Product Data Sheet

MCP 150/Metspec 281/338 Alloy

UPDATED ON 2012-07

TYPICAL USES

The principal uses of the alloy are in applications analogous to investment casting in which it substitutes the so-called 'lost wax.'

Other applications include proof casting; Lead free soldering and the formation (by metal spraying) of alloy moulds for plastics and resins.

PHYSICAL PROPERTIES

MCP 150 is a non-eutectic alloy of Bismuth and Tin. The solid is a mixture of the α and β phases, respectively the solid solutions of Bismuth and Tin in Bismuth (see phase diagram, fig. 1 overleaf). The low viscosity combines with the bright surface finish and convenient melting range to produce an alloy extremely well adapted to accurate reproduction by casting.

In common with all alloys of low melting point, MCP 150 undergoes a slow equilibration after solidification, producing changes in physical properties. The changes may be accelerated by annealing.

Characteristic	Typical Value
Density	8.21 g/cm^3
Brinell Hardness	23-24
Melting Range	135 -170°C
Specific heat at 25°C (solid)	0.180 J/g.°C
Specific heat at 120°C (liquid)	0.213 J/g.°C
Enthalpy of fusion	47.5 J/g
Electrical resistivity	34.0 mΩ.cm
Compressive Properties: Proof stress at 2 days and 70 days (0.2% set) (1.0% set)	 41.8 - 46.2 MPa 52.6 – 52.8 MPa
Tensile Properties: Data at 2 days and 70 days Proof stress 0.2% set Tensile Strength Elongation (% in 5.65√A)	 31.6 rising to 37.5 MPa 62.5 falling to 58.5 MPa 105 falling to 35

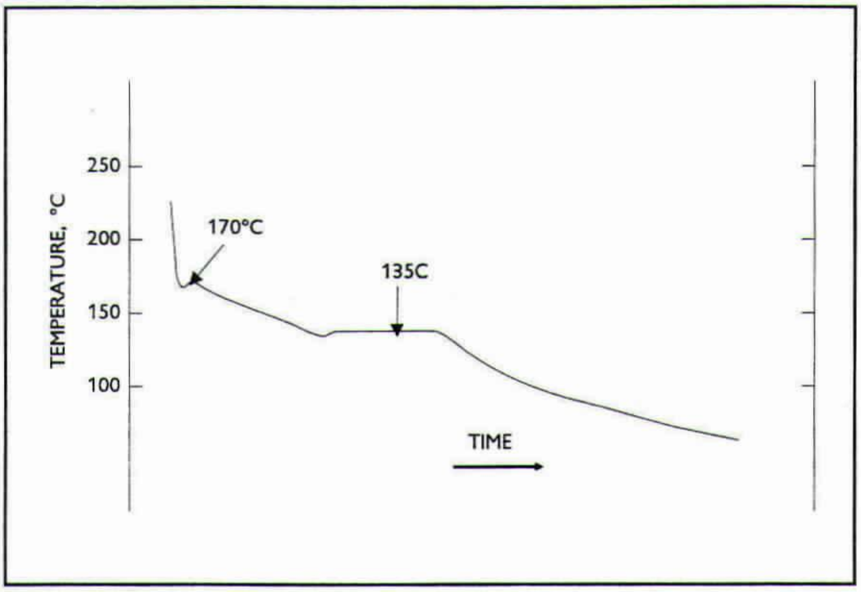

Fig. 1 SOLIDIFICATION

The trace obtained by solidification from a homogenous melt of a sample of 300g indicates two well-defined arrests (each following slight supercooling), at 170 and 135^{0}C.

For this alloy a level plateau defines very precisely the solidus temperature, which may be compared with the onset values found in melting of both newly solidified and matured samples (fig. 3).

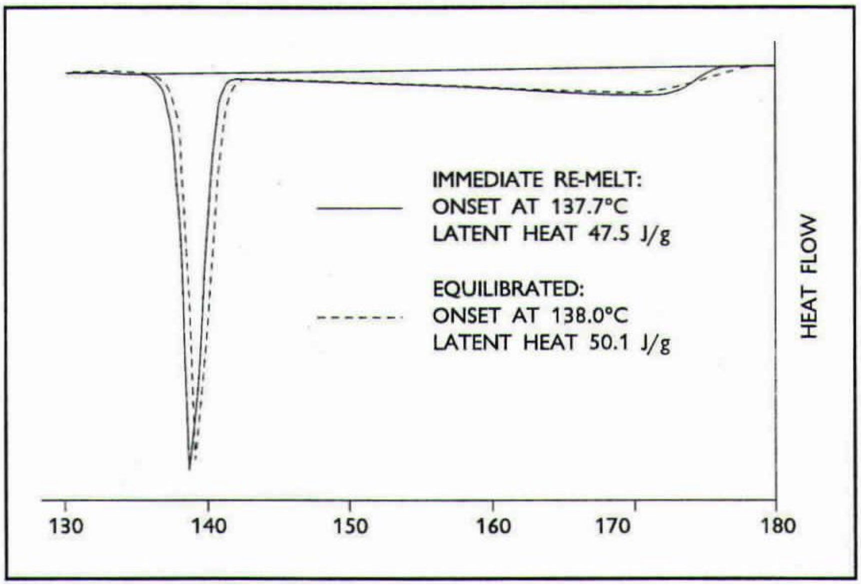

Fig. 2 MELTING

The structural changes that take place after solidification are made apparent by the technique of differential scanning calorimetry (DSC). The behavior of matured alloy is here compared with that of a newly solidified specimen.

