



# ***DECO***

**Precision Engineered  
Zinc Die Casting**



***DECO***

**DIE CASTING**

**POWDER COATING**

**MACHINING**

**ASSEMBLY**

**[www.decoprod.com](http://www.decoprod.com)**



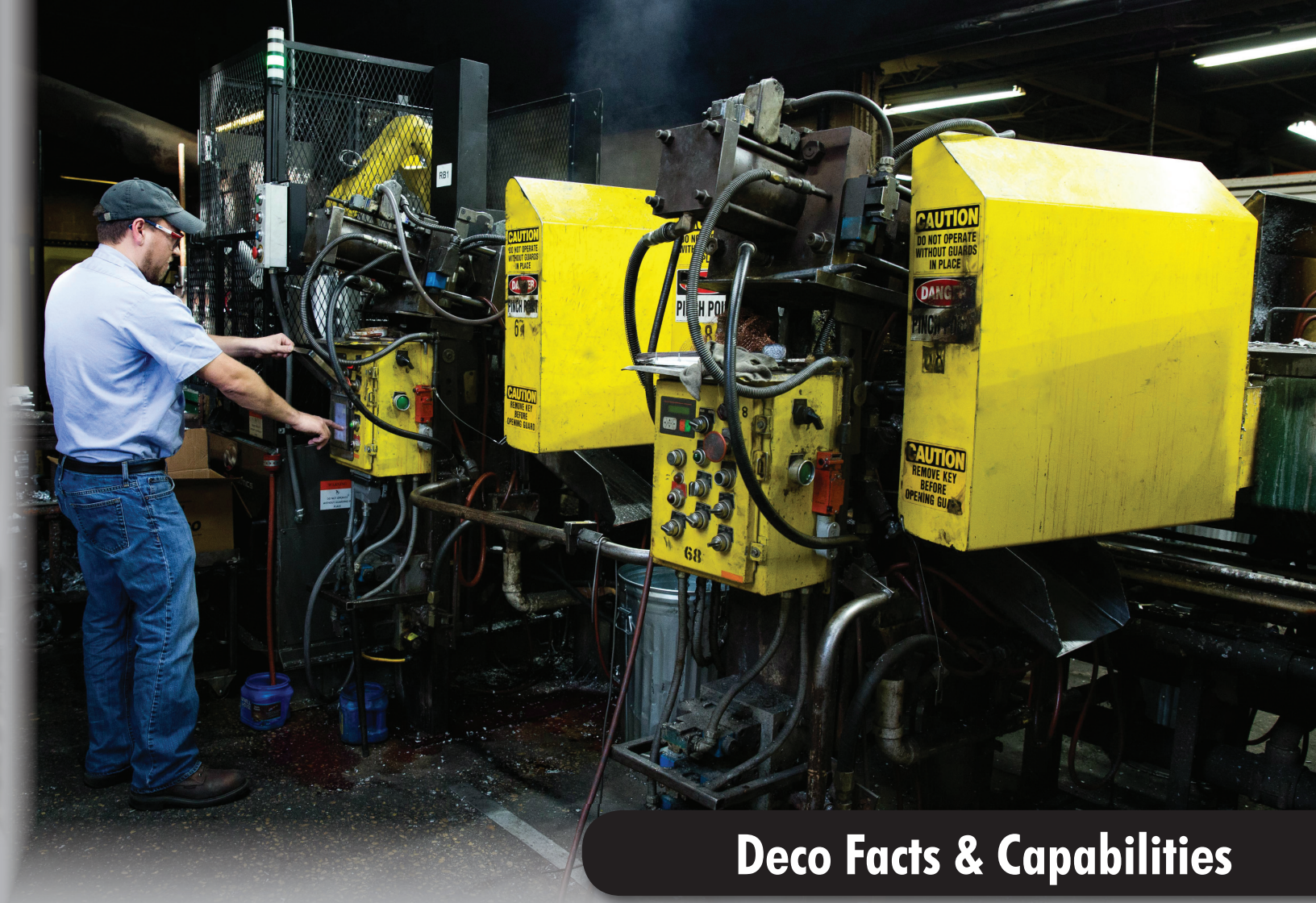
## Why choose Deco Products?

