

## ENGINEERING DATA SHEET

<i>Bearings</i>		
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The standard bearing used in all Chempumps is a Carbon-Graphite compound, termed CG type B, which has excellent corrosion resistant characteristics when operating in most liquid environments. Certain fluids will attack the binder or process streams may contain abrasive solids which preclude the use of Chempump's standard carbon-graphite bearing. In these cases alternate materials are available such as:

- Silicon Carbide
- Carbon-Graphite Type F-2
- Rulon 123
- Aluminum Oxide (ALOX)

A brief description of each of these bearing materials follows.

**CARBON-GRAPHITE TYPE B** - These are materials manufactured from a blending of Carbon and Graphite powders with a hydrocarbon binder. The result is a materials which is resistant to wear, chemically resistant and thermally stable. There are many grades of Carbon-Graphite bearing materials. Chempump, through years of application experience, has chosen Type B as the most versatile for the wide range of applications and chemicals handled.

The shaft journal treatments M-2, M-3 or NCB can be used with type B bearings although it is not necessary. Journal treatment will extend the life of the shaft since it will resist abrasion if the bearings run dry or are exposed to abrasive particles. See Engineering data sheet 26E for more information concerning shaft coatings.

Chempump's "G" Series pump has sleeveless bearings as standard. Sleeved bearings are also available and must be used in applications where the fluid pumping temperature exceeds 250°F or when a bearing wear detector is used.

The maximum fluid temperature for a sleeved, type B bearing is 400°F.

**SILICON CARBIDE** - This material is a self sintered, high density hardened material with very good wear and chemical resistance. Silicon carbide is very wear resistance but care must be taken when applying this material because silicon carbide is brittle making it susceptible to thermal and mechanical shock. This type of bearing is much less forgiving than carbon graphite when system upsets, such as dry running and cavitation, occur. Silicon graphite bearings do not wear gradually. If the bearings fail they normally shatter into many pieces causing a catastrophic failure.

The NC Series pumps have, as standard, a backup bearing for all silicon carbide bearing designs. In the event of a failure of the silicon carbide bearing the backup bearing rides on a secondary journal allowing the pump to operate for a short time without major damage.

For the G series pumps hardened journals must also be used in conjunction with silicon carbide bearings. NC series pumps have bearings, shaft sleeves and thrust washers all constructed of silicon carbide.

**CARBON-GRAPHITE TYPE F-2** - This is a grade of Carbon-Graphite which is used primarily in Hydrofluoric Acid service. Experience has shown that the binder of the carbon graphite type B bearings is attacked by hydrofluoric acid causing the bearing to swell and seize on the shaft. The type F-2 graphite composition is inert to hydrofluoric acid attack.

This grade can be used on other applications, but most are covered by the Type B bearing which is less expensive and more readily available.

The shaft journal treatments M-2, M-3 or NCB can be used with type F-2 bearings although it is not necessary. Journal treatment will extend the life of the shaft since it will resist abrasion if the bearings run dry or are exposed to abrasive particles. See Engineering data sheet 26E for more information concerning shaft coatings.

**RULON 123** - These are filled polymer bearings which have good wear characteristics, and excellent chemical resistance. This material is used when pumping highly oxidizing compounds such as nitric acid. Rulon 123 has excellent corrosion resistance to all concentrations of nitric acid yet is soft enough to run against a stainless steel shaft.

**Aluminum Oxide (ALOX)** - This material is very similar to silicon carbide with regard to wear and chemical resistance. Aluminum oxide is also very susceptible to thermal and mechanical shock.

Available only in the G Series pumps, M-2, M-3 or NCB shaft coatings must be used in conjunction with ALOX bearings.