

# PLUNGER TIPS

## For Pressure Die Casting

Mipalloy manufactures fully machined plunger tips for pressure die casting in Mipalloy 4 (2% Beryllium Copper), Mipalloy 100 (0.55% Beryllium Copper) & Mipalloy 100 (Nickel Silicon Chromium Copper)



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Complete Competence in Copper



ISO 9001 : 2015



ISO 14001 : 2015



OHSAS 18001 : 2007

# PLUNGER TIPS FOR PRESSURE DIE CASTING INDUSTRY

## INTRODUCTION

Mipalloy is dedicated to the manufacture and supply of superior quality copper alloys.

Apart from having a majority market share in all our product lines in India, we regularly export our products to USA, Canada, UK, Germany, Australia, Turkey, Mexico, Indonesia, Oman, Saudi Arabia, Pakistan, Nepal, Srilanka etc.

Since Copper forms the core of all our activities and as we have considerable experience in handling this precious red metal our motto is

**“COMPLETE COMPETENCE IN COPPER”.**

## FACILITIES

We have been manufacturing Mipalloy 4 (2% Beryllium Copper), Mipalloy 100 (0.55% Beryllium Copper) & Mipalloy 100 (Nickel Silicon Chromium Copper) for over two decades & we have a thorough knowledge of the field. Mipalloy has three modern factories on the outskirts of Chennai having state of art manufacturing operations necessary for the products like casting, forging, rolling, heat treatment, special purpose machining, Gun drilling, CNC machining, Plating etc.

In our melting and casting facilities, copper and copper alloys are produced on state of the art systems. The charge material used is only LME Grade A, Copper Cathode.

We have hot and cold rolling systems for forming the materials. In addition, we have facilities for extruding, forging as well as heat treatment of plunger tips. Special procedures and process sequences developed by Mipalloy make it possible to produce complex geometries, while maintaining the highest levels of quality.

Modern, precise CNC-driven machine tools are available for final machining of plunger tips. Construction data for producing the desired work piece geometry are taken via integrated CAD/CAM systems. This makes it possible to produce complex surfaces with extremely tight tolerances.

This total in-house capability gives Mipalloy the start-to-finish control needed to pursue its business philosophy on all levels involved and through all stages of production.

## PRODUCTION PROGRAM

We have the capability to manufacture plunger tips in a wide variety of sizes from 1” diameter to 8” diameter. Standard sizes are typically 3” diameter to 5” diameter.

We supply high quality plunger tips in Mipalloy 4 (2% Be. Cu.). We can supply economically priced plunger tips in Mipalloy 100 (C17510-0.55% Be. Cu.) & Mipalloy 100 (C18000-Ni. Si. Cr. Cu.) as well. Based on blanket orders we can maintain stocks of plunger tips to ensure off the shelf deliveries.

Our intimate relationship with users in Pressure Die Casting industry has led to a greater understanding of applications of plunger tips. Our plunger tips exceed the aspirations of the industry due to a deeper understanding of complex copper metallurgy & its industrial usage.



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## PLUNGER TIPS FOR PRESSURE DIE CASTING INDUSTRY



### PROPERTIES OF PLUNGER TIP MATERIALS

Alloy	UNS No.	Typical Composition	Hardness	Thermal Conductivity at 20°C
Mipalloy 4	C17200	Be. 1.8 – 2.0%, Co. – 0.2%min, Si. – 0.2%, Al. – 0.2%, Cu. – Remaining.	35 – 45 HRC	107 W/m <sup>o</sup> k
Mipalloy 100	C17510	Be. 0.2 – 0.6%, Ni. 1.4 – 2.2%, Co. – 0.3%, Si. – 0.2%, Al. – 0.2%, Cu. – Remaining.	95 – 105 HRB	207 W/m <sup>o</sup> k
Mipalloy 100	C18000	Ni. 2.0 – 3.0%, Cr. 0.1 – 0.6%, Si. – 0.4 – 0.8%, Fe. – 0.15%. Cu. – Remaining.	90 – 100 HRB	190 W/m <sup>o</sup> k



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## Advantages of Mipalloy 4 (2% Beryllium Copper)

### Plunger Tips over Cast Iron Plunger Tips:

- ❖ The thermal conductivity of Mipalloy 4 material is 6-7 times greater than Cast Iron.
- ❖ The thermal shock resistance of Mipalloy 4 is 9 times greater than Cast Iron.
- ❖ Mipalloy 4 plunger tips have better galling resistance and better surface lubricity in contact with the alloy steel shot sleeve.
- ❖ The heat transfer coefficient of Mipalloy 4 Plunger Tip is 2 to 3 times greater than Cast Iron in liquid aluminum.
- ❖ The machinability of Mipalloy 4 material is about 3 times faster than Cast Iron.
- ❖ Because of the improved thermal properties, Mipalloy 4 Plunger Tip provides the die caster with significant advantages. The shock resistance provides much longer life for the Mipalloy 4 plunger tip.
- ❖ Mipalloy 4 Plunger Tip also has more predictable life which means that tip replacement can be done during scheduled maintenance rather than interrupting operational uptime.
- ❖ Higher conductivity reduces die casting cycle time with Mipalloy 4 plunger tips. The higher heat transfer coefficient and higher thermal conductivity allows better cooling efficiency with Mipalloy 4 plunger tips.
- ❖ Higher conductivity allows thicker walls on the Mipalloy 4 plunger tip. This means that a worn-out Mipalloy 4 plunger tip can be turned down to a smaller size more times than Cast Iron. This obviously provides greater metal utilization.
- ❖ The higher conductivity of Mipalloy 4 materials provides improved thermal stability and therefore better dimensional accuracy. Dimensional accuracy provides a tighter fit between the tip and the sleeve, less blow-by, and longer life for the tip. With a better fit, there is less chance of wear or damage to the shot sleeve. This is a huge concern for the caster, as a shot sleeve can cost up to US \$15,000.

### **CONCLUSION**

- ❖ The life of Mipalloy 4 plunger tip is 5 to 10 times longer than Cast Iron. The die casting cycle time reduction using Mipalloy 4 plunger tip is 25 to 40%. The wall thickness of Mipalloy 4 plunger tip can be 50 to 75% greater than Cast Iron. This translates to 1 to 2 additional smaller tips (free of charge!) machined from the original. The actual machining time (including set-up, inspection as well as tool-on-metal time) can be reduced by 25% to 50% by using Mipalloy 4 plunger tip.



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Plot Nos: C14 & C15, SIPCOT Industrial Park, Irrungattukottai - 602 105, Sriperumbudur, (Close to Chennai), India.

Ph: ++91-44-2715 6104 / 24 / 39 Fax : ++91-44-2715 6082 Mobile: ++91 98404 26496

Email: sales@mipalloy.com, website: www.mipalloy.com