1.0 Introduction

Alloys of copper and aluminium are known as aluminium bronze and, together with other alloying additions, produce a range of properties that are beneficial to a diverse range of industries. Of these, the nickel aluminium bronze group of alloys is the most widely used. They have been adapted with time to optimise performance and can provide a combination of properties that can offer an economic alternative to other types of alloy systems.

Nickel aluminium bronzes are available in both cast and wrought product forms and have a unique combination of properties:

- Excellent wear and galling resistance
- High strength
- Density (10% lighter than steel)
- Non-sparking
- Low magnetic permeability (of <1.03 µ in selected grades)
- High corrosion resistance
- Good stress corrosion properties
- Good cryogenic properties
- High resistance to cavitation
- Damping capacity twice that of steel
- Low susceptibility to marine organism attachment
- A protective oxide surface film which has the ability to self-repair.

End uses range from landing gear bushing and bearings for all of the world’s commercial aircraft to seawater pumps and valves, propellers for naval and commercial shipping, non-sparking tools in the oil and gas industry and pleasing facades in architecture.

The nickel aluminium bronze alloys are fairly complex materials and, during manufacture, require good control of the metal structure by attention to composition and heat treatment. As such it is the purpose of this publication to provide an engineering overview of the properties of the alloys, their specifications and their applications for operators, designers, manufacturers and fabricators. Their corrosion behaviour is explained and guidance is given to obtain optimum service performance. Methods of manufacture, welding and fabrication are also described and a list of references and useful publications is provided. The Appendix covers full details of designations, specifications and related composition and mechanical property requirements.