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New Issue of Naval Defence Standard

Practical and Comprehensive Guidance on Use of Copper-Nickel Systems from the MoD

The latest issue of Naval Defence Standard DEF STAN 02-781 provides the most important guidance in many years on the use of copper-nickel alloy systems in ships and submarines, and other marine industries will benefit too.

Covering 'Protection of Seawater System Pipework and Heat Exchanger Tubes in HM Surface Ships and Submarines', it is the culmination of a detailed assessment co-ordinated by the MoD into the seawater behaviour of copper alloys, and in particular copper-nickels. The aim is to avoid the effects of exposure of copper alloy systems to stagnant and polluted seawater, which produce sulphides and can lead to corrosion. Raising a new awareness of this possibility and providing methods to avoid it in a formal document is a huge step forward in avoiding potential problems.

90-10 and 70-30 copper-nickel are the two grades developed for Naval applications. The latter is mainly preferred for submarine service where its tolerance to flow velocity, higher strength and non-magnetic properties are required. However, in many fundamental ways, the two alloys are fairly similar; both are ductile, weldable, have low general corrosion rates, resistance to chloride pitting, crevice corrosion and stress corrosion cracking, are not temperature dependant and have good conductivity. The largest applications are condensers, heat exchangers and sea-water piping.

Copper-nickels require certain expertise and observance of operational procedures to maintain their corrosion resistance, which is dependent upon the establishment and maintenance of protective surface films on exposure to clean seawater. With ever increasing time and financial pressures, there was a risk that this aspect could be overlooked, particularly during commissioning, maintenance and refit. The MoD saw the benefit of drawing on their wide experience and formally defining guidelines to obtain good performance.

Def Stan 02-781 covers seawater quality and describes what is acceptable in terms of sulphate-reducing bacteria, biological oxygen demand and total suspended solids, and how to measure them. It explains passivation and surface film maintenance options, biocide treatments, filtration and simple corrosion monitoring techniques.

Copper-nickel alloys have been used for seawater service since the 1940s and were largely developed into their current engineering grade compositions by the Royal Navy. Established as the workhorse alloys for seawater handling in surface ships, their use has since expanded to other marine applications in offshore oil and gas, commercial shipping and desalination. These industries can also profit from the guidance in this Standard.

For in-depth details of the applications of copper-nickels relevant to all marine industries, visit the global website for technical information on copper-nickel alloys. Produced by the Copper-Nickel Task Group, a panel of international industry experts, www.coppernickel.org features peer-reviewed technical information and data on these workhorse alloys.

The Standard itself can be viewed at: <http://www.dstan.mod.uk/data/02/781/00000200.pdf>.



Image courtesy of BAE Systems.

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