



FLUOROCARBON

FLUOROGLIDE® SLIDE BEARINGS
PIPE SUPPORTS & SKIDWAYS





Introduction

Corporate Overview

Fluorocarbon is one of the UK's largest fluoropolymer processors and a global supplier of PTFE, polymer related components and semi-finished materials.

Our customers are fabricators, many of whom are worldwide leaders, across a variety of business sectors, which is why we ensure our range of products and services are focused on meeting their increasing demands.

Worldwide Resources

- 3 manufacturing sites in the UK, Europe & Asia
- Sales offices in the UK, Europe & Asia
- Partners globally

Products

Our expertise in development and commitment to first-rate customer service has created global appeal for our extensive range of products, which include:

- Seals
- Hoses
- Fluoroglide® Slide Bearings, Pipe Supports and Skidways
- Skidding Lubricants
- Timber Skidshoes
- PU & rubber finished products
- Valve seats
- Semi-finished materials (melt fluoropolymers, PTFE rod, tube, sheet and tape)
- Machined components
- Moulded components
- High performance surface coatings

Services

- Machining
- Assembly
- Bonding
- Etching, cleaning & gritblasting to SA standards, SA 2.5 and SA 3.0

Competitive advantage

We aim to offer our customers, cost effective solutions at the highest quality from material selection through to product manufacturing and distribution.

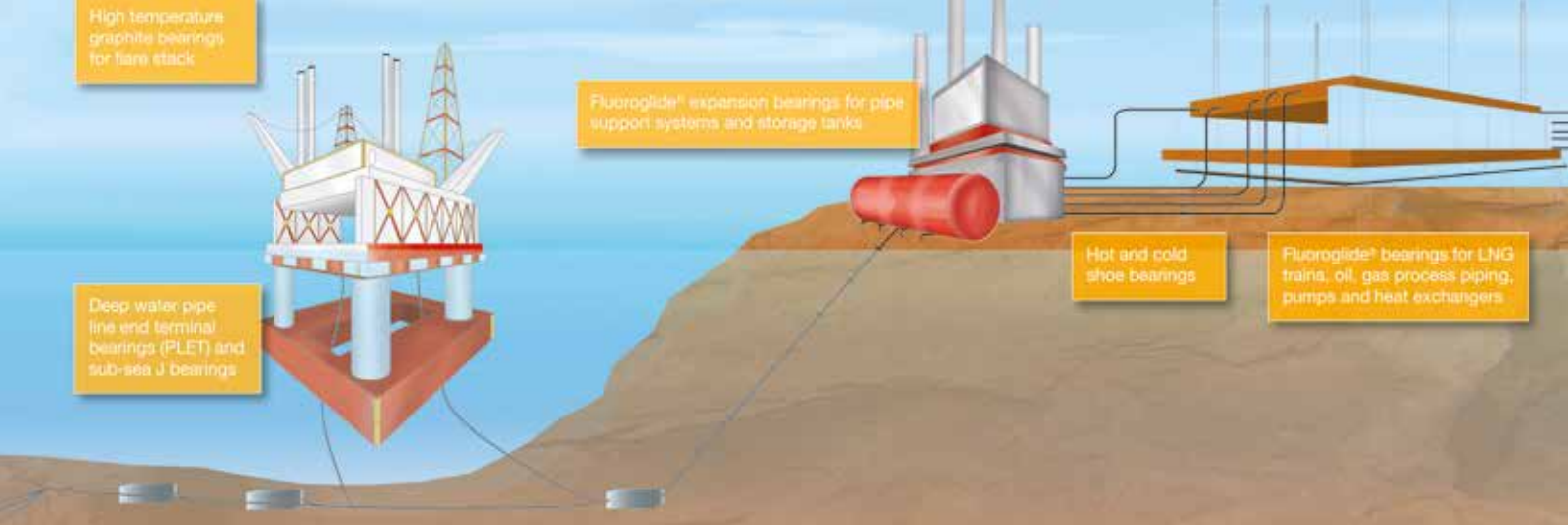
We have a group research and development team, and our modern, qualified laboratories offer full traceability on all products, other advantages include:

- A quality system certified to ISO 9001:2008
- Supply against discreet requirements or scheduled demands such as Kanban and Just-In-Time
- Support for APQP and PPAP submission of products
- Testing and analysis to International Standards including - ASTM, DIN, BSI and ISO
- Testing includes - tensile, elongation, density, hardness, zero strength time, peel testing, compression, friction and wear

Fluorinoid® Materials

Based on elastomer, PTFE and thermoplastic technologies, our Fluorinoid® company register includes over 500 materials that offer exceptional characteristics enabling them to operate in demanding environmental conditions.





