Summary

This publication describes the electrical and mechanical properties of high conductivity copper and copper alloys that are intended for use in electrical applications. It is primarily aimed at electrical engineers rather than metallurgists but gives the basic metallurgical detail needed to understand the processing requirements of alloys.

High conductivity copper is the best choice for bulk electrical conductors, such as cables, motor windings and busbars, but there are many electrical accessories, such as terminations, connectors, contactors and circuit breakers, where other material properties are equally or more important. For these applications there is a very wide range of copper alloys available with, for example, enhanced strength, resistance to stress relaxation or creep, while retaining excellent conductivity.

1.0 Introduction

Copper has the highest conductivity of any non-precious metal. This, combined with its high ductility, medium strength, ease of joining and good resistance to corrosion, makes copper the first choice as a conductor for electrical applications.

High conductivity copper is the most common form of the metal and it is widely available with consistent high quality. It is the first choice for the manufacture of bulk conductors such as cables, busbars, transformer windings and motor stators and rotors. However, for other electrical applications, such as connector parts, commutators and catenary wires, the mechanical properties may need to be enhanced by the addition of appropriate alloying elements. The ease with which copper can form alloys with other elements results in the availability of a very wide range of materials suitable for all electrical applications.