Born out of the heartland and always “Made in the U.S.A.”, Deco Products is the largest stand-alone dedicated zinc die caster in North America. We have continued to grow our business through a commitment to excellence and dedication to the success of our customers since 1960!

Being in business this long speaks volumes for the value we offer our customers; cost savings, exceptional quality, on-time delivery, friendly customer service, innovation, engineering collaboration and design support. And because we have the resources to grow with you, partnering with Deco affords you the security of knowing we are able to supply your enterprise with the highest quality precision engineered cast parts for the life cycle of your products.

Deco Products is family owned and financially strong. Our ongoing capital investments and commitment to continuous improvement reflect our long-term perspective to produce the finest zinc castings and assemblies made in America. As we continue to enhance our processes, we welcome opportunities to create partnerships with companies equally committed to excellence.





## Deco Facts & Capabilities

### Facility

- 150,000 square foot manufacturing plant
- State of the art equipment aligned to process and cost control

### Precision Die Casting

- 86 die casting machines
- Tool locking forces from 14 to 500 tons
- Exceptional die management

### Value-added operations

- Machining: drilling, reaming, tapping, CNC
- Complete assembly services

### Decorative & protective finishing

- Powder-coating
- Plating

### Engineering

- Experienced engineering team works with customers to ensure optimized part and die design for consistent quality and efficient production while satisfying functionality requirements.
- Utilize flow analysis software to predict how the mold will fill, solidify, and cool—reducing the risk of defective parts.

### Quality

- Continuously registered to current ISO 9001 standards since 1998.
- Deploy AIAG APQP methods regularly, including FMEA, control plans, SPC, and PPAPs.





## What is zinc?

Zinc has applications in many consumer products, zinc is primarily used in automotive industry. The largest single use for zinc today is for galvanizing steel to provide protection from corrosion. The second largest use for zinc is the production of zinc die castings. There are a number of reasons why designers and engineers take advantage of the inherent benefits of zinc die castings in component design, but principally, the reasons are quite simple: zinc die castings are strong, they are economical, and they can often be cast to the exact shape required without the need for additional machining



# Why Zinc for Casting Parts.... Think Zinc

- **Precision Tolerances & Net shape:** Zinc can be cast to tighter tolerances and dimensional accuracy than other metals or molded plastics. This “Net Shape” manufacturing frequently reduces or eliminates the need for costly machining. However, when necessary to allow for component features that are problematic to die cast, zinc is easily machined or threaded, and accepts self-tapping screws.
- **Strength:** Zinc alloys are stronger per weight than other materials (to 54,000 psi). This produces a casting with greater impact resistance and rigidity than its plastic and aluminum counterparts.
- **Thin Walls:** Zinc can be cast with thinner wall cross sections than any other metal; hence, it requires less material. Aluminum’s cost per pound may appear less, but aluminum castings require more material and cost for the same strength.
- **Long Tool Life:** A typical zinc mold can last 10 times as long as an aluminum mold because the lower temperature melting point causes less thermal shock. If the tool cost is a large percentage of the production costs, or the part is high volume then using zinc instead of aluminum can provide significant savings. Furthermore, our dies are high quality—all made from premium H-13 die steel to our specifications.
- **Less Porosity:** While component and die design will greatly influence porosity, zinc die castings are typically higher density with less porosity than aluminum die castings.
- **Finishing:** The surface of a zinc casting allows for great adhesion of a broad assortment of finishes. Zinc castings are readily powder coated, electroplated, painted, pad printed, or chromated allowing almost any desired aesthetic characteristic and coating durability to be achieved.
- **Ductility:** Zinc can be joined or fixed to assemblies through a variety of methods without the use of fasteners. Due to its high ductility, zinc can be deformed to offer riveting, staking, and crimping, permanently fastening the casting by displacing the metal at a clamping point.
- **Bearing Properties:** Bushing and wear inserts in component designs can often be eliminated because of zinc’s excellent bearing properties. Zinc has an improved static coefficient of friction over aluminum which as a propensity to gall and wear.
- **Heat Sinks:** Zinc die casting offers numerous advantages over aluminum in a number of heat sink applications. Die cast zinc heat sinks offer one-piece construction, increased design flexibility and lower cost. One of the biggest advantages is that heat-dissipating fins can be incorporated into a frame, housing or enclosure. Casting the fins as part of the housing can greatly lower costs by reducing the number of components and eliminating assembly costs. Additionally, a single component that combines both housing and heat sink has greater thermal efficiency. Zinc’s excellent fluidity permits the production of thinner, closely spaced fins that provide a larger surface area but less volume.
- **Eco-Friendly w/ Smaller Carbon Footprint:** Zinc alloys are among the cleanest melting materials available, non-toxic, and 100% recyclable. Unlike plastic injection molding, all byproducts of the zinc casting process can be re-melted and cast again. Additionally zinc melts below 800 degrees Fahrenheit, but aluminum requires over 1200 degrees Fahrenheit. The extra heat required to cast aluminum means more fuel used in the production process. This not only helps make zinc die casting a greener alternative, but provides savings as well.





