ZA-12 Zinc Base alloy is suitable for casting in sand, permanent, investment, plaster, and silicon rubber molds where it develops "as cast" properties similar to high pressure die cast alloys. Some of the advantages of ZA-12 alloy are relative insensitivity to cooling rate; excellent machinability; more faithful reproduction of pattern detail due to excellent castability; platability similar to zinc die cast parts; economic advantage by virtue of lower material costs and lower casting temperature than competitive copper base alloys. ZA-12 is often used to produce prototype or short run parts that may be eventually die cast. It is also used to replace parts cast in non ferrous alloys, particularly copper base alloys and some ferrous castings. ZA-12 is useful in producing engineered castings in silicon rubber molds where higher properties are required.

**CHEMICAL COMPOSITION (ASTM 791-88 UN8 Z35631) (wt %)**

<table>
<thead>
<tr>
<th>Component</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum</td>
<td>10.5-11.5</td>
</tr>
<tr>
<td>Copper</td>
<td>0.5-1.25</td>
</tr>
<tr>
<td>Magnesium</td>
<td>0.015-0.030</td>
</tr>
<tr>
<td>Iron</td>
<td>0.075 MAX</td>
</tr>
<tr>
<td>Lead</td>
<td>0.006 MAX</td>
</tr>
<tr>
<td>Cadmium</td>
<td>0.006 MAX</td>
</tr>
<tr>
<td>Tin</td>
<td>0.003 MAX</td>
</tr>
<tr>
<td>Zinc</td>
<td>Balance</td>
</tr>
</tbody>
</table>

**TYPICAL PHYSICAL PROPERTIES**

- Melting Range: 710-810°F (377-432°C)
- Pouring Range: 850-950°F (455-538°C)
- Density: 0.218 lbs/in³ @ 70°F (6.03 g/cm³ @ 20°C)
- Specific Gravity: 6.03
- Thermal Conductivity: 67.1 BTU/ft/hr°F @ 75°F
- Electrical Conductivity: 28.3% I.A.C.S. @ 68°F

**TYPICAL MECHANICAL PROPERTIES**

- Tensile Strength: Sand Cast 40,000-45,000 psi, Chill Cast 45,000-50,000 psi
- Yield Strength (0.2% Offset): Sand Cast 30,000-31,000 psi, Chill Cast 31,000-32,000 psi
- Elongation in 2 inches: Sand Cast 1-3.5%, Chill Cast 5-6%
- Hardness (Brinell 500 kg): Sand Cast 95-110, Chill Cast 105-120
- Shear Strength: Sand Cast 36,000-38,000 psi, Chill Cast 36,000-38,000 psi
- Impact Strength (Charpy 1/4" x 1/4" bar untouched): Sand Cast 12 ft lbs., Chill Cast 12 ft lbs.

*See Reverse*
FABRICATION PRACTICES

Stress Relieving Temperature 212°F(100°C) for 3-6 hours, air cool
Machinability is excellent

CASTING TECHNIQUE

Since ZA-12 alloy does not dress readily, gating systems such as used for red brasses or aluminum alloys are suitable. Likewise the riser practice used for red brass or aluminum can be used. Contrary to most non ferrous alloys, surface shrinkage tends to occur on the underside (drag) as opposed to the upper side (cope) surface. Therefore important surfaces should be on the upper side (cope).

CASTING CHARACTERISTICS

Pattern Maker’s Shrinkage 5/32 in/ft
Drossing Low
Gassing Low
Fluidity Excellent
Shrinkage Low (solidification shrinkage 1.2%)
 Casting Yield High
 Casting Structure Fine Grained & Dense

MELTING

ZA-12 should be melted as rapidly as possible using a clay-graphite or other refractory pot. Iron pots should be avoided due to possible iron contamination. Deoxidation or degassing is not necessary. To prevent possible aluminum segregation, a gentle stirring of the melt followed by skimming is recommended. If possible keep the pouring temperature below 930°F(500°C).

JOINING

ZA-12 can be joined to itself by TIG welding. If filler metal is required it should be of ZA-12 composition.

Soldering of ZA-12 with tin lead solders or other conventional solders is not possible. It has been reported that cadmium-zinc solders will solder ZA-12 to itself or other alloys, but due to the potential health hazards of Cadmium containing solder, this should only be attempted with approved methods using the recommended protective equipment.

CORROSION RESISTANCE

ZA-12 is considered to have the corrosion resistance of zinc die castings. If appearance is important, ZA-12 castings can be protected by chromium plating, chromate conversion coating, anodizing, paints, or other means.

NOTE:
The information contained in this data sheet is the most accurate in our possession at the time of publication, and is based on our effort to meet accepted industry references, standards, and specifications. However, Belmont cannot assume responsibility for in-service performance of these products due to our lack of control over, or supervision of, their use.