

National Pump Components

Bronze Components Designed for Reliable Pump
Service

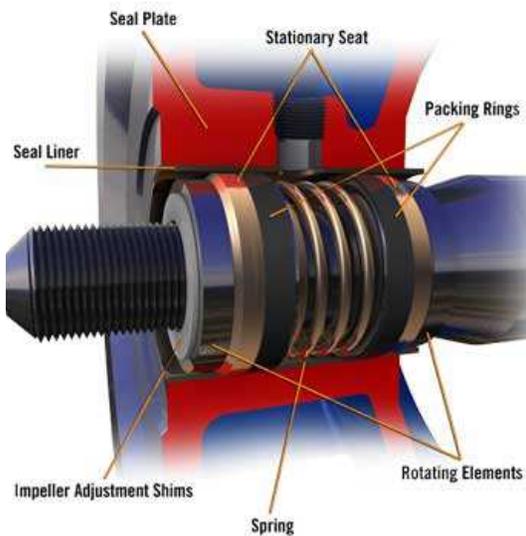


www.nationalbronze.com

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National Pump Components

INTRODUCTION



Since 1911 National Bronze Mfg. Co. has been a leading manufacturer of bronze based components. Throughout the last 100 plus years, National Bronze Mfg. has developed various technologically advanced product lines to meet customers' needs.

National Bronze Mfg. Co. supplies machined bronze components for applications in many critical industries. Bronze based products offer significant advantages in a number of pump applications. National Bronze Mfg. has been a proud supplier to the pump industry worldwide.



Bronze pump components from National Bronze Mfg. are of the highest quality in the industry. This standard of quality begins at the mill where the bronze bar stock is cast. This is possible due to the strong relationships we have developed with some of the world's premier bronze mills. Bronze pump components are then manufactured on a number of state of the art CNC controlled machinery. These advanced machines allow the tightest of tolerances to be achieved with every part.

Throughout the entire process parts are continuously inspected in National's climate controlled inspection lab. All of National Bronze Mfg. process are certified for quality under the ISO 9001/2008 standard.

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WHY BRONZE?



Bronze is one of the world oldest metals. The earliest bronze alloys date to 4500 BC. It is a metal that has proved the test of time, and continues to be a superior material choice for a number of applications today.

One of the benefits of using bronze based components is the number of different bronze alloys that are available. Bronze alloys have a huge variety of uses that reflect their versatile physical, mechanical, and chemical properties. By adding or subtracting various elements from the alloy mixture, specific properties can be achieved in order to adapt to the needs of the particular application.

Specific Bronze Alloys are formulated to achieve the following advantages for pump applications:

- Low wear rate
- Ability to run dry
- Can be lubricated with water or process fluids as well as grease or oil
- Close clearances to give stable shaft and lower seal wear
- Good wear life in dirty conditions
- Resistant to chemicals
- Lead free alloys for drinking water applications
- Low shaft wear
- High compression strength



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VERTICAL TURBINE PUMPS

These pumps are generally used to pump high volumes of water at low pressure heads. Often used in critical applications or as emergency standby pumps where reliability and long life are important. Maintenance on these pumps can be difficult and expensive.

Stuffing Box Bearings

Stuffing box bearings lack the water flow experienced by lineshaft bearings. Bronze bearings offer a low coefficient of friction and therefore have the ability to perform with only limited water flow.

