

ISO 9001 : 2000 Company



# PTFE Structural Bearings



**POLY FLUORO LTD**

# GENERAL INFORMATION

In a wide range of applications, PTFE structural bearings are superior to conventional expansion plates, rollers and rocker arm type supports. They support petrochemical plants, heavy machinery, pipelines, buildings and bridge girders; they accommodate expansion, contraction and other reciprocating motions of any structure that moves as a result of thermal, seismic or differential forces.

Bearings for such applications must operate at high loads and low speeds, and it is under just these conditions that the self-lubricating properties of PTFE are at maximum. This factor, together with its no stick-slip and anti-weathering characteristics, is the principle reason why PTFE has proved to be successful as a slide bearing material.

## TECHNICAL DESCRIPTION OF STANDARD PTFE SLIDE BEARINGS

### MATERIALS USED

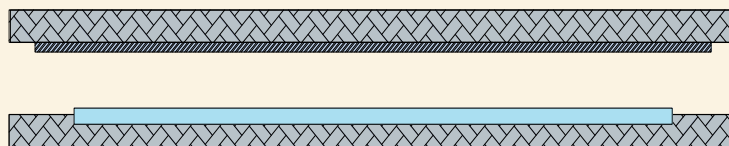
#### LOWER ELEMENT



To be comprised of a thick mild steel / carbon steel (IS 2062 / A36) plate recessed to a depth of 1.5 – 4mm, about 10-25mm within the ends of the plate. A PTFE sheet of 3-5mm thickness is etched on one side to make it bondable and then bonded to the lower steel plate using industrial adhesive (Araldite AW106) at a pressure equal to approximately 1.5 times the recommended load of the bearing for a period of no less than 4 hours. This will also ensure that the load bearing capacity of the assembly matches the recommended load.

#### UPPER ELEMENT

To be comprised of a thick mild steel / carbon steel (IS 2062 / A36) plate, welded to a stainless steel (AISI 304, polished on one side with a grade #8 finish) plate of 2-4mm in thickness. The two plates will be tig welded along the edges of the stainless steel plate and buffed so as to retain the original finish along the edges

DIAGRAM TO ILLUSTRATE THE MATERIALS USED IN PTFE SLIDE BEARINGS.



 Carbon Steel  
 SS 304  
 Virgin PTFE

### COEFFICIENTS OF FRICTION

The coefficient of friction of PTFE materials is dependent on many variables, including pressure, sliding velocity and temperature. Between stainless steel and PTFE, the coefficient is less than that between any other two solid engineering materials. It has been variously reported from 0.02 to 0.2, but this depends on surface preparation and the test method.

In general, the coefficient of friction between the mating surface and the PTFE slide bearing pad will be at a minimum when the stress in the PTFE is at a maximum (consistent with acceptable limits of creep), the bearing is made from unfilled PTFE, and the finish of the mating surface is highly polished.

In addition, one of the most important frictional characteristics of PTFE is the absence of 'stick-slip', because unlike all other conventional bearings, the static friction of PTFE is equal to or only marginally higher than the dynamic friction.

AVERAGE PRESSURE ON PTFE (MPA)	MAX. VALUE OF ' $\mu$ ' FOR LUBRICATED PTFE	MAX. VALUE OF ' $\mu$ ' FOR UNLUBRICATED PTFE
5	0.08	0.16
10	0.06	0.12
20	0.04	0.08
>30	0.03	0.06

## RECOMMENDED MAXIMUM BEARING PRESSURES

Depending on the circumstances, design pressures may be allowed to vary. With these pressures, a design coefficient of friction of 0.1 for unfilled PTFE or 0.12 for filled PTFE will give a significant margin of safety when operating conditions cannot accurately be predicted, but the figures obtained in practice will normally be considerably less than these.

TYPE OF PTFE	AVERAGE BEARING PRESSURE (MPA)	MAX. EDGE PRESSURE (MPA)
Filled PTFE or unfilled recessed PTFE	24.5	35
Unfilled PTFE (not recessed)	14	35
PTFE with bronze	42	70

## TECHNICAL ADVANTAGES OF PTFE SLIDE BEARINGS

- PTFE has the lowest coefficient of friction of any known solid engineering material, including lubricated metal
- There is no stick-slip action
- They have indefinite life, since chemicals and weather have no effect on PTFE - moisture absorption is less than 0.01% even under icing conditions or immersion, and the material is chemically inert
- No maintenance is required, PTFE will never cold weld to itself and therefore requires no lubrication
- The bearings are easily installed, either pre-assembled or on site
- PTFE bearings are far less bulky than alternative assemblies
- There is no possibility of fatigue failure
- Electrical and thermal insulation minimise galvanic corrosion and heat loss
- Vibrations are damped
- Small particles which may become embedded do not cause binding of the surfaces
- The slide bearing can accommodate some misalignment in construction without setting up stress corrosion along a leading edge, as can occur in conventional bearings