While the plastic range is essentially unaltered, the onset temperature for melting, like the latent heat of fusion, is found to have altered slightly in older specimens.

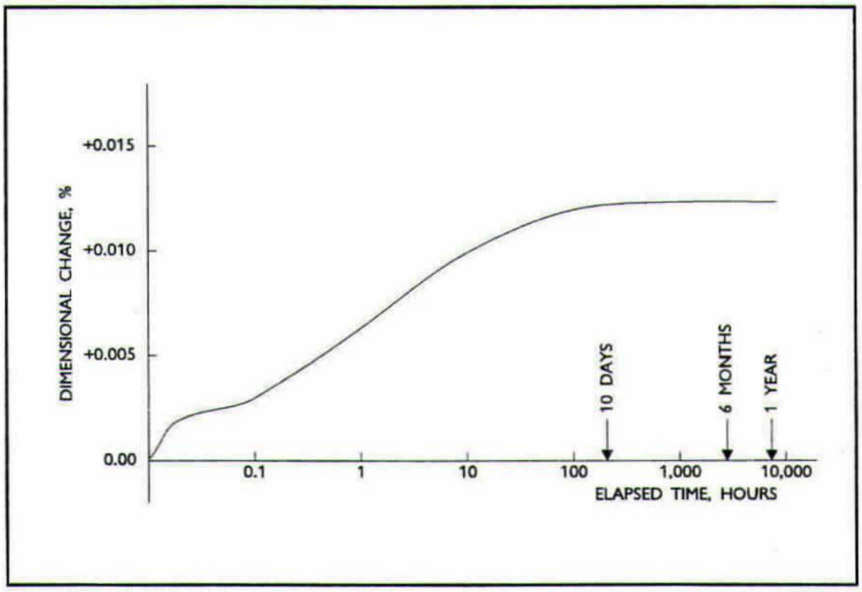

Fig. 3 GROWTH & SHRINKAGE

The linear dimensional changes after casting are sensitive to the size and shape of the specimen, which affect the rate of cooling after solidification and, in consequence, equilibration of the internal structure. Differences ultimately disappear, to be barely apparent between fully mature specimens.

The Curve shown is for a 10mm square bar, 250mmin length, which shows a net growth of 0.012% after four days, by which time it has become almost completely stable. NOTE: MCP 150 alloy is used in sprayed metal applications where the dimensional stability is especially dependant on operating technique and may differ sharply from the date for cast metal that is illustrated here.

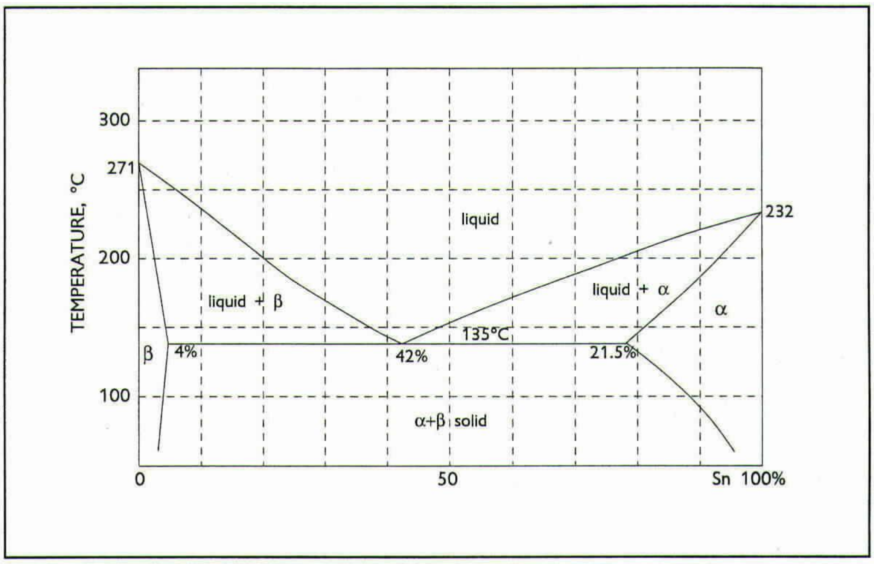

Fig. 4 THE BISMUTH-TIN PHASE DIAGRAM

The diagram is based on published data (e.g. M.Hansen & K. Anderko, 'constitution of Binary Alloys;' C.J. Smithells, "Metals Reference Book"). There is a slight uncertainty in the eutectic composition, with most reports in the range of 42-43% Tin.

The Alloy MCP 150 contains 60% Tin.

STORAGE AND USE

Store products in their original packaging.
Wear protective equipment recommended by the Safety Data Sheet.