## Zinc Casting vs. Other Processes

### Cast Aluminum

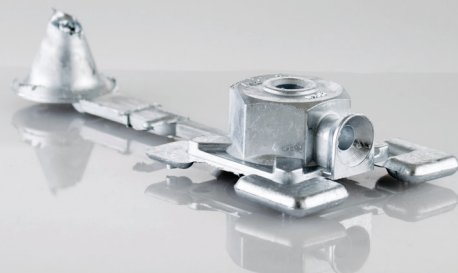
Zinc die castings have lower casting costs. Aluminum can normally only be pressure cast using the cold chamber process. Cold chamber die casting is less productive than the hot chamber process used with zinc alloys. In consequence the cost of a zinc alloy die casting is frequently lower than that of an aluminum alloy die casting.

Zinc components can be accurately cast to finished dimensions with greater precision and hence avoid machining. It's a fact that finish machining is more often required for aluminum die castings, which in addition to adding cost tends to expose porosity.

Zinc tools can last up to **10 times longer** than aluminum tools. Having a long lasting tool can represent a significant cost savings

Almost any finish can be applied to zinc die castings. Zinc alloys have a **better surface for finishing** because zinc comes out of casting with a smoother skin. Since aluminum has to be so much hotter than Zinc, the thermal shock generated in the casting process produces a part with a surface that can be more pitted. Many finishes amplify these defects. Add in the superior formability zinc offers and the cost advantages in finishing and assembly operations can be significant.

Zinc alloys can be cast in **thinner walls**. Thin walled casting has a superior strength to weight ratio, thus strong and light zinc castings can be designed using the minimum of metal. This also improves the production rate and lowers cost.





### Stampings

Die castings are producible in **more complex shapes** and can be made in shapes not producible in stamped forms. Stamping from sheet metal or coil stock offers economy that is difficult to equal when a component is made from one relatively simple stamping. However, their design freedom is severely limited and more complex shapes are often produced by assembling several stampings, usually by spot welding. When a complex stamping or several stampings are required, die casting can be a **cost-effective choice**. In the case of multiple stampings, the costs of fixturing and welding added to the costs of fabricating the additional parts can make die-casting to “net shape” more economical.

Material costs for stamping may be substantially higher than indicated by published per pound costs due to high scrap rates. Stampings invariably consume more material than is contained in the end product, The process often requires peripheral material for clamping the sheet metal in the dies. Therefore, significant amounts of metal are removed from the perimeter, as well as from the interior openings. Die casting, as noted above, is very material efficient.