What We Do

F luoroglide[®] Bearings

What we offer

- Fluoroglide[®] Slide Bearings for pipeline, process plants, chemical plants and civil engineering
- Fluoroglide[®] Skidway Plates for jacket, topside loadout
- Fluoroslip[®] Lubricating Systems
- Fluoroglide[®] Bridge Bearings
- Fluoroglide[®] Subsea J and T bearings for plets and pipelines
- Fluoroglide[®] High Temperature bearings for Flare stack application
- Fluoroglide[®] Pot Bearings and Elastomer Bearings for civil engineering

In addition to our product offering, we provide our extensive experience in on-site installation support whilst training and knowledge sharing with your engineers.

During manufacture Fluorocarbon undertake regular tests to ensure correct bonding and friction. Certified test certificates are available for:

- Peel test
- Friction testing using actual Skidway plates with Green Heart Timber Skidshoe.
- Wear testing
- Subsea testing
- Compression testing
- Mechanical properties of Fluorinoid[®] materials

Our Range

Fluoroglide® PTFE Skidways

Fluoroglide® PTFE Skidways

The Fluoroglide® range of skidways and bearings are based on tried and tested slide bearing manufacturing procedures, which ensure low coefficient of friction, and reliability in varying environments throughout the world.

Our skidway plates are used in many construction yards throughout the world to assist in skidding jackets, modules and heavy structures. Jackets and decks with weights up to 35,000 tonnes have been successfully loaded out on Fluoroglide® skidway plates in combination with Fluoroslip® Lubricating Systems.

Typical friction values are 5-12% for static breakout and 1-5% for dynamic skidding. These values are dependent upon the surface finish of the timber skid shoe, flatness of the installed skidway plates and the use of Fluoroslip®. Actual values for coefficient of friction achieved during loadout of a 18,300 tonne fabrication pulled by strain jacks were:

- Static breakout friction 4.5%
- Dynamic 3%

Fluoroslip® Lubrication System

To reduce static breakout friction due to:

- Long construction period
- Absorbent timber skid shoe
- Uneven loading
- Construction yard debris

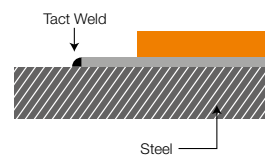
We recommend the use of Fluoroslip® FL414 and FL614 to achieve a static breakout of less than 5%.

The Skidway

We offer a range of skidway plates to suit any requirement and our experienced technical consultants are available for on-site discussions.

Typical recommended configurations

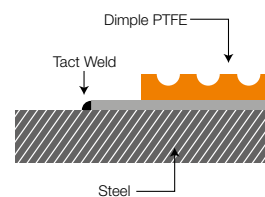
A typical Fluoroglide® skidway plate comprises of 2.5mm Fluorinoid® PTFE hot pressure bonded to a 3mm carbon steel plate, with a 25mm welding lip for on-site tack welding to prevent damage to the PTFE. All exposed metallic surfaces are primed to protect against corrosion. The typical size of the Carbon Steel is 500mm x 2000mm and the PTFE is 450mm x 1950mm.



TS 2530-STD Skidway Plate

2.5mm PTFE pad bonded to 3mm Carbon Steel with 25mm welding lip for tack welding to skid beam.

Typical size:
Carbon Steel 500x2000
PTFE 450x1950



JS 2530-SP Dimpled Skidway Plate

2.5mm Dimpled PTFE pad bonded to 3mm Carbon Steel with 25mm welding lip for tack welding to skid beam.

Typical size:
Carbon Steel 500x2000
PTFE 450x1950

Our Range

T Timber Skid Shoes Fluoroglide® FL914

The range of Fluoroglide® Timber Skid Shoes are manufactured from Green Heart timber sourced from British Guyana. The timber is graded to HS/D70 grade as defined in BS5756:2007 by suitable qualified graders with no wane permitted.

Typical properties for Fluoroglide® FL914 Green Heart Timber:

- Tension parallel to grain - 13.8 N/mm²
- Compression parallel to grain - 23.0 N/mm²
- Perpendicular to grain when fully supported - Min 10.6 N/mm²
- Average density - 1080
- Supplied preprepared timber for on-site assembly
- Assembled skid shoes

For information on Lubrication Systems see p6.



Fluorocarbon have been successfully manufacturing bonded PTFE/metallic Fluoroglide® skidway and Bearing plates for over 25 years.

Our Range

Lubrication Systems

Skidway and Bridge Lubrication Systems

Fluorinoid® PTFE when sliding against Fluorinoid® PTFE has a co-efficient of friction value of 0.03.

However when used for skidding heavy structures or as a bridge bearing assembly with a different assembly configuration it may be advantageous to incorporate a lubrication system to assist with reduction of friction.

