Super 13 Chrome

The Super 13 Chrome alloys, UNS S41426 and HP-2, are quenched and tempered martensitic stainless steels intended for corrosion resistance in sweet (CO_2) and mildly sour (H_2S) environments with moderate chloride content up to 350°F. Super 13 Chromes offer improved mechanical properties and increased resistance to the effects of CO_2, H_2S, chlorides, pH, and temperatures when compared with standard 13 Chrome. The higher strength and temperature resistance, relative to 13 Chrome L80, allow their use in deeper wells with high pressure and high temperature (HPHT) conditions, as downhole tubular components, packers, and other subsurface equipment. Super 13 Chromes also provide increased resistance to H_2S and chlorides relative to Modified 13 Chrome, allowing for use in mild sour environments.

UNS S41426 is included in NACE MR0175/ISO15156 Table A.19, which provides a recommended limit of 1.5 psi partial pressure H_2S. API 5CRA/ISO13680 classifies it as Group 1, Category 13-5-2 alloy acceptable for sour service, in the 95 ksi yield strength condition.

NOMINAL COMPOSITION

Chromium 13% Nickel 5% Molybdenum 2% Iron Balance

SPECIFIED MECHANICAL PROPERTIES - API 5CRA / ISO 13680 Group 1 Category 13-5-2

Grade	Yield Strength min. (ksi)	Yield Strength max. (ksi)	Tensile Strength min. (ksi)	Hardness max. (HRC)	NACE MR0175/ISO 15156 reference
95	95	105	105	27	Table A.19
110	110	140	115	32	not included

TYPICAL MECHANICAL PROPERTIES

Grade	Yield Strength (ksi)	Tensile Strength (ksi)	Charpy V-Notch Toughness (ft-lbs at 14F)
95	102	118	130
110	115	124	140

TYPICAL PHYSICAL PROPERTIES

		70°F	200°F	350°F
Density	lbs/in^3	0.28	0.28	0.28
Thermal Expansion	X10^{-6}/ °F		5.9	5.9
Elastic Modulus	psi x 10^6	29.3	28.7	28.2
Poisson Ratio		0.3	0.3	0.3
Thermal Conductivity	Btu/ft h °F	9.1	9.7	10.7
Specific Heat	Btu/lb °F	0.10	0.11	0.12
Yield Strength De-Rating	%	100	91	87