

AUSTENITIC

While wrought austenitic grades have a single-phase microstructure, their cast equivalents usually have a small amount of ferrite mixed with the austenite. Ferrite is beneficial in reducing the potential for stress corrosion cracking. Therefore, when wrought and cast versions of a grade are subjected to an environment where stress corrosion cracking is possible, the casting may be less likely to crack. Ferrite also improves casting characteristics and mechanical strength. Figures 4, 5 and 7 show the effect of elevated temperature exposure on mechanical properties and hardness. Figure 6 shows the beneficial effect of increasing ferrite volume fraction on chloride stress corrosion cracking resistance.

Ferrite is beneficial to weldability and weld repair because it minimizes the hot cracking that may occur in the weld deposits of fully austenitic stainless steels. Because some corrosive solutions are more likely to attack either austenite or ferrite, the presence of ferrite

improves corrosion resistance in some environments and is detrimental in others. The effect on corrosion resistance is determined by the specific alloy composition, heat treatment, and service conditions.

Ferrite can be detrimental in some applications because it reduces toughness. Prolonged exposure at temperatures above 600°F (315°C) can reduce toughness because of the 885°F (475°C) embrittlement of the ferrite. The elevated temperature toughness may be adequate, but the ambient temperature toughness is decreased as a result of exposure in this temperature range. The user should not assume that a casting has the wrong composition or heat treatment just because it is magnetic. While wrought austenitic grades are non-magnetic, their cast equivalents often contain from 5 to 40% ferrite and are partially magnetic. For example, wrought Type 316 is not magnetic, but its cast equivalent, CF8M, has ferrite in its microstructure and is partially magnetic. The corrosion-resistant



Figure 5 Effect of elevated temperature on static and centrifugally cast CF8 with a ferrite number of 9 to 11 and 0.081%N^{Ref. 5}