### Injection Molded Plastics

Zinc die castings are often preferred over plastics where **strength, rigidity, durability**, or dimensional stability are required. Die cast parts are stronger and more durable than plastic injection moldings having the same dimensions. Plastic parts are more prone to warping and surface “sinking”. Die castings have a high degree of permanence under load when compared to plastics, and are completely **resistant to ultra-violet rays, weathering, and stress-cracking** in the presence of various reagents.

Zinc castings are also preferred over plastics for components **operating at elevated temperatures**. The melting temperatures of die casting alloys are 2-3 times higher than the typical plastics. In many applications plastic components are protected from heat sources. Using die castings some or all heat shielding can be removed. This can reduce weight and manufacturing costs.

When decorative components require a durable finish, zinc die-castings are usually selected. **Superior surface characteristics** allow zinc to be powder coated, plated, painted and chromated with little to no surface preparation. In addition, the high density of zinc imparts a feeling of permanence and a solid product that cannot be matched by plastic.





## Alloys

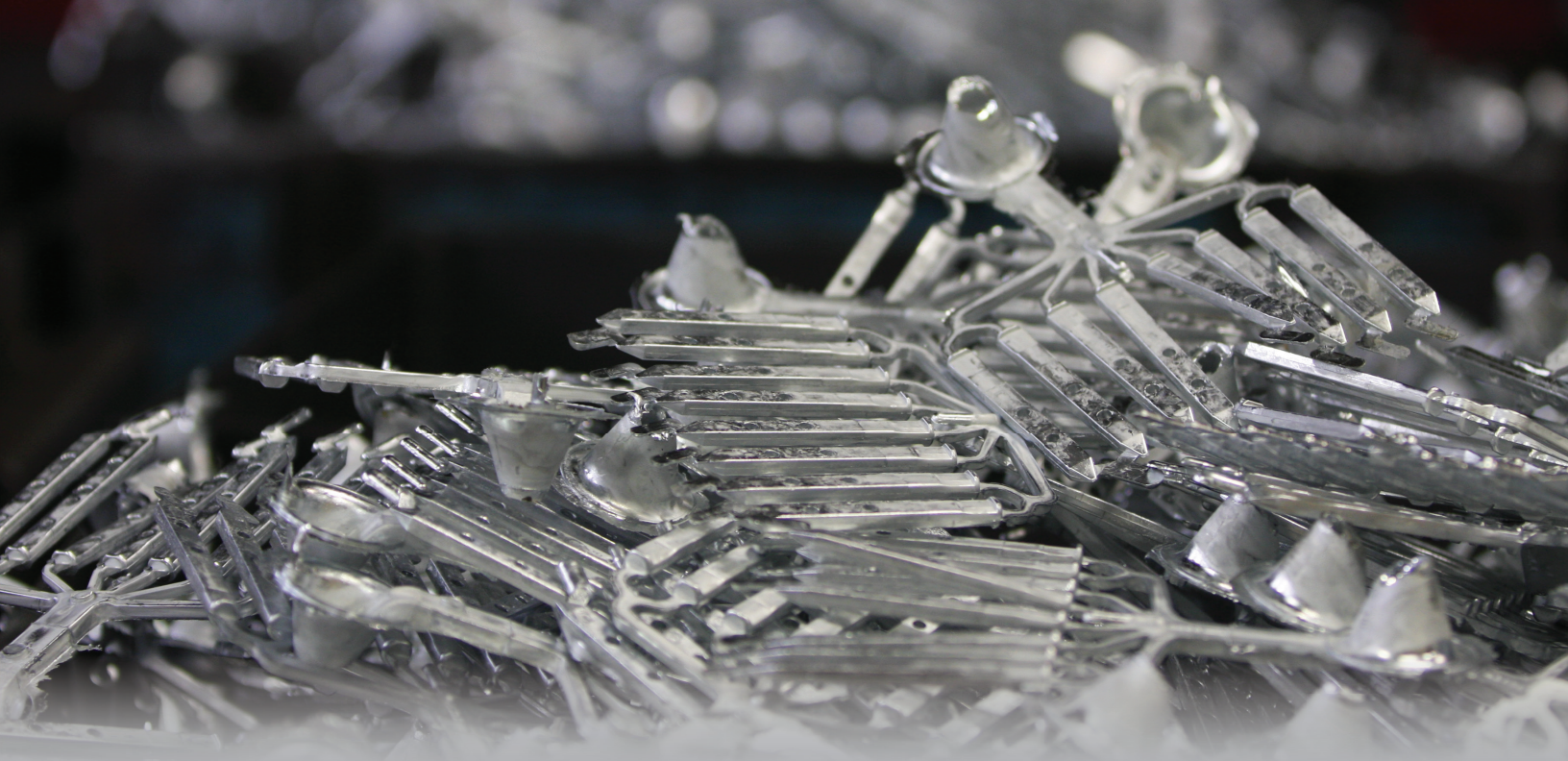
