

# TECHNICAL DATASHEET

## ALLOY-BEND 70

### TYPICAL USES

A traditional and still important use of the alloy is in tube and section bending, for which it needs to be quenched to bring it to the best condition for process; with a melting point well below 100°C, its advantage over alternative alloys lies in the simple, low cost melt out techniques that can be used.

Although not a true eutectic, ALLOY-BEND 70 is satisfactory for thermal protection devices designed to yield at 70°C. Other uses include work holding and supporting, blocking of glass lenses, sheet forming dies and fusible cores.

### PHYSICAL PROPERTIES

ALLOY-BEND 70 was long thought to be the eutectic of the bismuth-tin-lead-cadmium system. However, a weak first arrest in solidification at 74°C shows this not to be so: Investigations by the 'last to freeze' technique suggest that the eutectic is of significantly different proportions. Melting behaviour is quite complex and depends *inter alia* on the age and thermal history of the alloy.

In common with all alloys of low melting point, ALLOY-BEND 70 undergoes equilibration after solidification. The equilibration process gives rise to slow dimensional changes, which occur at rates dependent on the immediate post solidification treatment. Natural cooling is characterised by a sudden recalescence at about 55°C, which produces changes in physical properties that must be delayed by quenching before use in bending work.

GUIDE VALUES		
Density	9.67 g.ml <sup>-1</sup>	
Brinell hardness	13 - 14.5	BS 240 : 1986 (1991)
Melting-point	70°C	(see overleaf)
Specific heat	(solid, 25°C) (liquid, 150°C)	0.146 J.g <sup>-1</sup> .°C <sup>-1</sup> 0.184 J.g <sup>-1</sup> .°C <sup>-1</sup>
Latent heat of fusion	32.9 J.g <sup>-1</sup>	(at immediate re-fusion)
Thermal conductivity	0.180 J.sec <sup>-1</sup> .cm <sup>-1</sup> .°C <sup>-1</sup>	
Electrical resistivity	48.0 μΩ.cm	(0.0354x conductivity of Cu)
Viscosity		(see fig. 4)
Compressive properties: proof stress at 2 days and 70 days		
(0.2% set)	10.4 rising to 17.9 MPa	
(1.0% set)	14.3 rising to 23.0 MPa	
Tensile properties: data at 2 days and 70 days		BS EN 10 002
Proof stress, 0.2% set	6.9 rising to 11.4 MPa	
Tensile strength	18.4 rising to 26.1 MPa	
Elongation (% in 5.65√A)	205 falling to 120	

## 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.

## VISCOSITY

Like that of most fusible alloys, the viscosity of ALLOY-BEND 70 is quite low. Slightly above the liquidus at about 74<sup>0</sup>C it is a few mPa.s; however; the high surface tension causes practical measurements to suggest non-Newtonian behaviour. Viscosity is, in fact, so low that it is rarely a serious consideration in designing systems in which large quantities of alloy are circulated.