



an EnPro Industries company

Proven Solutions for the Global Compression Industry™

# Materials for Pump Wear Parts





CPI materials for pump wear parts are proprietary polymer alloys designed for pump bushing wear rings, guide bushings and thrust washers in liquid pumps.

The CPI materials are intended to reduce diametral clearance on pump wear parts without the risk of damage to metal components. The properties of these materials are designed to help avoid catastrophic pump failures caused by dry-run start up or excessive vibration.

### Problem Solving Solutions

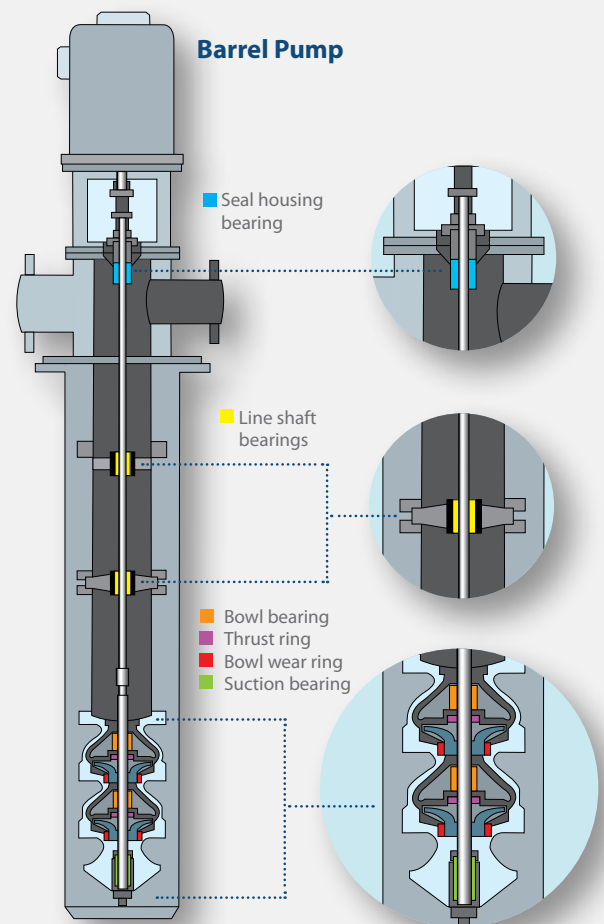
CPI materials for pump wear parts have a low coefficient of thermal expansion and provide excellent resistance to chemical attack as well as protection against impacts, thermal shocks, and hydrolysis. Applications using CPI materials significantly increase hydraulics, improving pump performance with reduction in energy consumption and reduced wear, which is reflected in maintenance and operating costs.

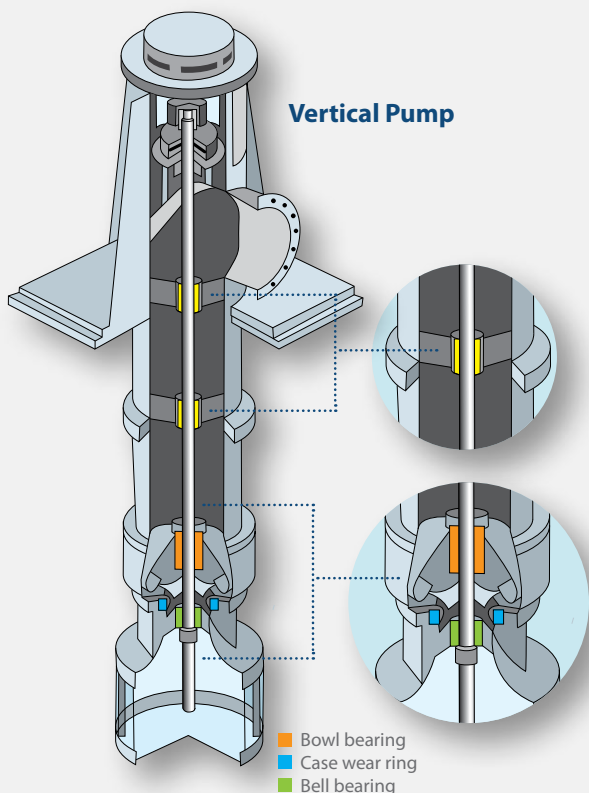
### Applications of CPI Materials for Pump Wear Parts

CPI materials for pump wear parts have been successfully installed and operate in line shaft bearings, impeller wear rings, thrust washers on vertical pumps - (single or multi-stage) barrel pumps, API, bearings on Archimedes screws and horizontal pumps.

### Mixers and Agitators

Due to premature wear of many PTFE based bearings, CPI materials for pump wear parts are ideally suited for use in agitator and mixer bearings due to its chemical and frictional resistance, combined with excellent dimensional stability and improved running performance.





### Advantages of CPI Materials for Pump Wear Parts

- Good machinability with no special treatment required
- Non - galling and non - seizing properties
- Low coefficient of friction ensuring long running life
- Reduced running clearances minimizes recirculation
- Excellent quality to absorb shock and vibration

### CPI materials for pump wear parts - Case Studies

**Vertical pump with discharge column - RPM: 2900tr/min**

#### Problem

The pump handles chemical wastes and was fitted with bronze bearings with a poor lifetime of just a few months.

