

HAYNES[®] 556[®] alloy

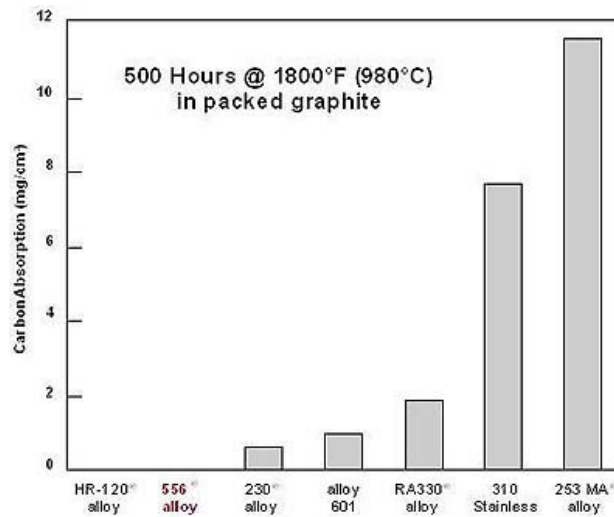
Carburization Resistance

HAYNES[®] 556[®] alloy has excellent resistance to carburization, as measured in both mixed gas exposure tests and packed graphite exposure tests. Results for these tests are presented in the following pages.

All results are presented in terms of the mass of carbon absorption per unit area, which was obtained from the equation $M = C(W/A)$ where M = the mass of carbon absorption per unit area (mg/cm^2). C = difference in carbon (weightfraction) before and after exposure, W = weight of the unexposed specimen (mg) and A = surface area of the specimen exposed to the test environment (cm^2).

Packed Carburization Resistance

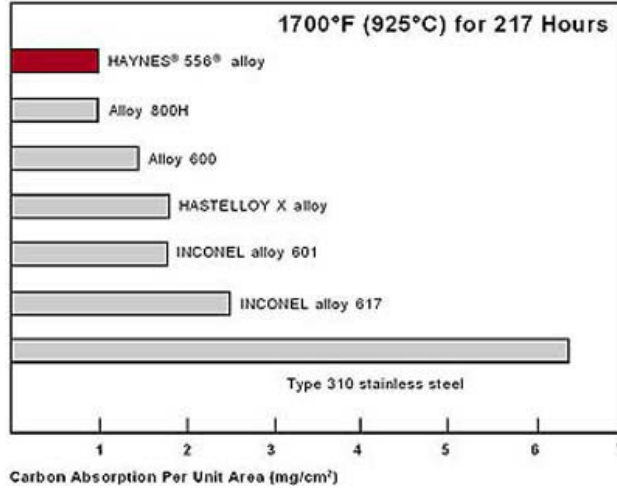
Carbon absorption observed for 556[®] alloy following 500 hour exposure in packed graphite at 1800°F (980°C) was negligible, as shown below. Similar resistance was exhibited by HAYNES[®] HR-120[®] alloy. This is in contrast to other alloys tested, all of which exhibited measurable carbon absorption. In particular, the resistance to carburization of 556[®] alloy was significantly better than that for the stainless steel type materials.



Mix Gas Carburization Tests

Carbon absorption observed for 556[®] alloy following exposure at both 1700°F (925°C) and 1800°F (980°C) to a carburizing gas mixture was significantly lower than that for most other materials tested. This is shown in the graphs on the following pages. For these tests, the exposure was performed in a gas environment consisting of (by volume %) 5.0% H₂, 5.0% CO, 5.0% CH₄ and the balance argon. The calculated equilibrium composition (volume %) at 1800°F (980°C) and one atm was 14.2% H₂, 4.8% CO, 0.003% CO₂, 0.026% CH₄, 0.011% H₂O and the balance argon. The activity of carbon was 1.0 and the partial pressure of oxygen was 9×10^{-22} atm at 1800°F (980°C).

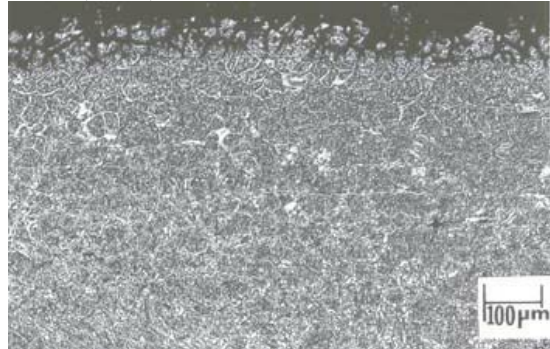
Comparative 1700°F (925°C) Mix Gas Carburization Tests



Typical Carburized Microstructures (Unetched) After Exposure For 215 Hours at 1700°F (925°C)

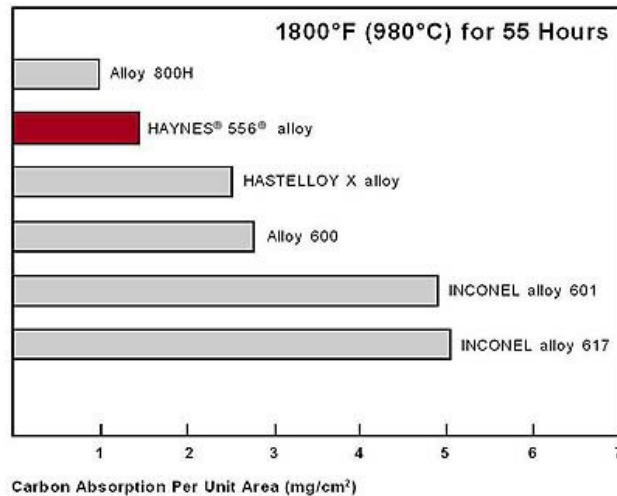


HAYNES® 556® alloy

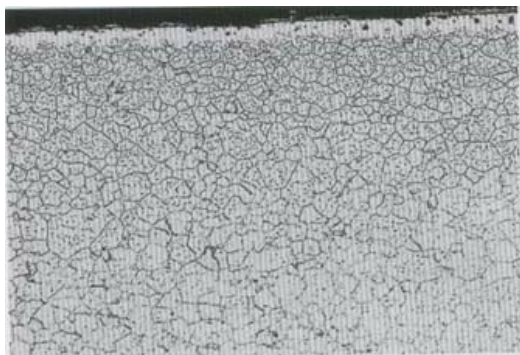


Type 310 Stainless Steel

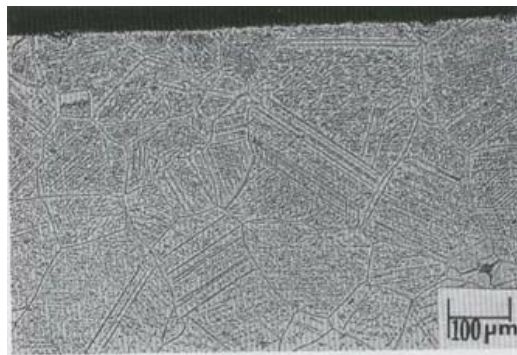
Comparative 1800°F (980°C) Mix Gas Carburization Tests



Typical Carburized Microstructures (Unetched) After Exposure For 55 Hours at 1800°F (980°C)



HAYNES® 556® alloy



INCONEL alloy 617

Note: Alloy 617 is carburized to the center of the sample.