

## Addition of copper to cast iron

### What is the effect of copper?

Copper increases the tensile strength, hardness and wear resistance of grey cast iron by promoting a pearlitic structure and reducing the free ferrite content. Copper also reduces the risk of chill in thin sections and at free edges, and is about one quarter as effective as silicon.

Copper is sometimes added to the pearlitic grades of nodular (SG) iron to improve strength and wear resistance. It may also be used as a partial replacement or substitute for nickel in the abrasion-resistant white martensitic irons and austenitic irons (BS 3468:1961 Type AUS 101).

### How much copper should be used?

This will depend on casting section thickness and the increase in tensile strength required but for general guidance:

0.5-1.0 per cent in irons for light section castings.

1-2 per cent in irons for medium and heavy section castings which have slow cooling rates in the mould, or where greater increases in tensile strength are required in light section castings.

1-2 per cent in combination with small amounts (usually 0.25-0.5 per cent) of chromium and/or molybdenum when maximum tensile strength is needed.

Copper additions to grey iron in excess of about 3 per cent involve the risk of separation of free copper during solidification of the iron in the mould, giving a reduction in strength.

For the production of austenitic iron to BS 3468:1961 Type AUS 101, an addition of 5.5-7.5 per cent of copper is specified. In this type of iron the copper remains completely in solution.

*Increase in tensile strength, for different diameter as-cast test bars, obtained by the addition of copper*