Fluorocarbon have a range of proven lubricating systems available;

- FL414 Specially formulated liquid silicone system
- FL614 PTFE membrane system

FL414 is used for reduction of friction during load out of heavy structures. The FL414 is applied by brushing on to the Fluoroglide skidway plates prior to positioning the timber skid shoes. This lubrication system is stable with no changes to viscosity by environmental temperature fluctuations during the long construction period.

- FL414 is recommended for use in Highway pot bearings
- FL414 will not cause any environmental problems on land or sea

FL614 is a PTFE membrane positioned between the Fluoroglide® skidway plates and timber skid shoe.

It is generally specified for use when skidding heavy structures which have a long construction time.

The advantages are prevention of the FL414 being absorbed by the Green Heart Timber, the membrane is forced into the grain structure of the Green Heart Timbers which results in PTFE sliding against the lubricated (FL414) skidway plates.

FL916 is a formulated wax which is heated to a soft wax state and spread on to the skidding surface of the timber skid shoe. The wax solidifies in the timber surface structure preventing absorption of the FL414 during the construction period.



Our Range

Civil Engineering

In the construction sector Fluorocarbon Slide Bearings are used to resolve issues that can arise from temperature change, material expansion and natural forces caused by seismic activity and high winds.

Typical applications include Stadiums, Car Parks and Incremental Constructed Suspension Bridges.



Case Histories

Fluoroglide® slide bearings were specified for use on the Queensferry crossing (Forth Road Bridge) to move the bridge segment tooling in the casting shop with maximum flexibility to an exact position for pouring the concrete.

Fluoroglide® Slide Bearings were used by the contractor to move a new section of the Grand Union Canal, crossing the North Circular Road. This was a 24 hour operation to replace a new section without danger or delays to the road closure below.

A temporary skidway was constructed to move the Euro Tunnel boring machine into place way below ground level.

Fluorinoid® FL100 dimple PTFE is available to the EN1337 specification, Fluorocarbon can supply sheets or formed sections for use in spherical bearings as used under the Thelwall Viaduct M6 bridge.

Our Range

Fluoroglide® J Bearings

Fluoroglide® J Bearings

Fluorinoid® FL134 Material

We have developed a grade of PTFE Fluorinoid® FL134, to give outstanding performance subsea.

The specially developed Fluorinoid® FL134 PTFE material will not support any kind of marine growth or allow attachment of marine growth such as barnacles etc.

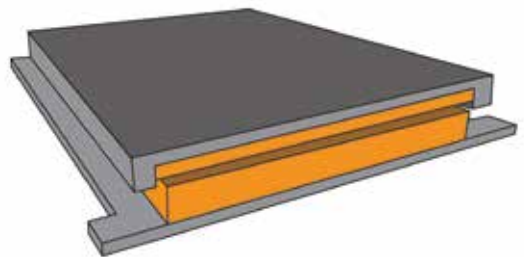
The design has been approved by both BP and Total for use on PLETS oil fields at depths of 1,500 metres in Angola.

In-house and independently verified testing has been undertaken on this material in sea water, under controlled conditions.

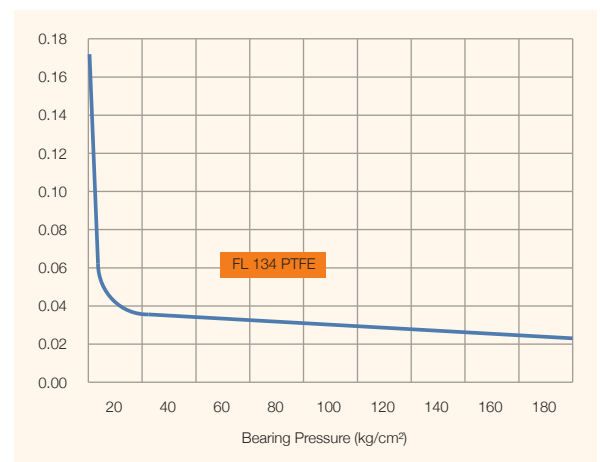
Our range of J Bearings have been designed to operate in sub-sea conditions with our Fluorinoid® FL134 bearing material chemically and mechanically locked into a steel housing plate.

Recommended design load for Fluorinoid® FL134 in a J Bearing configuration is a maximum of 100kgs/cm². With these design pressures the coefficient of friction will be 0.1 maximum.

Fluoroglide® J Bearings



Graph showing coefficient of friction against bearing pressure



Our Range

Fluoroglide[®] T Bearings

Fluoroglide[®]T Bearings

Fluorinoid[®] FL340 Material

Fluorinoid[®] FL340 polymer is used as a capping bearing in subsea pipe cross over sleepers.