Lineshaft and Pump Bowl Bearings

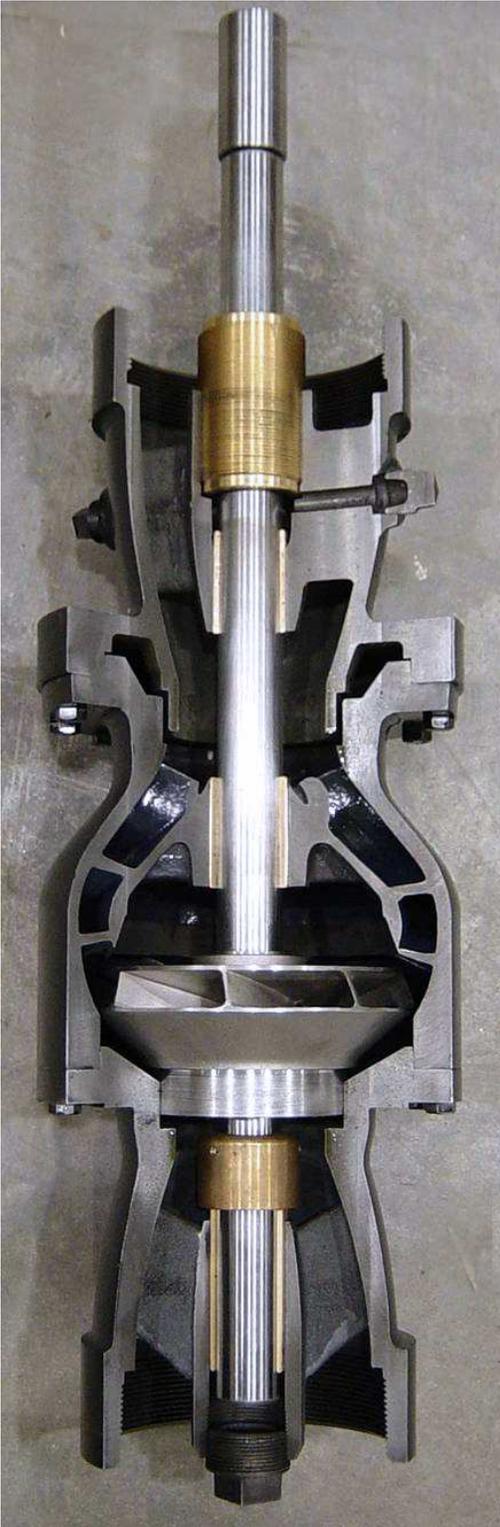
Bronze lineshaft bearings can be lubricated with water or a range of pumped products which limits the requirement for cumbersome oil lubrication systems.

Bronze bearings can be manufactured to close running clearances. Closer running clearances ensure more stable shaft operation with less vibration. Greater shaft stability and less vibration means that seals and external roller bearings are able to operate more effectively and last longer.



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VERTICAL TURBINE PUMPS CONTINUED...



Suction Cover Bearings

Suction cover bearings usually experience high concentrations of dirt particles from the water source especially in river water applications. To overcome wear caused by this dirt, suction cover bearings are often sealed and grease or oil lubricated. In addition to the complex grease or oil lines and the required lubrication system another big disadvantage is that the grease or oil leaking from the bearing contaminates the water.

Bronze bearings can be lubricated with process water fed from an upper stage rather than from a dedicated oil or water lubrication system. Cumbersome grease lubrication lines and systems can be done away with and pollution avoided.

Impeller and Casing Wear Rings

The close running clearance from bronze impeller and casing wear rings means an efficiency improvement due to a lower by pass. Also if the bronze wear ring happens to contact with the housing no damage is caused. The wear ring will conform to the new size and re-establish a close clearance.

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CENTRIFUGAL PUMPS

Examples of centrifugal pumps include the following:

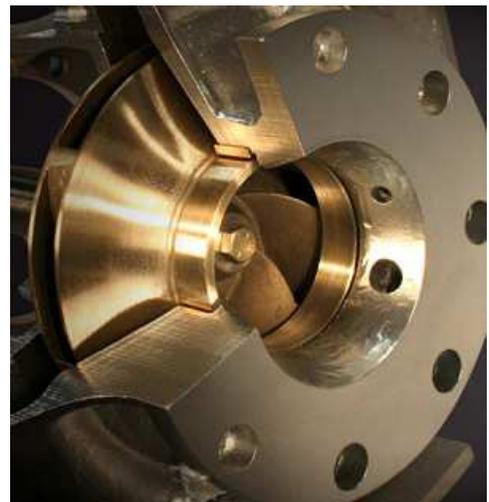
- Multistage Mining Pumps
- Process Pumps
- Slurry Pumps
- In Line Process Pumps
- Split Case Pumps



The long life of bronze bearings ensure that expensive removal and repair of pumps is limited.

Lantern Rings

Lantern rings are used as part of the shaft sealing system to evenly distribute water around the pump shaft. The dimension stability of bronze lantern rings allows for stable running clearance so that desired water flow may be achieved. Due to their low coefficient of friction, bronze lantern rings can survive even when the water supply is temporarily suspended.



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FRACTURING MUD PUMPS

With Mud Pumps it's all about pressure. Pressure to keep the oil and gas down, pressure to frac the rock, and pressure to never stop working. High Pressure Hydraulic pumps rely on many bronze based components. Bronze is the material of choice for these components due to its reliability.

Expendables

Expendable parts are a group of parts which are made to be sacrificed and replaced. Many of these components are bronze based. From crosshead bearings to pump liners and lantern rings, bronze is utilized to deliver performance and reliability.



