Nickel Alloys for Completion Equipment & Accessories

Historically, high alloy downhole completion equipment has been manufactured from precipitation hardened “PH” nickel alloy bar stock. Often times starting with bar results in significant material loss, additional machining time and costs, and limitations to part lengths when compared to starting with a cold-worked nickel alloy tube.

Utilizing our job shop mill, CRA produces cold worked seamless heavy-walled tubes for mechanical applications. CRA manufactured tubes are offered to semi-finished near shape dimensions with close tolerances allowing for significant reduction in machining hours and cost. Providing reliable, quality products produced with accelerated deliveries creates opportunities to meet customer’s delivery requirements while reducing inventory risk.

Presented below are comparisons of the two most commonly used ph nickel alloys, 925 & 718, to alternative cold worked nickel alloys, 2535 & 2550.

STANDARD API STRENGTH CLASSIFICATIONS

Type	UNS Number	C	Cr	Ni	Mo	Cu	Ti	Nb + Ta	Al	PREN
2535	**N08535**	0.030 max	24 to 27	29 to 36.5	2.5 to 4	1.50 max	---	---	---	32 to 40
2550	**N06255**	0.030 max	23 to 26	47 to 52	6 to 9	1.20 max	0.69 max	---	---	43 to 56
925	**N09925**	0.025 max	19.5 to 22.5	42 to 46	2.5 to 3.5	1.5 to 3.0	1.9 to 2.4	0.08 to 0.5	0.1 to 0.5	28 to 34
718	**N07718**	0.045 max	17 to 21	50 to 55	2.8 to 3.3	0.23 max	0.8 to 1.15	4.87 to 5.20	0.4 to 0.6	26 to 32

STANDARD API STRENGTH CLASSIFICATIONS

Specification	Type	Grade	Yield Strength min. (ksi)	Tensile Strength min. (ksi)	Elongation min. (%)
5CRA	2535	110	110	115	11
5CRA	2550	125	125	130	10
6ACRA	925	110	110	140	18
6ACRA	718	120	120	150	20

These nickel alloys are all suitable for most sour service applications. Alloy 2550, with its high Pitting Resistance Equivalent Number (PREN), is also suitable for injection wells and high chloride environments. Where hydrogen embrittlement is a concern, the cold worked nickel alloys are preferred. While hydrogen embrittlement failures have been experienced with high strength ph nickel alloys, no such failures have been reported with the cold worked alloys and laboratory studies have shown them to be essentially immune.

CORROSION RESISTANCE

NACE MR0175 Sour Service Limits			
Type	**UNS Number**	**Temperature (F)**	**H2S Max Partial Pressure (psi)**
2535	**N08535**	Up to 270F Up to 400F	No limit 150
2550	**N06255**	Up to 300F Up to 425F	No limit 300
925	**N09925**	Up to 400F	500
718	**N07718**	Up to 400F	500

**While every effort has been made to ensure the accuracy of the above review, assessment, conclusions, and report, the appropriateness of their application and their interpretation remain the sole responsibility of the user.*