



AUSTENITIC STAINLESS STEEL

GRADES 304 and 316

Summary comparison of corrosion resistance

Austenitic stainless steel 18%Cr-8% Ni (type 304) exhibits a good resistance to general corrosion, which makes it the workhorse material for a large array of applications: household appliances, restaurant and hospital equipment, architecture and many areas of food processing industries.

To prevent any problems in relation to weldments, the low Carbon grade 304L is generally used.

However, the use of 304 / 304L should be proscribed in any media containing halide ions, particularly chlorides such as found in marine applications, salt-rich food processing such as brine, etc...

This directly stems from the adsorption of such ions at the surface of the steel which damages the protective "passive layer", thus leading to so-called localized corrosion mainly "pitting corrosion" and in some cases "crevice corrosion".

In such chloride-containing media, grade 304 must be replaced by grade 316 (or 316L) containing an addition of Molybdenum over 2%. Molybdenum efficiently prevents the adsorption of the detrimental ions and thus protects the integrity of the "passive layer". Grade 316 / 316L is thus mandatory in marine, brackish environments and food processing industries using salty solutions.

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Moreover, Molybdenum provides also an increased level of resistance to general corrosion such as encountered in most chemical and petrochemical industries.

For a very rough comparison of the 2 types of grades, in chloride-free acid media, such as 2N – H₂SO₄ acid, it is estimated that the speed of “general corrosion” is 10 to 20 times faster in grade 304 vs grade 316.

This has been shown by measurements of weight loss but also supported by more elaborate and precise electrochemical measurements (such as depassivation criteria, etc...).

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