

2205 is a duplex (austenitic-ferritic) stainless steel containing approximately 50% ferrite and 50% austenite in the annealed condition. 2205 has been a practical solution to chloride stress corrosion cracking problems experienced with 304/304L or 316/316L stainless. The high chromium, molybdenum and nitrogen contents provide corrosion resistance superior to 316/316L and 317/317L stainless in most environments. 2205 is not suggested for operating temperatures above 600°F

The design strength of 2205 is significantly higher than 316/316L, often permitting lighter wall construction. 2205 has good notch impact toughness down to temperatures below - 40°F. 2205 is welded with E2209 or ER2209 fillers.

Chemistry

	Ni	Cr	Mo	Mn	Si	C	N	S	P	Fe
Min	4.5	22.0	3.0	-	-	-	0.14	-	-	-
Max	6.5	23.0	3.5	2.0	1.0	0.03	0.2	0.02	0.03	bal

Per ASTM A240

Specifications

UNS: S31803, S32205

W. Nr./EN: 1.4462

ASTM: A182 (Grade F51), A240, A276, A476, A789, A790, A923

ASME: SA182 (Grade F51), SA-240, SA-276, SA-479, SA-789, SA-790, SA-923

NACE: ISO 15156/MR0175

Physical Properties

Density	0.283 lb/in ³
Melting Range	2525 - 2625°F
Poisson Ratio	0.3
Electrical Resistivity	31.5 μΩ • in
Coefficient of Thermal Expansion (68°F - 212°F)	7.2 μin/in •°F
Thermal Conductivity (212°F)	8.4 BTU/(hr•ft•°F)
Modulus of Elasticity (68°F)	29 • 10 ⁶ psi

Mechanical Properties

Specification: A240

Ultimate Tensile Strength, ksi	95
0.2% Yield Strength, ksi	65
Elongation, %	25
Hardness MAX, Brinell	293

* Values are minimums unless otherwise stated

Specification: A276

Ultimate Tensile Strength, ksi	95
0.2% Yield Strength, ksi	65
Elongation, %	25
Hardness MAX, Brinell	290

* Values are minimums unless otherwise stated

Typical Elevated Temperature Properties

Temperature, °F	Ultimate Tensile Strength, ksi	0.2% Yield Strength, ksi	Elongation, %
70	110.0	75.0	35.0
200	75.2	30.2	39.5
400	66.0	26.0	28.0
600	64.2	23.1	26.0

Features

- High resistance to chloride stress corrosion cracking
- Chloride pitting and crevice corrosion resistance superior to 317/3017L stainless
- Good general corrosion resistance
- High Strength
- Good sulfide stress corrosion resistance
- Useful up to 600°F

Applications

- Chemical process vessels, piping, and heat exchangers
- FGD scrubber systems
- Pulp mill digesters, bleach, washers, chip presteaming vessels
- Food process equipment
- Oil field piping and heat exchangers



Mechanical Properties Continued

ASME Allowable Stresses

ASME VIII B&PV Code	Minimum Design Temperature, °F	Allowable Stresses (ksi) at Temperature					
		100	200	300	400	500	600
ZERON® 100 Plate	-20.0	31.1	30.2	29.2	29.2	29.2	29.2
2507 Plate	-20.0	33.1	33	31.2	30.1	29.6	29.4
2205 Plate	-20.0	27.1	27.1	26.2	25.2	24.6	24.3
ASME B31.3 Pressure Piping							
ZERON® 100	-60.0	36.3	35.9	34.4	34	34	34
2507	-20.0	38.7	35	33.1	31.9	31.4	31.2
2205 (UNS 31803)	-60.0	30	30	28.9	27.9	27	26.9

Corrosion Resistance

Chloride Corrosion

Alloy	PREN	Critical Pitting Temperature, CPT °F (°C)
316/316L	24	50 (10)
317/317L	28	68 (20)
LDX 2101®	26	79 (26)
2205	35	95 (35)
ZERON® 100	>41	158 (≥70)
6-Moly	43	158 (≥70)

*PREn = Cr% + 3.3 x (Mo% + 0.5 x W%) + 16 x N%
 Measured in 6% Ferric Chloride per ASTM G48