### Zamak No. 3

The most widely used zinc alloy is commonly called No. 3. Its excellent all-around physical and mechanical properties, superb castability, and long-term dimensional stability have made it the choice for about 85% of U.S. die castings. In most design applications using a zinc alloy, No. 3 will do the job. In general only after casting design improvements have been evaluated and found inadequate should another alloy be considered.

### Zamak No. 5

The addition of about 1% copper to the No. 3 alloy provides increased tensile strength (about 15%) and higher hardness at the expense of elongation and impact strength. No. 5 alloy is widely used in Europe, but accounts for less than 10% of U.S. consumption.





### **Zamak No. 7**

The third most popular alloy is a high purity, low magnesium alloy called No. 7. This alloy has improved fluidity (because of the lower magnesium content) allowing it to be cast at lower temperatures for better as-cast surface finish and higher production rates. Most No. 7 alloy is used in decorative hardware applications. Since it possesses slightly more ductility than other zinc alloys, No. 7 is also used where castings require severe deformation in assembly operations.

### **Zamak No. 2**

Actually, a predecessor of the universal No. 3 alloy, No. 2 offers the highest strength and hardness available in a conventional zinc alloy. It is about 25% stronger as cast than No. 3 and 10% stronger than No. 5 with higher hardness than both.

The principle disadvantages of this interesting alloy are its very low impact strength and elongation after aging (especially at higher temperatures) and a slight dimensional instability with aging.

