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My duplex or superduplex stainless steel WPQ has failed ASTM G48 testing. What can I do about it and what is its relevance anyway?

Frequently Asked Questions

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ASTM G48 testing in ferric chloride solution allows a quick assessment of pitting corrosion resistance of stainless steels. Although service is rarely in media similar to this very aggressive test solution, there are similarities between ferric chloride solution and the environment within a corrosion pit that may develop during service in chloride solutions, eg seawater. Hence, this test has become accepted as a quality control or ranking test for stainless alloys and welds.

There has been much debate about the most appropriate test temperatures, so if a weld fails the test criterion, it is worth checking that the test temperature was correctly specified. A temperature of 22°C is frequently specified for welds in 22%Cr duplex stainless steel and 35°C is frequently requested for 25%Cr superduplex steels (although NORSOK standards require 40°C). Test temperatures significantly above these would cause corrosion of many welds that have perfectly acceptable service properties.

The most effective ways of improving pitting performance and hence increasing the likelihood of passing the test include the following:

Improve the weld surface finish by removing weld oxides. This may be done by pickling, grinding, brushing or blasting after welding or, for gas shielded welding, by improving the effectiveness of the gas shielding on the root cap side, as appropriate.

For 22%Cr duplex stainless steel, use of superduplex filler may be considered as an alternative to a matching 22%Cr duplex type.

For gas shielded welding and TIG (GTA) welding in particular, nitrogen loss from the weld pool may be problematic and, if so, may be minimised by choice of shielding gas with a nitrogen addition, eg 1% N₂ for 22%Cr grades and 2% N₂ for 25%Cr grades.

Metallurgical examination may reveal the presence of too much ferrite or 'sigma' phase. Both of these may act to lower corrosion resistance but the former is infrequently encountered and the latter is largely restricted to superduplex grades. If sigma phase is present, the weld heat input or interpass temperature may be too high. Ferrite formation is encouraged by low heat input and inadequate addition of filler metal.

For further information, please [contact us](#).

ASTM G48-03 - Standard test methods for 'Pitting and crevice corrosion resistance of stainless steels and related alloys by use of ferric chloride solution'