

G-3 (UNS N06985)

Alloy G-3 (UNS N06985) is a cold hardened nickel-based alloy, intended for corrosion resistance to highly sour (H₂S) environments with high chloride content, requiring high strength up to 400°F. The high nickel and molybdenum content of G-3vb extends the sour service limits of nickel alloys while also providing excellent resistance to chlorides and dissolved oxygen. It is therefore used for downhole tubular components, packers, and other subsurface equipment in severely sour wells with high-pressure and high-temperature (HPHT) conditions, saltwater Injection wells, and Acid Gas Injection (AGI) wells. However, all environmental factors, including H₂S, CO₂, temperature, pH, and chloride concentration, should be considered before final material selection.

For sour service applications, it is classified in MR0175/ISO15156 as a type 4d alloy, with no restrictions to a partial pressure of H₂S below 300°F and resistant to 300 psi H₂S at 425°F.

NOMINAL COMPOSITION

Chromium 22%

Nickel 50%

Molybdenum 7%

Iron Balance

SPECIFIED MECHANICAL PROPERTIES - API 5CRA / ISO 13680 Group 4 Category 22-50-7

Grade	Yield Strength min. (ksi)	Tensile Strength min. (ksi)	Elongation min. (%)	NACE MR0175/ISO 15156 Environmental Limits
110	110	115	11	Table A.14 Type 4d
125	125	130	10	Table A.14 Type 4d
140	140	145	9	N/A

TYPICAL MECHANICAL PROPERTIES

Grade	Yield Strength (ksi)	Tensile Strength (ksi)	Charpy V-Notch Toughness (ft-lbs at 14F)
110	130	138	80
125	138	149	67

TYPICAL PHYSICAL PROPERTIES

		70°F	200°F	400°F
Density	lbs/in ³	0.29		
Thermal Expansion	X10 ⁻⁶ / °F	8.1	8.1	8.1
Elastic Modulus	psi x 10 ⁶	28.9		
Poisson Ratio		0.3		
Thermal Conductivity	Btu/ft h °F	5.8	6.8	8.0
Specific Heat	Btu/lb °F	0.11	0.11	0.11