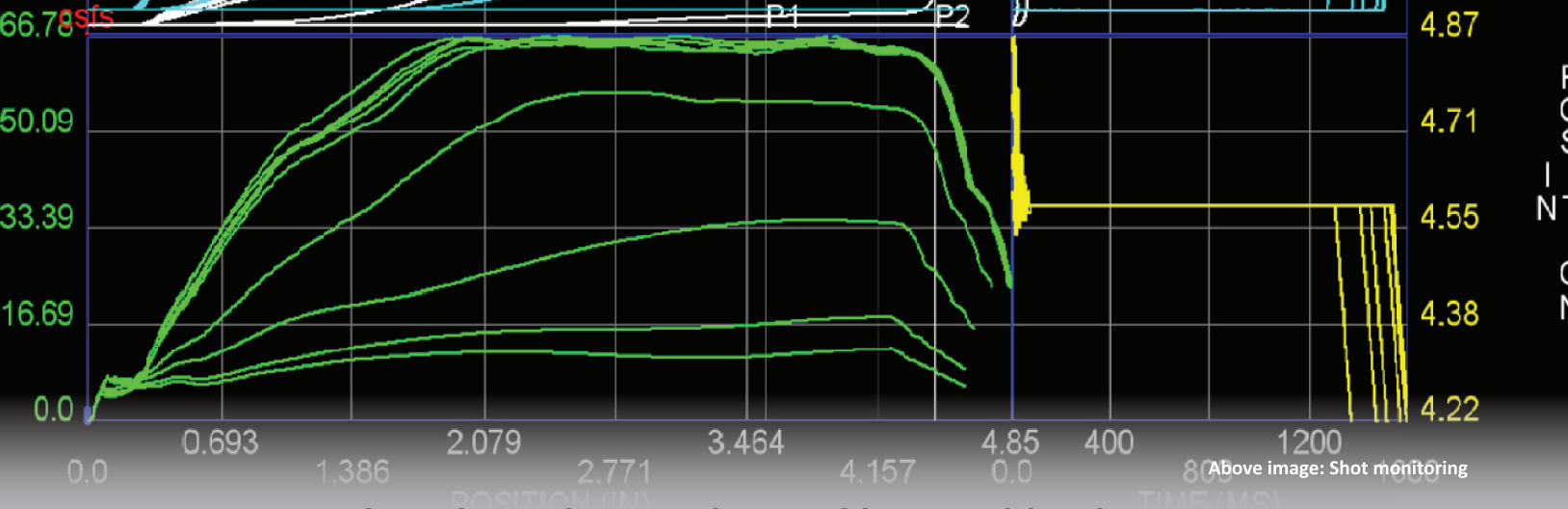
### **ZA-8**

Offers best plating and finishing characteristics with improved strength, hardness and creep properties compared to the other conventional zinc ZAMAK die casting alloys. Major application area is usually for die casting where improved properties over ZAMAK's are required, particularly performance at elevated temperatures.

### **Non-Standard Alloys**

Deco also does research and casting of newest alloys including EZAC, AcuZinc and other high fluidity alloys.





## ZINC ALLOY PROPERTIES AND COMPARISON GUIDE

Alloy	Zamak 3	Zamak 7	Zamak 5	Zamak 2	ZA-8
Mechanical Properties	Die Cast	Die Cast	Die Cast	Die Cast	Die Cast
Ultimate : psi x 10 <sup>3</sup>	41	41	48	52	54
Tensile Strength <sup>B</sup> Mpa	283	283	328	359	374
Tensile psi x 10 <sup>3</sup>	32	32	39	41	42
Yield Strength <sup>C</sup> Mpa	221	221	228		290
Compressive psi x 10 <sup>3</sup>	60	60	87	93	37
Yield Strength <sup>C</sup> Mpa	414	414	600	641	252
Elongation: % in. 2 in. (51 mm)	10	13	7	7	6-10
Shear psi x 10 <sup>3</sup>	31	31	38	46	40
Strength Mpa	214	214	262	317	275
Hardness: Brinell <sup>D</sup>	82	80	91	100	103
Impact ft-lb	43 <sup>E</sup>	43 <sup>E</sup>	48 <sup>E</sup>	35 <sup>E</sup>	31 <sup>E</sup>
Strength J	58	58	65	47	42
Fatigue psi x 10 <sup>3</sup>	6.9	6.8	8.2	8.5	15
Strength <sup>G</sup> Mpa	47.6	46.9	56.5	58.6	103
Young's - psi x 10 <sup>6</sup>	≥12.4	≥12.4	≥12.4	≥12.4	12.4
Modulus Mpa x 10 <sup>3</sup>	≥85.5	≥85.5	≥85.5	≥85.5	85.5
Torsional psi x 10 <sup>6</sup>	≥4.8	≥4.8	≥4.8	≥4.8	≥4.8
Modulus Mpa x 10 <sup>3</sup>	≥33.1	≥33.1	≥33.1	≥33.1	≥33.1
Physical Properties					
Density: lb/in <sup>3</sup>	0.24	0.24	0.24	0.24	0.227
g/cm3	6.60	6.60	6.60	6.60	6.30
Melting Range °F	718-728	718-728	717-727	715-734	707-759
°C	381-387	381-387	380-386	379-390	375-404
Specific Heat: BTU/lb °F	0.1	0.1	0.1	0.1	0.104
J/kg . K					
Coefficient of Thermal Expansion	15.2	15.2	15.2	15.4	12.9
µin/in/°F					
µm/m/°C					
Thermal Conductivity: BTU.ft/hr.ft <sup>2</sup> °F	65.3	6.3	62.9	60.5	66.3
W/m.K	113.0	113.0	108.9	104.7	114.7
Electrical Conductivity: % IACS	27	27	26	25	27.7
Electrical Resistivity µΩ in. at 68°F	2.5	2.5	2.6	2.7	2.4
µΩ CM at 20°C	6.4	6.4	6.5	6.9	6.2
Solidification Shrinkage %	1.17	1.17	1.17	1.25	1.1
Pattern Makers <sup>A</sup> Shrinkage in./ft					1/6
mm/m					10.4
Die makers <sup>B</sup> Shrinkage in./in.	0.007	0.007	0.007	0.007	0.007
mm/mm					

