

HAYNES[®] 230[®] alloy

Principal Features

Excellent High-Temperature Strength, Thermal Stability, and Environment Resistance

HAYNES[®] 230[®] (UNS N06230) alloy is a nickel-chromium-tungsten-molybdenum alloy that combines excellent high-temperature strength, outstanding resistance to oxidizing environments up to 2100°F (1149°C) for prolonged exposures, premier resistance to nitriding environments, and excellent long-term thermal stability. It is readily fabricated and formed, and is castable. Other attractive features include lower thermal expansion characteristics than most high-temperature alloys, and a pronounced resistance to grain coarsening with prolonged exposure to hightemperatures.

Easily Fabricated

HAYNES[®] 230[®] alloy has excellent forming and welding characteristics. It may be forged or otherwise hot-worked, providing it is held at 2150°F (1177°C) for a time sufficient to bring the entire piece to temperature. As a consequence of its good ductility, 230[®] alloy is also readily formed by cold-working. All hot- or cold-worked parts should be annealed and rapidly cooled in order to restore the best balance of properties. The alloy can be welded by a variety of techniques, including gas tungsten arc (GTAW), gas metal arc (GMAW), and resistance welding.

Heat Treatment

Wrought 230[®] alloy is furnished in the solution heat treated condition, unless otherwise specified. The alloy is solution heat-treated in the range of 2150 to 2275°F (1177 to 1246°C) and rapidly cooled or water-quenched for optimum properties.

Annealing at temperatures lower than the solution heat treating temperatures will produce some carbide precipitation in 230[®] alloy, which may marginally affect the alloy's strength and ductility.

Castings

HAYNES[®] 230[®] alloy may be cast using traditional air-melt sand mold or vacuum-melt investment casting foundry practices. Silicon levels at the high end of the specification range are recommended for enhanced fluidity. Castings may be used in either the as-cast or solution-heat-treated condition depending upon property requirements.

Applications

HAYNES[®] 230[®] alloy combines properties which make it ideally suited for a wide variety of component applications in the aerospace and power industries. It is used for combustion cans, transition ducts, flame holders, thermocouple sheaths, and other important gas turbine components. In the chemical process industry, 230[®] alloy is used for catalyst grid supports in ammonia burners, high-strength thermocouple protection tubes, high-temperature heat exchangers, ducts, high-temperature bellows, and various other key process internals.

In the industrial heating industry, applications for 230 alloy include furnace retorts, chains and fixtures, burner flame shrouds, recuperator internals, dampers, nitriding furnace internals, heat-treating baskets, grates, trays, sparger tubes, thermocouple protection tubes, cyclone internals, and many more.

ASME Vessel Code

HAYNES[®] 230[®] alloy is covered by ASME Vessel Code case No. 2063 for Section I and Section VIII

Division 1 construction to 1650°F (899°C).