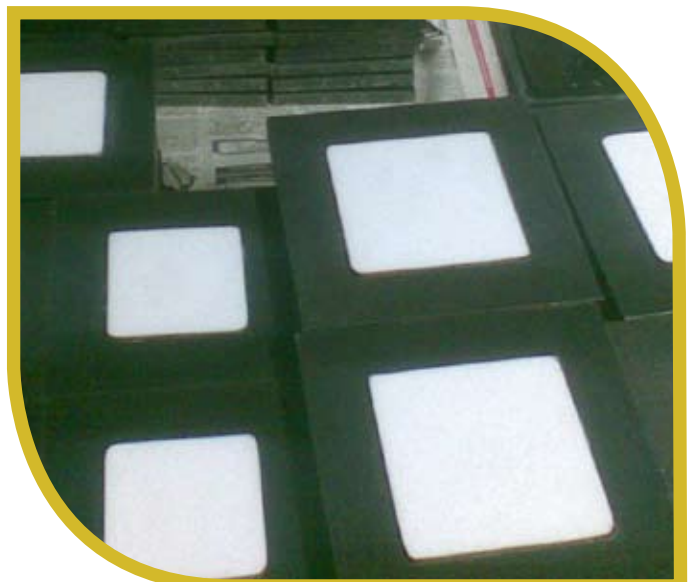


## STANDARDS

Poly Fluoro prides itself on the use of only the highest grades of materials in its bearings. Design and development of the bearings can also be undertaken by us, if the load and movement parameters are provided.

### STANDARDS ADHERED TO ARE:

BS 5400 – Design  
 IS 2062 – Mild Steel  
 A36 – Carbon Steel  
 AISI 304 – Stainless steel  
 ASTM 4894 – PTFE



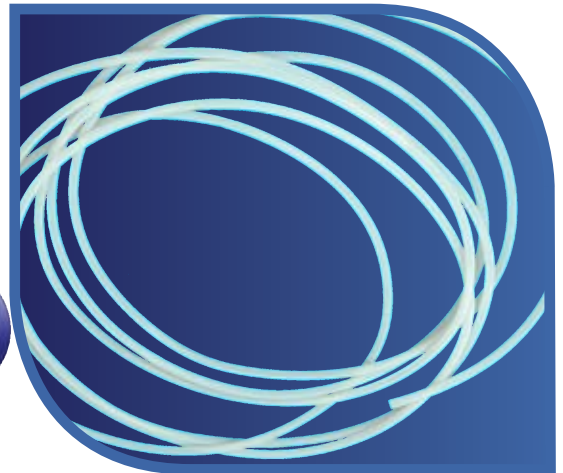
# OTHER PTFE PRODUCTS FROM POLY FLUORO

## FLUOROTUBE™ PTFE TUBING

FluoroTube™ marks the entry of Poly Fluoro into the PTFE tubing segment. The grades and sizes available make FluoroTube™ ideal for applications such as medical, chemical and automotive.

**FLUOROTUBE™ COMES IN SIZES RANGING FROM 1MM TO 25MM DIAMETERS AND IS UNIQUE IN MANY WAYS WHEN COMPARED TO CONVENTIONAL POLYMER TUBING:**

- Highly resistant to corrosive chemicals
- Working temperature range of -200°C to +250°C
- Chemically inert - making it ideal for medical applications
- Extremely low coefficient of friction



## LUBRING™

Lubring™ Slideways (a proprietary PTFE formulation) is a superior bearing material developed specially for machine tool ways, gibs and other sliding applications. It is widely used by leading machine tool manufacturers, re-builders and in-plant personnel to restore existing equipment to like-new precision.

**LUBRING™ EXHIBITS SUPERIOR PERFORMANCE WHEN COMPARED TO OTHER SLIDEWAY BEARINGS:**

- Excellent vibration dampening – dampens cutting tool vibration from migrating throughout the machine tool
- Chemical resistance – resists aggressive coolants and lubricants
- High wear resistance – ensures long service life
- Low wear in the event of dry operation – protects mechanical components in cases of poor or failed lubrication
- Impervious to moisture



## ENGINEERED PTFE COMPONENTS

Engineering components from Poly Fluoro are the combination of design expertise and unusual fabrication techniques. Poly Fluoro has a dedicated team of machining experts who review each product and recommend the design and material most suitable for the application.

Our design team, using cutting edge modelling software Solid Edge® and NX™ CAM Express can be as involved in the development of the component as you require, while our state-of-the-art CNC facilities and long experience in working with PTFE enable us to offer the highest quality service in the industry.

When it comes to fabrication skills Poly Fluoro Ltd. has experience in moulding, machining, thermoforming, grinding, welding and finishing PTFE products. Parts may be cut from stock shapes or they may be custom moulded and machined.

