

Type 630

17 Cr-4Ni UNS S17400

A martensitic, precipitation-hardening stainless steel with high strength and hardness, and good corrosion resistance.

Description

Type 630, commonly called 17-4, is a martensitic, precipitation hardening stainless steel. A low temperature heat treatment can provide unusually high strength and hardness, with corrosion resistance similar to that of Type 304 austenitic stainless steel.

Specifications

Outokumpu Stainless Type 630 can be supplied to meet AMS 5622, ASTM A 564, and MIL-S-853 specifications.

Product Forms Available

Bar
Billet

Corrosion Resistance

Type 630 is generally comparable to Type 304 in corrosion resistance. It is used in applications where the combination of moderate corrosion performance and unusually high strength is required.

Applications

Type 630 has been used in a wide variety of applications including oil field valve equipment, chemical process equipment, fittings, pumpshafts, gears, paper mill equipment, and aircraft parts.

Heat Treatment and Hardening

Type 630 is furnished in the solution annealed condition, designated Condition A. This is obtained by heating to 1900°F±25°F for one-half hour and then cooling to below 90°F. The mechanical properties may be altered by subsequent age hardening treatments. These aging treatments are referred to as Conditions H900, H1025, H1075, H1150, H1150M, and H1150D. The suggested heat treatments are shown in Table 3.

Chemical Composition, wt. pct.

Table 1

	Type 630
Carbon	0.07 max
Manganese	1.00 max
Phosphorus	0.040 max
Sulfur	0.030 max
Silicon	1.00 max
Chromium	15.0-17.5
Nickel	3.0-5.0
Copper	3.0-5.0
Columbium plus Tantalum	0.15-0.45

Physical Properties

Table 2

	Condition A
Density, lb/in ³	0.285
Modulus of Elasticity, psi	31.2 x 10 ⁶
Linear Expansion, 68-212°F/°F	6.7 x 10 ⁻⁶
Thermal Conductivity, Btu/ft hr°F	12.7
Heat Capacity, Btu/lb°F	0.11
Electrical Resistivity, Ω – inch	29.5 x 10 ⁻⁶

Heat Treatments

Table 3

Condition	Temperature °F	Time, h	Quench
H900	900	4	Air Cool
H1025	1025	4	Air Cool
H1075	1075	4	Air Cool
H1150	1150	4	Air Cool
H1150M	1400 for 2 h, air cool plus 1150 for 4 h, air cool		
H1150D	1150 for 4 h, air cool plus 1150 for 4 h, air cool		

Mechanical Properties

Table 4

Condition	Tensile Strength (ksi)	0.2% Yield Strength (ksi)	Elongation in 2 in. (%)	Reduction of Area (%)	Hardness (Rc)	Charpy V-Notch Impact Strength (ft.-lb.)
H900	198	183	15	52	44	16
H1025	168	162	16	58	38	40
H1075	164	148	17	59	36	45
H1150	144	126	20	60	33	55
H1150M	123	87	22	66	29	100
H1150D	150	110	20	60	29	50

Typical mechanical properties in the aged conditions are shown in Table 4. Aging will cause slight dimensional changes.

It should not be forged below about 1850°F. Forgings must be solution annealed before the final aging treatment.

Welding

Type 630 can be satisfactorily welded with either Type 630 or AWS E308L/ER308L welding consumables. However, the 308L filler metal cannot be heat treated to the same mechanical properties as the base metal. The thermal cycle associated with welding can substantially alter the condition of Type 630. To obtain the properties considered characteristic of Type 630, the material should be solution annealed and aged subsequent to welding.

Technical Support

Outokumpu Stainless, Inc. assists users and fabricators in the selection, qualification, installation, operation, and maintenance of Type 630. Technical personnel, supported by the research laboratory of Outokumpu Stainless, can draw on years of field experience with Type 630 to help you make the technically and economically correct materials decision.

Outokumpu Stainless is prepared to discuss individual applications and to provide data and experience as a basis for selection and application of Type 630.

Outokumpu Stainless works closely with its distributors to ensure timely availability of Type 630 in the forms, sizes, and quantities required by the user. For assistance with technical questions and to obtain top quality Type 630, call Outokumpu Stainless, Inc. at 1-800-833-8703.

Workability

Cold Working

Cold forming or fabrication should occur prior to the final solution anneal and age hardening treatment.

Hot Working

Type 630 should be uniformly heated to 2150-2200°F for a minimum of one hour.

Outokumpu Stainless is a core business within Outokumpu, a dynamic metals and technology group operating worldwide and marketing its metals, metal products, technology and services to customers in a wide range of industries.

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