#### Solution

Bearings manufactured using CPI materials performed almost without wear on the bearings after 5 years.

**Vertical barrel pump - 12 multi-stages**

#### Problem

The pump handles propylene at 0°C, fitted with metallic bearings and guide bushings with PTFE insert which created problems with dry start-up running and PTFE extrusion.

#### Solution

Bearings and guide bushings manufactured using CPI materials have greatly improved the pump performance.

**Archimedes screw - inclined sewage lift - RPM: 30**

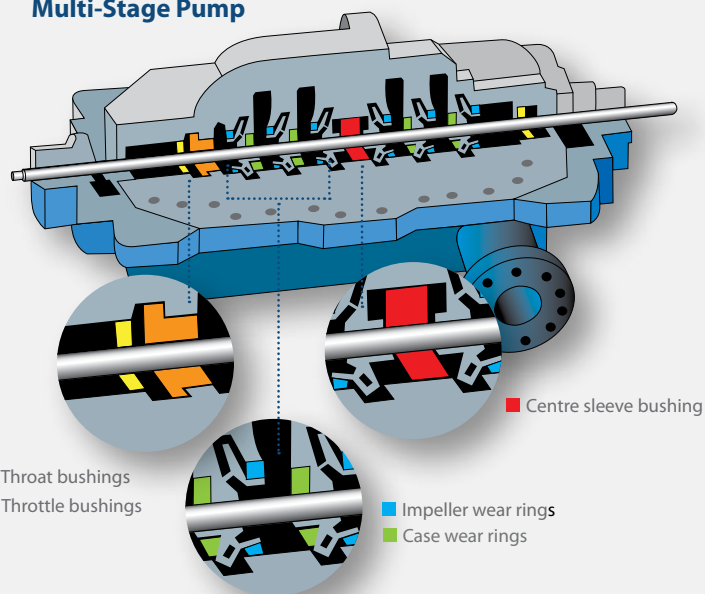
#### Problem

Original cast iron bearings were unreliable with short life.

#### Solution

The bearings were replaced using CPI material - CPI182 bearings and have now run for several years without failure.

### Multi-Stage Pump



## Machining and Installation Guide

CPI materials for pump wear parts are available in a large range of bushings sizes, are easy to machine and install with the proper interference fit. CPI also provides a custom machining service to customer specifications.

Recommended interference fits OD (%)

Minimum: 0.1 mm Maximum: 1.5 mm

Temperature °C	% Interference	
T < 50	0.20	End chamfer: 3 mm x 30° Press fitted
50 < T < 100	0.25	We recommend to finish bore after the press fit
101 < T < 150	0.30	Minimum wall thickness: 4 mm
151 < T < 200	0.35	Limit temperature: -50°C + 250°C
201 < T < 250	0.40	

### Example 1:

Temperature 80°C and diameter 203.2 mm  
 $203.2 \times 0.25/100 = 0.5$  mm of interference

### Example 2:

Temperature 210°C and diameter 400 mm  
 $400 \times 0.40/100 = 1.6$  mm of interference 1.5mm maximum

## Machining

Recommended tooling carbide coated or diamond

Operation	Cutting Speed	Feed Rate
Turning	80-120m/min	0.1-0.3 mm/tr
Parting	40-60m/min	0.08-0.12 mm/tr
Milling	125-160m/min	3000-4000 mm/tr

CPI materials for pump wear parts meet the non-metallic wear part description of the API610 -11th ed. for Centrifugal Pumps for Petroleum, Petrochemical and Natural Gas Industries.

## Recommended Running Clearance ID (mm)

Minimum: 0.1 mm Maximum: 0.5 mm\*

Diameter mm	Clearance Ø mm	API
Ø < 50	0.10	0.25
50 < Ø < 100	0.15	0.28 to 0.35
100 < Ø < 150	0.20	0.38 to 0.43
150 < Ø < 200	0.25	0.45 to 0.48
200 < Ø < 250	0.30	0.50 to 0.53
250 < Ø < 300	0.35	0.55 to 0.58
300 < Ø < 350	0.40	0.60 to 0.63
350 < Ø < 400	0.45	0.65 to 0.68
>400	0.50	0.70 to 0.95

\* For diameter > 400 mm, 0.5 mm minimum +0.05mm for each range of 50 mm

## End Clearance (mm)

Minimum: 0.1 mm Maximum: 1.5 mm

Based on 100mm length and  
temperature ambient 20°C

Temperature °C	Expansion mm
0	0
50	0.4
100	0.7
150	1
200	1.2
250	1.5

## Further Information

Technical material data leaflets are available on the CPI Materials for Pump Wear Parts from a CPI Technical Engineering Representative.



CPI, an EnPro Industries company, is an industry-leading manufacturer of precision-engineered components for reciprocating compressors used in petrochemical, refining, natural gas, and offshore industries. The CPI product range includes packing, piston and rider rings and a complete line of compressor valves designed to provide each customer with maximum performance and reliability for their application. In addition, CPI offers the highest quality lubrication system technology for further compressor efficiency and protection.