

HAYNES[®] 242[®] alloy

Principal Features

Excellent High-Temperature Strength, Low Thermal Expansion Characteristics, and Good Oxidation Resistance

HAYNES[®] 242[®] alloy (UNS N10242) is an age-hardenable nickel-molybdenum chromium alloy which derives its strength from a long-range ordering reaction upon aging. It has tensile and creep strength properties up to 1200 - 1300°F (649 - 704°C) which are as much as double those for solid solution strengthened alloys, but with high ductility in the aged condition. The thermal expansion characteristics of 242[®] alloy are much lower than those for most other alloys, and it has very good oxidation resistance up to 1500°F (816°C). Other attractive features include excellent low cycle fatigue properties, very good thermal stability, and resistance to high-temperature fluorine and fluoride environments. HAYNES[®] 244[®] alloy has been developed as an upgrade from 242[®] alloy, with enhanced tensile and creep properties up to 1400°F (760°C), as well as a lower coefficient of thermal expansion.

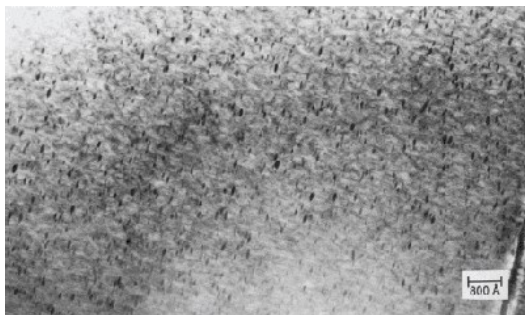
HAYNES[®] 242[®] alloy is produced in the form of reforge billet, bar, plate, sheet, and wire welding products, all in various sizes. Other forms may be produced upon request.

Applications

HAYNES[®] 242[®] alloy combines properties which make it ideally suited for a variety of component applications in aero and industrial gas turbine engines. It may be used for seal rings, containment rings, duct segments, casings, fasteners, rocket nozzles, pumps, and many others. In the chemical process industry, 242[®] alloy will find use in high-temperature hydrofluoric acid vapor-containing processes as a consequence of its excellent resistance to that environment. The alloy also displays excellent resistance to high-temperature fluoride salt mixtures. The high strength and fluorine environment-resistance of 242[®] alloy has also been shown to provide for excellent service in fluoroelastomer process equipment, such as extrusion screws.

New Long-Range-Order Strengthening Mechanism

HAYNES[®] 242[®] alloy derives its age-hardened strength from a unique long-range-ordering reaction which essentially doubles the un-aged strength while preserving excellent ductility. The ordered Ni₂(Mo,Cr)-type domains are less than a few hundred Angstroms in size, and are visible only with the use of electron microscopy.



Transmission electron micrograph showing long-range-ordered domains (dark lenticular particles) in 242[®] alloy. (Courtesy Dr. Vijay Vasudevan, University of Cincinnati). Sample was solution heat treated at 2012°F (1100°C) and aged for 100 hours at 1200°F (650°C).