensile (min) KSI (Mpa)	Tensile (min) (Cold Drawn) KSI (Mpa)	Yield (min) KSI (Mpa)	Yield (min) (Cold Drawn) KSI (Mpa)	Elongation (min) %	Reduction of Area (min) %	Hardness HRC (BHN)
100-120 (690-827)	120-150 (827-1034)	70-85 (482-586)	100-130 (690-896)	25%	45%	28 (290)

Typical mechanical properties, actual minimums may vary based on processing.

ASTM A182 F51 Equivalent

STANDARD

WERKSTOFF NR.

UNS

Duplex 31803

1.4462

S31803