

## Superior Quality Green Sand Castings

Employing a full range of non-lead bronze and copper alloys, Erie Bronze produces superior quality green sand castings up to 100 pounds. The automated high-capacity molding line along with the ability to alloy metals and our proprietary degassing processes ensure customers receive the same high quality casting with every pour.

Our modern 65,000 square foot foundry is home to the latest technology. Every investment in people, technology and equipment has been made to ensure consistent product quality, reduced lead times and increased efficiency.

Bronze and copper castings are commonly found in machinery, valves, pumps, glass container moulds, marine hardware and electrical equipment such as transformers, switch gear and connectors.

Focus and flexibility are hallmarks of Erie Bronze and Aluminum. A relentless focus on quality and production speed with quick change flexibility positions Erie Bronze to meet the most demanding requirements...all at a very competitive price.



## Green Sand Castings



## Glass Mould Components

Erie Bronze specializes in bronze glass mould components such as neck rings, bottle moulds and bottom plates. These components are cast using proprietary Eballoy® non-ferrous alloys designed to improve wear and corrosion resistance, while offering glass-makers thermal conductivity ranging from 18 to 37 (Btu/sq. ft./hr/°ft) at 850°F.

Erie Bronze produces neck rings in an as cast or semi-machined condition with the mating faces and ends milled, and one or more of the bands turned. Although typically held much tighter, our in-house machine shop works to a "half on half" tolerance of .002" (.05mm) and "shake" is held within .002" (.05mm). Other bronze castings are offered in the As Cast condition within typical sand casting dimensional tolerances.

Upon request, Erie Bronze also offers our high quality neck rings with a nickel insert. The insert is available in Rockwell C hardness ranging from 30 to 44.

## Sand Casting Alloys and Mechanical Properties

Nominal % of elements

### Copper

CDA Number	Name	ASTM	Copper (Cu)	Tin (Sn)	Zinc (Zn)	Nickel (Ni)	Iron (Fe)	Aluminum (Al)	Other	Tensile Strength PSI Min.	Yield Strength PSI Min.	Elong. % 2 in. Min.	Hardness Brinell Typical* (F Rockwell)
C80410	Copper		99.9 min.						0.1	20,000	7,000	20%	30 (F Scale)
C83400	Red Brass		90		10					35,000	10,000	30%	50 (F scale)
C86200	Manganese Bronze	B584, B763	63	-	25	-	3	4	Mn 3.7	90,000	45,000	18%	180
C86300	Manganese Bronze	B22, B584, B763	63	-	25	-	3	6.2	Mn 3.7	110,000	60,000	12%	225
C86500	Manganese Bronze	B584, B763	58	0.5	39		1.2	1	Mn 0.8	65,000	25,000	20%	130
C87500	Silicon Bronze	B584, B763	82	-	14	-	-	-	Si 4.0	60,000	24,000	16%	134
C90300	Navy G	B584, B763	87.5	8.3	4	-	-	-	-	40,000	18,000	20%	70 (500kg.)
C90500	Gun Metal	B22, B584, B763	87.5	10.1	2	-	-	-	-	40,000	18,000	20%	75 (500kg.)
C90700	Gear Bronze	B427	89	11	-	-	-	-	-	35,000	17,000	10%	80 (500kg.)
C95200	Aluminum Bronze	B148, B763	87.7	-	-	-	3.3	9	-	65,000	25,000	20%	110
C95300	Aluminum Bronze	B148, B763	89	-	-	-	1	10	-	65,000	25,000	20%	140
C95400	Aluminum Bronze	B148, B763	83.2	-	-	-	4	10.8	-	75,000	30,000	12%	170
C95500	Aluminum Bronze	B148, B763	80	-	-	4.3	4	11	-	90,000	40,000	6%	195
C95800	Aluminum Bronze	B148, B763	81	-	-	4.5	4	9	Mn 1.0	85,000	35,000	15%	159

### Eballoy® Glass Mould Alloy

690	Container Mould Alloy		81	-	-	4	4	10.5	-	96,000	47,000	5%	190 - 220
700	Minox XX		67	-	8.5	15	-	9.5	-	88,000	44,000	4%	180 - 210

