



## Product Data Sheet

# MCP 61/Metspec 141 Alloy

UPDATED ON 2012-07

### TYPICAL USES

MCP 61 is employed mainly in the optical industry, where it is suitable for its low melting point and consequent tendency not to distort the glass or plastic, which it supports.

The alloy contains neither Lead nor Cadmium and may be preferred on grounds of health and safety or for environmental reasons.

### PHYSICAL PROPERTIES

MCP 61 is the final eutectic of the Bismuth-Tin-Indium system. Melting behavior is fairly complex and depends *inter alia* on the age and thermal history (and thus the degree of equilibration) of the alloy.

In common with all alloys of low melting point, MCP 61 undergoes equilibration after solidification. The equilibration process gives rise to slow dimensional changes, which occur at rates dependent on both the immediate post solidification treatment and the size and shape of the piece.

Characteristic	Typical Value
Density	8.10 g/cm <sup>3</sup>
Brinell Hardness	4.5 -5.1
Melting Point	60°C
Specific heat at 25°C	0.196 J/g.°C
Enthalpy of fusion	26.9J/g
Electrical resistivity	41 mΩ.cm

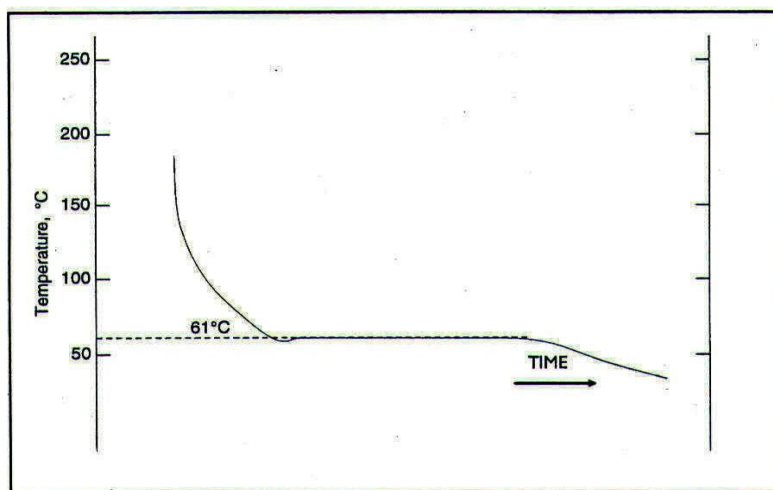


Fig. 1 SOLIDIFICATION

The trace obtained by solidification from a homogeneous melt of a sample of 300g indicates a precise, single arrest at 61°C, as expected from a reasonably accurate eutectic. There is very slight evidence of further reaction in the solid state.

This trace may be compared with the behavior in melting of newly solidified and mature samples (fig. 2).

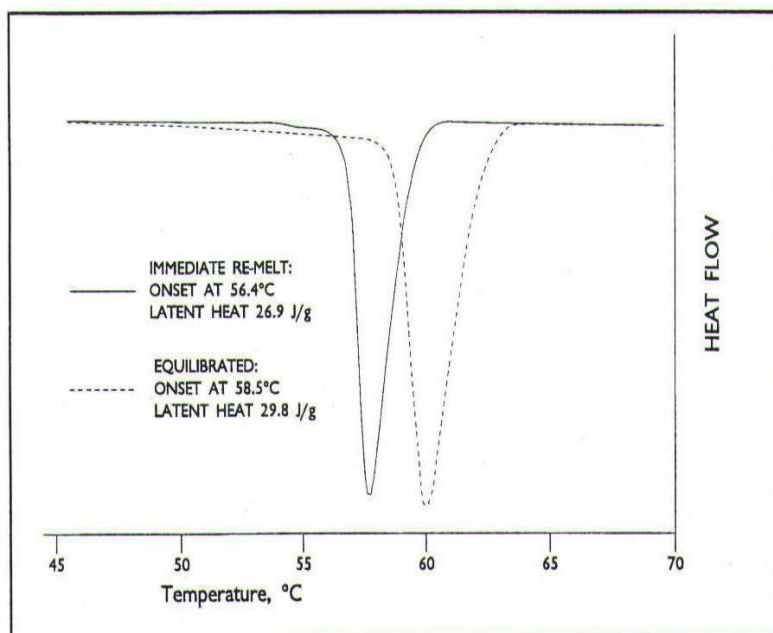


Fig. 2 MELTING

The structural change taking place after solidification is better revealed by the technique of differential scanning calorimetry (DSC), where the behavior of matures alloy can be compared with that of a newly solidified specimen.

The melting pattern, like the latent heat of fusion, is different for older specimens, but this is due to post solidification change and does not conflict with the view that the alloy is eutectic.

While the curves for the illustrated extremes of treatment are reproducible, there are substantial differences in melting behaviour between specimens of different ages (or which have had different thermal conditioning). The curve remains stable after the specimen has reached the 'equilibrated' condition.

