

Incoloy 925 (UNS N09925)

Age-hardenable nickel-iron-chromium alloy with molybdenum, copper and titanium, for stud bolts, bolts, nuts and machined parts. Bar per ASTM B805; oil and gas equipment per API 6ACRA, material designation 110K.

UNS N09925	WERKSTOFF NR. 2.4858	BAR SPECIFICATION ASTM B805	OIL AND GAS API 6ACRA 110K
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CHEMICAL COMPOSITION % by weight

Element	ASTM B805 Table 1	API 6ACRA Table 1
Nickel, Ni	42.0 to 46.0	42.0 to 46.0
Chromium, Cr	19.5 to 22.5	19.5 to 22.5
Iron, Fe	22.0 min	22 min
Molybdenum, Mo	2.5 to 3.5	2.50 to 3.50
Copper, Cu	1.5 to 3.0	1.50 to 3.00
Titanium, Ti	1.9 to 2.40	1.90 to 2.40
Aluminum, Al	0.1 to 0.5	0.10 to 0.50
Niobium, Nb	0.5 max	0.08 to 0.50
Carbon, C	0.03 max	0.025 max
Manganese, Mn	1.0 max	1.00 max
Silicon, Si	0.5 max	0.35 max
Phosphorus, P	0.03 max	0.020 max
Sulfur, S	0.03 max	0.003 max

- API 6ACRA limits are tighter than the UNS chemistry for some elements.

TENSILE PROPERTIES, ASTM B805 minimum · ksi (MPa)

Condition	Tensile	Yield	El. 4D	RA
Solution treated (Table 2)	75 (517)	35 (241)	35%	50%
Cold worked, SA + aged (Table 3)	140 (965)	105 (724)	18%	25%
Hot worked, SA + aged (Table 3)	140 (965)	110 (758)	18%	25%

API 6ACRA, 110K Tables 5, 6 and 7

Yield strength 0.2%	110 to 140 ksi (758 to 965 MPa)
Tensile strength	140 ksi (965 MPa) min
Elongation in 4D	18% min
Reduction of area	25% min (QTC ≤ 10 in. [254 mm]); 20% min (over 10 in.)
Hardness	26 to 38 HRC; maximum per ANSI/NACE MR0175
Charpy V-notch, 10 × 10 mm	35 ft-lbf (47 J) average, 32 ft-lbf (43 J) single; lateral expansion 0.015 in. (0.38 mm) min

HEAT TREATMENT

ASTM B805, solution treatment	1875 °F (1024 °C); air cool or faster up to 1 in. (25.4 mm) diameter, water quench or faster above 1 in. (Note 1, recommended)
ASTM B805, aging	1365 °F (740 °C) for 6 to 9 h, furnace cool to 1150 °F (621 °C), hold to 18 h total precipitation treatment, air cool or faster
API 6ACRA, solution annealing	1825 to 1925 °F (996 to 1052 °C), 0.5 to 4 h
API 6ACRA, age hardening	1325 to 1400 °F (718 to 760 °C) for 4 to 9 h, furnace cool to 1125 to 1220 °F (607 to 660 °C), total aging time 12 h min

SUPPLY AND TESTING

Bar condition, ASTM B805	Solution treated, suitable for age hardening, unless otherwise specified; as-hot-worked or solution treated plus aged by agreement
Tests per lot, ASTM B805	One chemical analysis per heat; one tension test per heat, size and heat-treatment batch
API 6ACRA	Tension, Charpy and hardness per QTC, plus microstructure examination of full cross-section slices