



Other common names: Alloy B-3

Hastelloy B-3 is a nickel-molybdenum alloy which includes magnificent resistance to pitting, corrosion and stress-corrosion cracking plus, thermal stability better than that of alloy B-2. Additionally, this nickel steel alloy has great resistance to knife-line and heat-affected area attack. Alloy B-3 additionally withstands sulfuric, acetic, formic and phosphoric acids and other non-oxidizing media. Besides, this nickel alloy has excellent resistance to hydrochloric acid at all focuses and temperatures. Hastelloy B-3's recognizing highlight is its capacity to keep up excellent ductility during transient exposures to intermediate temperatures. Such exposures are routinely experienced during heat treatments connected with fabrication.

Limiting Factors

Alloy B-3 has poor corrosion resistance to oxidizing situations; hence, it is not recommended for use in oxidizing media or in the vicinity of ferric or cupric salts since they might bring about quick untimely corrosion failure. These salts might be created when hydrochloric acid interacts with iron and copper. Accordingly, if this nickel steel alloy is utilized as a part of conjunction with iron or copper piping in a system containing hydrochloric acid, the presence of these salts could cause the alloy to fail prematurely.

Applications

- Chemical processes
- Vacuum furnaces
- Mechanical components in reducing environments

Characteristics

- Maintains excellent ductility during transient exposures to intermediate temperatures
- Excellent resistance to pitting, corrosion and stress-corrosion cracking
- Excellent resistance to knife-line and heat-affected zone attack
- Excellent resistance to acetic, formic and phosphoric acids and other non-oxidizing media
- Resistance to hydrochloric acid at all concentrations and temperatures
- Thermal stability superior to alloy B-2

Corrosion Resistance

It is an extra individual from the nickel-molybdenum group of alloy with magnificent resistance to hydrochloric acid at all concentrations and temperatures. It additionally withstands sulfuric, acetic, formic and phosphoric acids and other no oxidizing media. The B-3 alloy has an extraordinary chemistry intended to accomplish a level of thermal stability extraordinarily better than that of its predecessor, e.g. HASTELLOY B-2 alloy. The B-3 alloy has incredible, magnificent resistance to pitting corrosion, to stress-corrosion cracking and to knife-line and heat-affected area.

Fabrication

Issues connected with fabrication of alloy B-2 parts should be minimized with alloy B-3 because of its enhanced thermal stability. A low carbon content grant alloy B-3 to be utilized as a part of the as-welded condition. Hastelloy B-3 has great general forming and welding attributes. This alloy can be forged or generally hot-worked, giving that it is held at 2250° F for an adequate measure of time to convey the whole piece to temperature. Since it is a low carbon alloy, the utilization of lower hot completing temperatures might be important to accomplish grain size control. It may also be formed by cold working. In spite of the fact that it works-harden somewhat quickly; B-3 alloy parts can be made utilizing all basic cold forming strategies. All basic welding strategies might be utilized with alloy B-3; be that as it may, oxyacetylene and submerged arc welding process is not recommended when the fabricated thing is to be utilized as a part of corrosive service.

Welding

The welding of is regularly done on like materials utilizing shield gas processes GTAW and GMAW and the arc welding process. The semi-completed items should likewise be in a stress free, metallic bright condition and free of dirt. With a specific end goal to accomplish ideal corrosion resistance, care must be taken to apply at least heat during welding. Preheating or optional heat treatment is generally unnecessary.

Hot Working

Hot shaping is done in the temperature scope from 1232 to 982 °C. Consequent solution annealing took after by fast cooling is required. Prior to heating, all work pieces should be free of oil, grease, carbon, sulfur-containing residues and different contaminants. The furnace should be conformed to keep up a neutral to slightly oxidizing atmosphere.

Cold Working

With cold forming grades more than 15%, a lasting solution annealing is required in order to retrieve optimum corrosion resistance.

Heat Treatment

All wrought forms are furnished in the solution heat-treated condition unless generally determined. The B-3 alloy is solution heat-treated at 1065°C and rapid quenched, with the exception of bright annealed sheet or coil products which are heat-treated at 1150°C and cooled in hydrogen.

Chemical Properties

C	Al	Si	P	S	Ti	V	Cr	Mn
0.01 max	0.5 max	0.10 max	0.03 max	0.01 max	0.2 max	0.2 max	1.0- 3.0	3.0 max

Fe	Co	Ni	Cu	Zr	Nb	Mo	Ta	W	Ni+MO
1.0- 3.0	3.0 max	65.0 min	0.2 max	0.1 max	0.2 max	27.0 - 32.0	0.2 max	3.0 max	94.0 - 98.0

Mechanical Properties

Tensile Strength (ksi)	0.2% Yield Strength (ksi)	Elongation% in 2 inches
110	51	40

Physical Properties

Properties	Units	Temperature in °C
Density	9.22 g/cm ³	Room
Specific Heat	0.089 Kcal/kg.C	Room
Melting Range	1370-1418 °C	-
Modulus of Elasticity	216 KN/mm ²	Room
Electrical Resistivity	137 μΩ.cm	Room
Coefficient of Expansion	10.6 μm/m °C	25-100°
Thermal Conductivity	11.2 W/m-°K	Room

ASTM Specifications

Pipe / Tube (SMLS)	Pipe Welded	Tube Welded	Sheet / Plate	Bar	Forging	Fitting
B 622	B 619	B 626	B 333	B 335	B 564	B 366

Availability

MANUFACTURING
Fasteners
Custom Machining
Custom Fabrication
Piping / Spools
Stamped Parts
B/W Fittings
S/W Fittings
Flanges
Compression Fittings

RAW MATERIALS
Pipes
Tubes
Bars
Sheets
Plates
-
-
-
-

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