

# HAYNES<sup>®</sup> 625 alloy

## Principal Features

### **Excellent Strength Up To 1500°F (816°C), Good Oxidation Resistance, and Good Resistance to Aqueous Corrosion**

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HAYNES<sup>®</sup> 625 alloy (UNS N06625) is a nickel- chromium-molybdenum alloy with excellent strength from room temperature up to about 1500°F (816°C). At higher temperatures, its strength is generally lower than that of other solid-solution strengthened alloys. Alloy 625 has good oxidation resistance at temperatures up to 1800°F (980°C) and provides good resistance to aqueous corrosion, but generally not as effectively as modern HASTELLOY<sup>®</sup> corrosion- resistant alloys.

### **Easily Fabricated**

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HAYNES<sup>®</sup> 625 alloy has excellent forming and welding characteristics. It may be forged or otherwise hot-worked providing temperature is maintained in the range of about 1800 to 2150°F (980 to 1175°C). Ideally, to control grain size, finish hot working operations should be performed at the lower end of the temperature range. Because of its good ductility, alloy 625 is also readily formed by cold working. However, the alloy does work-harden rapidly so intermediate annealing treatments may be needed for complex component forming operations.

In order to restore the best balance of properties, all hot- or cold-worked parts should be annealed and rapidly cooled.

The alloy can be welded by both manual and automatic welding methods, including gas tungsten arc (GTAW), gas metal arc (GMAW), electron beam, and resistance welding. It exhibits good restraint welding characteristics.

### **Heat Treatment**

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Unless otherwise specified, wrought HAYNES<sup>®</sup> 625 alloy is normally supplied in the mill-annealed condition. The alloy is usually mill-annealed at 1925°F plus or minus 25°F (1050°C plus or minus 15°C) for a time commensurate with section thickness and rapidly cooled or water-quenched for optimum properties. Depending on customer requirements, alloy 625 may also be supplied solution heat-treated at temperatures at or above 2000°F (1095°C), or mill annealed at temperatures below 1925°F (1050°C). Lower temperature mill annealing treatments may result in some precipitation of second phases in alloy 625 which can affect the alloy's properties.

### **Applications**

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HAYNES<sup>®</sup> 625 alloy is widely used in a variety of high- temperature aerospace, chemical process industry, and power industry applications. It provides excellent service in short- term applications at temperatures up to approximately 1500°F (815°C); however, for long-term elevated temperature service, use of alloy 625 is best restricted to a maximum of 1100°F (595°C). Long-term thermal exposure of alloy 625 above 1100°F (595°C) will result in significant embrittlement. For service at these temperatures, more modern materials, such as HAYNES<sup>®</sup> 230<sup>®</sup> alloy, are recommended.

As a low-temperature corrosion-resistant material, alloy 625 has been widely used in chemical process industry, sea water, and power plant scrubber applications. However, in most current requirements it has largely been superseded by more capable HASTELLOY<sup>®</sup> alloys, such as C-22<sup>®</sup> and G-30<sup>®</sup> alloys.

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