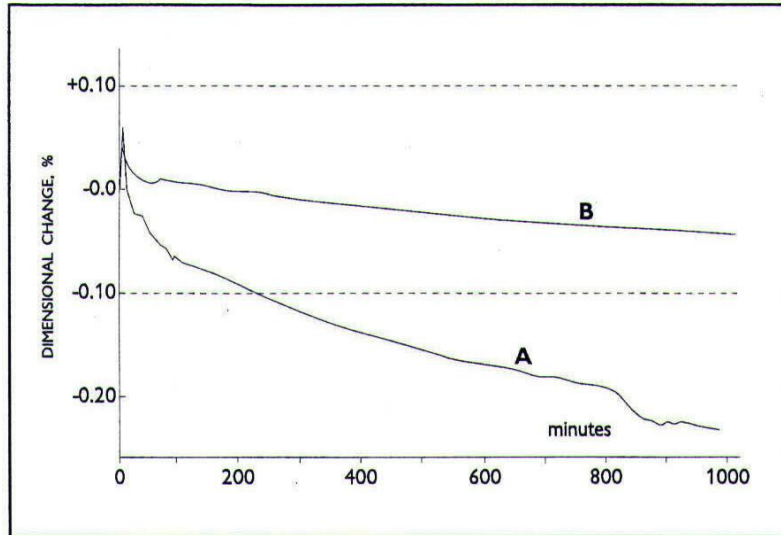


Fig. 3 GROWTH & SHRINKAGE

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. Ultimately, differences are barely apparent between fully mature specimens, although equilibrium may not, in fact, be attained for several months.

The lower curve 'A' is for a fast quenched, small specimen of 5 x 5 x 2mm; 'B' is for a fast quenched specimen, significantly larger at 10 x 10 x 2mm. While these illustrate the kind of change that might be expected in a lens blocking process, it should be borne in mind that the actual rates of change depend on other process parameters.

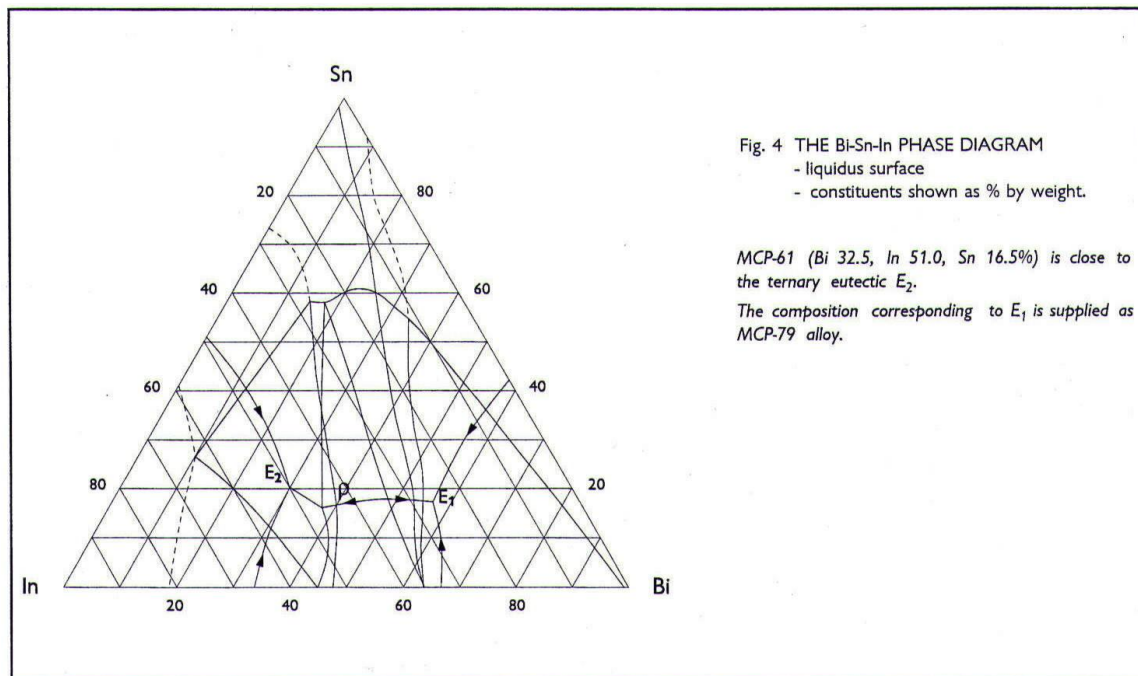


Fig. 4 THE Bi-Sn-In PHASE DIAGRAM  
- liquidus surface  
- constituents shown as % by weight.

MCP-61 (Bi 32.5, In 51.0, Sn 16.5%) is close to the ternary eutectic E<sub>2</sub>.

The composition corresponding to E<sub>1</sub> is supplied as MCP-79 alloy.

### STORAGE AND USE

Store products in their original packaging.

Wear protective equipment recommended by the Safety Data Sheet.