A Trusted Partnership

National Bronze Mfg. recognizes the growing need for high pressure hydraulic pump replacement parts. Many of these parts are critical to the continuous operation of oil and gas production sites.

These operations require quality parts with minimal lead time. As a solution to this problem National Bronze Mfg is prepared to develop supplier partnerships with organizations that require an established bronze component supplier.

For more information on the benefits of partnering with National Bronze Mfg see the "National Difference" section at the end of this brochure.



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CHEMICAL RESISTANCE

The following decision chart provides guidance on the selection of the 3 most popular bronze alloys according to the environmental conditions of the application.

Definitions	
R	Resistant
O	Resistant depending on construction, oxygen content, temperature, etc.
X	Not Recommended

STRONG ACIDS	Concentration %	Temperature in ° C	C93200	C95400	C86300
Hydrochloric Acid	5	20	X	O	X
Hydrofluoric Acid	5	20	O	O	X
Nitric Acid	5	20	X	X	X
Sulfuric Acid	5	20	O	R	X
Phosphoric Acid	5	20	O	O	X
WEAK ACIDS					
Acetic Acid	5	20	X	O	X
Formic Acid	5	20	X	R	X
Boric Acid	5	20	X	R	X
Citric Acid	5	20	X	R	X
BASES					
Ammonia	10	20	X	X	X
Sodium Hydroxide	5	20	O	R	O
Potassium Hydroxide	5	20	O	R	O
SOLVENTS					
Acetone		20	O	R	O
Carbon Tetrachloride		20	O	O	O
Ethanol		20	O	R	O
Ethyl Chloride		20	O	R	O
Glycerin		20	O	R	O
SALTS					
Ammonium Nitrate			X	X	X
Calcium Chloride			R	R	R
Magnesium Chloride			R	R	R
Magnesium Sulfate			R	R	R
Sodium Chloride			R	R	R
Sodium Nitrate			R	R	R
Zinc Chloride			X	O	X
Zinc Sulfate			O	O	O
GASES					
Ammonia			O	O	O
Chlorine			X	X	X
Carbon Dioxide			R	R	O
Fluorine			X	X	X
Sulfur Dioxide			O	O	X
Hydrogen Sulfide			O	O	O
Nitrogen			O	R	X
Hydrogen			O	R	X
FUELS & LUBRICANTS					
Paraffin		20	R	R	R
Petroleum		20	R	R	R
Fuel Oil		20	R	R	R
Diesel Fuel		20	R	R	R
Mineral Oil		70	R	R	R
OTHERS					
Water			R	R	O
Sea Water			O	R	X
Resin			R	R	O
Hydrocarbon			R	R	O

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LEAD FREE BRONZE ALLOYS

- C90300
- C90800
- C95400
- C89320
- C89325
- C89831
- C89833
- C89835
- C89844

LEAD FREE OPTIONS

On January 4, 2014 the "Reduction of Lead in Drinking Water Act" became effective. This law mandates that any products that come in contact with drinking water must contain less than 0.25% Lead. It covers all devices at the point of use that are intended to dispense water for human consumption.

C89835 is a "Lead Free" alternative for C93200 Bearing Bronze. When an application requires the properties of C932 Bearing Bronze but needs to be "lead free", C89835 Bismuth Tin Bronze can be used. C89835 Bismuth Tin Bronze utilizes Bismuth as a Lead replacement.

Bismuth and Lead both have relatively low solubility in copper alloys. As such, during casting, these elements solidify into low melt point pools throughout the alloy matrix, filling porosity voids and providing advantages for chip breakage during machining

Other popular bronze alloys are naturally lead free. Refer to the chart to the left for some of the naturally lead free bronze alloys.



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EXPERIENCE THE NATIONAL DIFFERENCE



Superior Customer Service

National Bronze Mfg is a customer centric company. Every process change, technological advancement, and improvement is done with the sole focus on improving our customer's experience.

This experience begins with our qualified quoting team. These experienced technicians use computerized modeling software to assure that our customers receive the most competitive and reliable pricing.

Quality Standards

National Bronze Mfg. has developed a multifaceted Quality Management Program. This system is fully documented and constantly monitored. We consistently exceed our customer's quality expectations.

Inventory Management

Throughout our 100 plus years we have developed and maintained a very loyal customer base. Many of these customers take advantage of our customized inventory management programs. These programs have benefited our customers through both lower costs and drastically reduced lead times.