\*E:1/4" unnotched Charpy





## How to Partner with Deco

Deco works with organizations all over the world, helping bring their ideas to life. The partnering process usually begins with a friendly, casual discussion about your company, the part design, application, estimated annual usage, availability of prints or 3D models, and surface finish requirements. Our engineering team will work with you to turn your design into an optimized die casting, making sure that all your requirements are met while minimizing tool and part manufacturing costs. It's never too early in the product design process to talk to a Deco engineer. We welcome discussions about your projects or training seminars; what we call "lunch and learn" sessions.

In addition to **new projects**, if you are having **difficulty with current castings** or suppliers and feel it's time to make a change, Deco Products can help with a seamless transfer of tooling. Today, many U.S. manufacturers are reevaluating their production and sourcing locations and are taking a closer look at the benefits of **reshoring**. Deco Products is proud to say we have always been **"Made in America."**

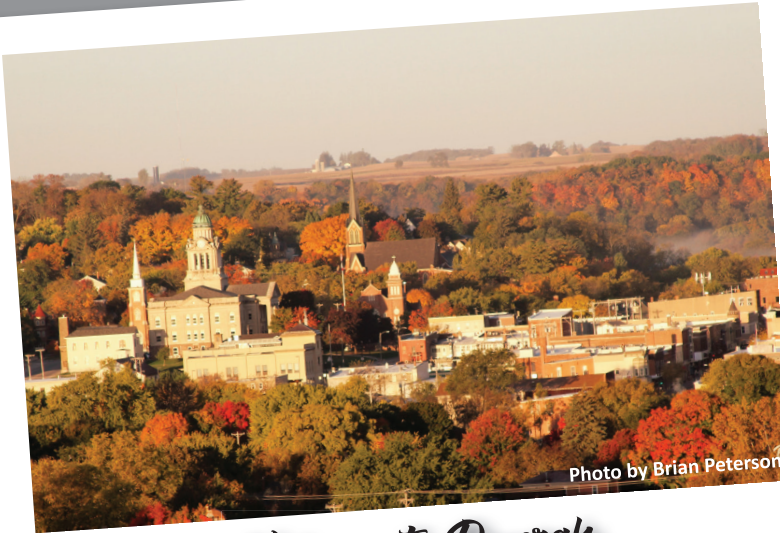
### Requesting a Quote

Please call (563) 382-4264 to speak to a sales manager or visit our site at [www.decoprod.com](http://www.decoprod.com).

Be prepared to provide the following:

1. Do you have a drawing, 3D model or sample part? We can accept Inventor, STEP, IGES, ProE or SolidWorks files.
2. What is the EAU?
3. What are the finish requirements? Is the part cosmetic? Does it require plating, powder coating, or some other finish?
4. Is PPAP required?





### *Welcome to Decorah*

Deco Products welcomes visitors to our operation set in historic and scenic Decorah, Iowa. Rated by Midwest Magazine as one of the best small towns in the Midwest. Deco Products sincerely looks forward to working with you on your next casting project.



**NADCA**



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