



Other common names: Alloy X, Inconel® HX

Hastelloy X is a nickel-chromium-iron-molybdenum super alloy. This alloy includes extraordinary elevated temperature strength, fabricability and oxidation resistance. Alloy X's oxidation resistance is incredibly up to 2200° F. This nickel steel alloy has additionally been observed to be exceptionally resistant to stress-corrosion cracking in petrochemical applications. Matrix stiffens provided by the molybdenum content results in high strength in a solid-solution alloy having good fabrication attributes. Despite the fact that this Hastelloy X nickel alloy is fundamentally noted for heat and oxidation resistance. It has good resistance to chloride stress-corrosion cracking, carburization and magnificent resistance to decreasing or carburizing atmospheres. Two normal conditions that frequently prompt early disappointment in elevated temperature alloys, carburization and nitriding, Hastelloy X resists.

Applications

- Gas turbines
- Petrochemical industry
- Industrial furnaces
- Heat treating equipment
- Nuclear engineering
- Jet engine combustion chambers
- Aircraft cabin heaters
- Turbine exhaust components

Characteristics

- Outstanding oxidation resistance through 2000° F
- Resistant to carburization and nitriding
- Excellent high temperature strength
- Good resistance to chloride stress-corrosion cracking

Alloy X is a standout amongst the most generally utilized nickel base super alloys for gas turbine engine combustion area parts such as transition ducts, combustor cans, spray bars and flame holders as well as in the afterburners, tailpipes and cabin heaters. It is recommended to utilize in industrial furnace applications since it has unusual resistance to oxidizing, decreasing and neutral atmospheres. Hastelloy X is additionally utilized in the chemical process industry for retorts, muffles, catalysts support grids, furnace baffles, tubing for pyrolysis operations and flash drier components.

Fabrication

Alloy X has excellent forming and welding qualities. It can be forged and, because of its good ductility, can be cold worked. It can be welded by both manual as well as automatic techniques including shielded metal arc, gas tungsten arc, gas metal arc and submerged arc processes. The alloy can also be resistance welded. For hot forming, the alloy should be heated to a starting temperature of 2150° F (1175°C).

Machining

The alloy is machinable by standard techniques and is related to the machining of the austenitic (300 series) stainless steels.

Forming

Cold working and shaping of the different product forms can be possible with standard tooling and processing.

Welding

Welding by standard processes, for example, resistance welding, shielded metal arc, and MIG or TIG should promptly be possible with this alloy. The coordinating filler metal should be utilized. Preheating and/or post heating are not required.

Heat Treatment

The alloy is mostly supplied in the solution annealed condition. This is expert at 2150 F followed by a fast cooling.

Forging

Hot forging can be accomplished by standard practice.

Hot Working

Hot forging can be accomplished by standard practice.

Cold Working

Promptly cold worked in a way like that for austenitic (300 series) stainless steels with the exception of this alloy is somewhat "stiffer" and may require more forming pressure. After severe cold working the product can be solution annealed.

Aging

The alloy can be aged, after solution heat treatment, at temperatures of 1200 to 1600 F. Aging will bring about a slight increase in strength and hardness with the impact being related to hours of presentation at the aging temperature - the more extended the time the greater impact.

Hardening

Hardened are done by cold working and somewhat by aging. This alloy is not hardenable by standard heating a quenching as with plain carbon steels.

Chemical Properties

C	Si	P	S	Cr	Mn	Fe	Co	Ni	Mo	W
0.05 - 0.15	1.0 max	0.04	0.03	20.5 - 23.0	1.0 max	17.0 - 20.0	0.5 - 2.5	Remainder	8.0 - 10.0	0.2 - 1.0

Mechanical Properties

Tensile Strength (ksi)	0.2% Yield Strength (ksi)	Elongation% in 2 inches
95	35	35

Physical Properties

Properties	Units	Temperature in °C
Density	8.22 g/cm ³	22°
Specific Heat	0.116 Kcal/kg.C	Room
Melting Range	1260-1355 °C	-
Modulus of Elasticity	205 KN/mm ²	Room
Electrical Resistivity	118.3 μΩ.cm	22°
Coefficient of Expansion	13.9 μm/m °C	26-93°
Thermal Conductivity	9.1 W/m-°K	21°

ASTM Specifications

Pipe / Tube (SMLS)	Pipe / Tube Welded	Sheet / Plate	Bar	Forging	Fitting
B 622	B 619	B 435	B 572	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
-
-
-
-

Disclaimer

The data and information in this data sheet are accurate to the best of our knowledge and belief, but are intended for general information only. Applications recommended for the materials are described only to help readers make their own evaluations and decisions, and are neither guarantees nor to be construed as express or implied warranties of suitability for these or other applications. Data referring to mechanical properties and chemical analyses are the result of tests performed on specimens obtained from specific locations with prescribed sampling procedures; any warranty thereof is limited to the values obtained at such locations and by such procedures. There is no warranty with respect to values of the materials at other locations. Sunmach and the Sunmach logo are registered trademarks of Sunmach Company. The contents & images of this datasheet are introduced for information purposes only and all the registered trademarks of their respective owners.