



Comparison of Cast Bronze with Cast Duplex Stainless Steel

All metals deteriorate over time and will ultimately return to their mineral state, the speed of which is dependant on the environment they are placed in and how well they are maintained .

Before any comparison is made it is important to explain that not all Bronze is of Naval Engineering Standard (NES 747). This standard refers to heat treated, cast nickel aluminium bronze, which is the preferred bronze for sea water conditions. Many bronze marine products on the market today are either aluminium bronze or silicone bronze, these do not perform at the same level as the above. Cast bronze can have many impurities which affect the ability to resist corrosion in a sea water environment. Manufacturers of bronze marine fittings often neglect to clarify the type of bronze used. This should always be checked as performance does vary.

Similarly, there are various stainless steels. The 300 series stainless steels are generally considered to resist rust, however 304 is inadequate for marine applications, where 316 is the accepted marine grade stainless steel. 316 shows good general resistance to corrosion and is widely used, however in certain applications (specifically where there is no oxygen present) 316 will be susceptible to corrosion. To increase resistance to corrosion a surface treatment such as electro polishing will provide extra protection. Alternatively there are superior grades of stainless steel which offer almost twice the resistance to corrosion that ordinary 316 or 316L offers. These include duplex stainless steel (2205), super duplex SS (2507).

Research conducted in the UK comparing nickel aluminium bronze (NES 747) with various stainless steels in an offshore sea water environment, revealed some interesting findings.

A composite ranking for resistance to corrosion was established, positioning the NiAl bronze below the duplex stainless steels and above 316 SS.

Given that most bronze fittings are made from less noble bronzes such as silicone bronze and aluminium bronze, which are affected more severely by galvanic corrosion, the ranking of these becomes similar to 316 stainless steel.

Research also recommended that the bronze products not be used in polluted waters.

The use of duplex and super duplex stainless steels in the marine environment is recommended as these metals with higher levels of molybdenum and chromium, apart from being far stronger than bronze, provide superior resistance to intergranular, pitting, crevice, galvanic and chloride stress corrosion.