### Aluminum Alloy

	ASTM	Copper (Cu)	Tin (Sn)	Magnesium (Mg)	Nickel (Ni)	Silicon (Si)	Aluminum (Al)	Tensile (Ultimate)	Yield	Elong. %	Hardness Brinell Typical*
443	B-26	-	-	-	-	5.25	Remainder	17,000	7,000	3%	25 - 55 (500kg.)
850	B-26	1	6.25	-	1	-	Remainder	16,000	-	5%	30 - 60 (500kg.)
852	B-26	2	6.25	0.75	1.2	-	Remainder	24,000	18,000	-	45 - 75 (500kg.)

\*@ 3000 Kg load unless otherwise noted. Hardness data for information only.



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Non-lead Bronze and Copper Sand Castings  
Aluminum Tubes and Rings

# Bronze and Copper Castings

## Mold Making and Handling System

At the heart of the foundry is a high speed 26-inch by 26-inch Harrison automatic mold making machine dedicated to the production of non-lead bronze and copper castings up to 100 pounds. The 6-inch to 8-inch variable height cope and drag provides ample depth to produce a wide variety of castings.

The flaskless continuous flow process creates a high-speed foundry operation with quick change flexibility to meet the most demanding delivery requirements. From a few parts to hundreds of castings, Erie Bronze can deliver... in spec and on time.

The Hartley Sand Compactability Controller monitors and creates the exact composition of the green sand mixture required throughout the process. Molds proceed down an automated mold handling system where castings are poured, cooled and then separated from the mold.

Prior to pouring the molten metal into the molds, the temperature is recorded and samples are drawn to verify that the chemistry of each furnace heat meets the customer's specification.

Finished castings are cut off, ground, cleaned and processed through quality control. Additional finishing, heat treating and machining operations are performed as ordered.



CAD and 3D Modeling



Sand Control



Spectrometer



Automatic Molding Machine

## Alloy Metals

"In-house alloying" and inspection capability ensure compliance with material specifications. Custom alloys can be developed quickly to meet specific applications.

## CAD and 3D Modeling

This state-of-the-art casting process begins with design engineers optimizing each casting using a variety of sophisticated CAD and 3D modeling tools. Simulations of the casting process automatically produce a visual flow of the molten metal into the mold cavity, verifying design of the gating system and ensuring components are free from defects.

## Sand Control System

Fully automated continuous mixing and recycling process controls the quality of green sand used for mold making. Constant monitoring and sampling of the mixer discharge for moisture, green strength and compactability ensures the integrity and consistency of each mold.

## Quality Assurance

To ensure alloys meet customer specification when poured, an optical emission spectrometry (OES) Spectrometer is used to test the chemical composition of every furnace melt and ladle pour. Samples are analyzed using the spectrometers Arc/Spark excitation and displayed on a screen allowing adjustments before the contents of the furnace are poured. This data is maintained on a computer to verify the composition of every furnace heat. Certification of the chemical analysis is available. Verification x-ray, liquid penetration inspection and test bars are also available.



## Aluminum Tubes and Rings

Aluminum labyrinth seal and bearing material cast at Erie Bronze offers unparalleled quality both in the elimination of porosity and metallurgical consistency. Cast 850, 852 and 443 aluminum tubes and rings have a maximum 13-inch length and minimum 3.5-inch outside diameter. Inside diameters vary as specified. These products have no minimum quantity... 1 to 100 or more pieces in any size.

## Finishing

Most of the tubes produced are rough machined as ordered. Aluminum alloys 850 and 852 can be heat treated to T5 condition.

## Proprietary Processes

Our proprietary degassing and static casting processes eliminate trapped gasses from the molten metal and assure uniform distribution of tin throughout the entire 850 and 852 casting. All metals are alloyed and tested in-house using an optical emission spectrometry (OES) Spectrometer. Optional test bars and chemistry reports are available to meet the customer's QS and ISO requirements.



Degassing virtually eliminates porosity in the casting.

Natural porosity of molten aluminum before degassing.



Labyrinth seals and bearings are typical end use products machined from aluminum tubes and rings.

# Aluminum Tubes and Rings