

This alloy conforms to British Standards 1490 LM9 and L.75 (obsolete). When precipitation heat treated it conforms to LM9-TE and when fully heat treated to LM9-TF.

### CHEMICAL COMPOSITION

	%
Copper	0.1 max.
Magnesium	0.2 - 0.6
Silicon	10.0 - 13.0
Iron	0.6 max.
Manganese	0.3-0.7
Nickel	0.1 max.
Zinc	0.1 max.
Lead	0.1 max.
Tin	0.05 max.
Titanium	0.2 max.
Aluminium	Remainder

### MECHANICAL PROPERTIES

	Precipitation Heat Treated (LM9-TE)	
	<b>Sand Cast</b>	<b>Chill Cast</b>
0.2% Proof Stress (N/mm <sup>2</sup> )*	110 - 130	150 - 170
Tensile Stress (N/mm <sup>2</sup> )*	<b>170</b> - 190	<b>230</b> - 250
Elongation (%)*	<b>1.5</b> - 2.5	<b>2</b> - 3
Impact Resistance. Izod (Nm)	1.4	2.0
Brinell Hardness Number	70	85
Endurance Limit (2 x 10 <sup>7</sup> cycles; ± N/mm <sup>2</sup> )	55	75
Modulus Of Elasticity (x 10 <sup>-1</sup> N/mm <sup>2</sup> )	71	71
Ultimate Shear Stress (N/mm <sup>2</sup> )	120	160

	Fully Heat Treated (LM9-TF)	
	<b>Sand Cast</b>	<b>Chill Cast</b>
0.2% Proof Stress (N/mm <sup>2</sup> )*	220 - 250	270 - 280
Tensile Stress (N/mm <sup>2</sup> )*	<b>240</b> - 270	<b>295</b> - 310
Elongation (%)*	0 - 1	0 - 1
Impact Resistance. Izod (Nm)	0.7	1.4
Brinell Hardness Number	95	110
Endurance Limit (2 x 10 <sup>7</sup> cycles; ± N/mm <sup>2</sup> )	70	90
Modulus of Elasticity ( x 10 <sup>-1</sup> N/mm <sup>2</sup> )	71	71
Ultimate Shear Stress (N/mm <sup>2</sup> )	200	230



# LM9 Aluminium Casting Alloy (Al – Si12Mg)

	<b>Chill Cast (LM9-M)</b>
0.2% Proof Stress (N/mm <sup>2</sup> )*	95 - 120
Tensile Strength (N/mm <sup>2</sup> )*	<b>190</b>
Elongation (%)*	3 - 5
Brinell Hardness Number	75 - 85

\* The values shown are typical ranges of sand and chill test bars produced to the requirements of B.S 1490; those in heavier type are minimum specification values.

## STRENGTH AT ELEVATED TEMPERATURES

Tensile properties are unaffected by temperatures up to 150°C but prolonged heating at higher temperatures significantly reduces the strength. For example the tensile strength of chill cast LM9 - TF at 200°C (after heating for 500 h) is approximately half that at room temperature.

## PHYSICAL PROPERTIES

Coefficient of Thermal Expansion (per °C at 20-100°C)	0.000022
Thermal Conductivity (cal/cm <sup>2</sup> /cm/°C at 25°C†)	0.35
Electrical Conductivity (% copper standard at 20°C†)	38
Specific Gravity	2.68
Freezing Range (°C) approx	75-550

† Value is approximate and will vary with condition.

## MACHINABILITY

Very considerable tool wear occurs in machining this alloy, but there is not the same tendency to drag that occurs with high silicon alloys containing on other alloying elements, e.g. LM6

Carbide tipped tools with large rake angles and relatively low cutting speeds give good results. A cutting lubricant and coolant should be employed.



# LM9 Aluminium Casting Alloy (Al – Si12Mg)

## CORROSION RESISTANCE

LM9 exhibits excellent resistance to corrosion under both ordinary atmospheric and marine conditions.

## ANODISING

LM9 can be anodised by any of the common processes, the resulting protective film ranging in colour from grey to dark brown, depending on the method employed.

## CASTING CHARACTERISTICS

FLUIDITY

Very Good, suitable for thin and intricate castings.

PRESSURE TIGHTNESS

Suitable for leak tight castings.

HOT TEARING

Castings in sand or chill moulds exhibit complete freedom from hot tearing.

TYPICAL POURING TEMPERATURE 710°C

The actual temperatures employed may range considerably above or below this value and will depend upon the particular conditions for each casting.

## HEAT TREATMENT

LM9 - TE (precipitation heat treated) - heat for 16 hours at 150 - 170°C

LM9 - TF (fully heat treated) - heat for 2 - 8 hours at 520 - 535°C, quench in water and heat for 16 hours at 150 - 170°C.

## APPLICATION

LM9 alloy is used where the fluidity and corrosion resistance of LM6 are required with high strength and hardness.

It is equally suitable for sand and permanent mould casting and is extensively used for low pressure castings.