

22 Chrome (UNS S31803)

22 Chrome (UNS S31803), also referred to as 2205 Duplex or Duplex 22 Chrome, is a cold hardened duplex stainless steel intended for corrosion resistance in sweet (CO₂) and mildly sour (H₂S) environments with moderate chloride content, requiring high strength up to 400°F. 22 Chrome offers improved mechanical properties and increased resistance to the effects of CO₂, chlorides, pH, and temperatures when compared with Super 13 Chrome. The higher strength and temperature resistance, relative to Super 13 Chrome, allow it to be used in deeper wells with high-pressure and high-temperature (HPHT) conditions, as downhole tubular components, packers, and other subsurface equipment.

All environmental factors, including H₂S, CO₂, temperature, pH, and chloride concentration, should be considered before final material selection.

This alloy is classified in MR0175/ISO15156 as a duplex stainless steel having a Pitting Resistance Equivalent Number (PREN) ≤40 and is suitable for H₂S partial pressure ≤0.3 psi.

NOMINAL COMPOSITION

Chromium 22%

Nickel 5.0%

Molybdenum 3.0%

Nitrogen 0.18%

Iron Balance

API 5CRA / ISO 13680 Group 2 Category 22-5-3 Specified Mechanical Properties

Grade	Yield Strength min. (ksi)	Tensile Strength min. (ksi)	Elongation min. (%)	Hardness max. (HRC)	NACE MR0175/ISO 15156 Environmental Limits
110	110	125	11	36	Table A.25
125	125	130	10	36	Table A.25
140	140	145	9	38	Not recommended for sour service

TYPICAL PHYSICAL PROPERTIES

		70°F	200°F	400°F
Density	lbs/in ³	0.28		
Thermal Expansion	X10 ⁻⁶ / °F	7.0	7.5	8.0
Elastic Modulus	psi x 10 ⁶	29.0	28.2	27.0
Poisson Ratio		0.24	0.24	0.24
Thermal Conductivity	Btu/ft h °F	8	9	10
Specific Heat	Btu/lb °F	0.12	0.12	0.12