Fluorinoid[®] FL340 is chosen for this application due to its very high abrasion resistance, inertness to marine growths and low coefficient of friction. Fluorocarbon are able to supply Fluorinoid[®] FL340 manufactured to bespoke finished dimensions.

Our range of T bearings have been developed for use in the subsea equipment area.

For power cable and pipe line support walls and cross over points. Also used in subsea buckle initiation sleeper units as slide ways.

The abrasion resistance has been qualified on purpose build environment (including sand) simulated equipment.

Typical properties:

| | Unit | Standard |
|-----------------------------|-------------------|----------------------|
| Impact strength | KJ/m ² | ≤140 |
| Water absorption | % | ≤0.01 |
| Compressive strength | Mpa | ≤30 |
| Ball indentation hardness | N/mm ² | ≤20 |
| Friction coefficient | | 0.03-0.17 |
| Abrasion loss | G/cm ² | 3.8x10 ⁻⁴ |
| Heat distortion temperature | °C | 85 °C |

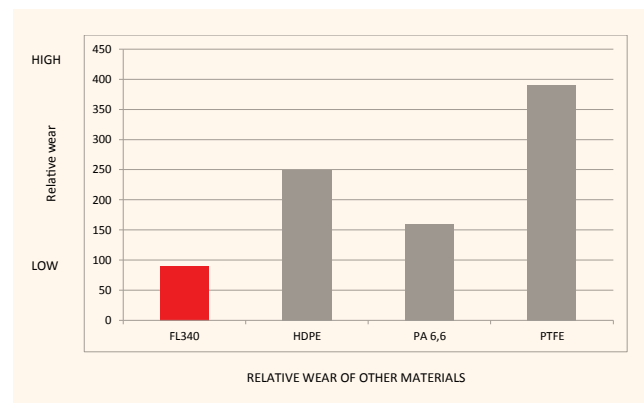
High abrasion resistance to sand particles.

Fluoroglide[®] T Bearings

(Subsea Sleeper Bearings)



Sand-Slurry wear comparison



Our Range

Fluoroglide® PTFE Slide Bearings & Pipe Supports

Fluoroglide® PTFE Slide Bearings and Pipe Supports

Fluoroglide® Slide Bearings are superior to conventional expansion plates, rollers and rocker arms, because they accommodate expansion and contraction, as well as other reciprocating motions of any structure that moves as a result of thermal, seismic or differential forces.

Such bearings operate at high loads and low speeds, and it is under these conditions, together with its no stick-slip and anti weathering characteristics, that the self lubricating properties of Fluorinoid® PTFE are at a maximum.



Applications

- Expansion movement in pipelines, heat exchangers, concrete decks or steel structures
- Cryogenic, vibration and acoustic affects on pipelines and structures
- Steam heated pipelines in chemical plants and oil production modules
- Oil, water and gas transportation above ground pipe mains
- Buildings and bridges
- Pedestrian walkways

Fluorinoid® PTFE is manufactured and etched within the Fluorocarbon Group. Surface preparation of steel, machining, controlled bonding and painting are all done in-house to ensure a quality product.

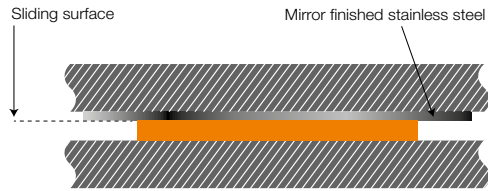
Bearing configurations shown are typical. Variations are possible to suit the application.

Alternative thicknesses of PTFE, backing plates, thermal insulation pads and vibration damping pads may be specified - see Part Number Key. The dimensions given are typical.

Alternative backing materials are available for all bearing types - see Part Number Key. Dimpled PTFE is available when required by the application.

The high temperature limit of each configuration should be regarded as the absolute maximum. Normally the temperature at the surface of the PTFE should not exceed +120°C.

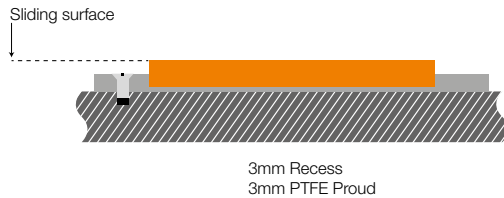
For glass-filled PTFE bearings, the load capacity should be multiplied by 2. For contained glass-filled PTFE bearing the load capacity may be multiplied by 4 Under these conditions the deformation of the bearing material will not exceed 0.05mm. Load conversion factors: 1kg/cm² = 14.201bf/in² = 98.04kPa.



FC SS 2530-MST Counterfaced Bearing

2.5mm PTFE pad bonded to 3mm backing plate for tack or full welding or bolting. Counterfaced by a larger, mirror stainless steel plate.

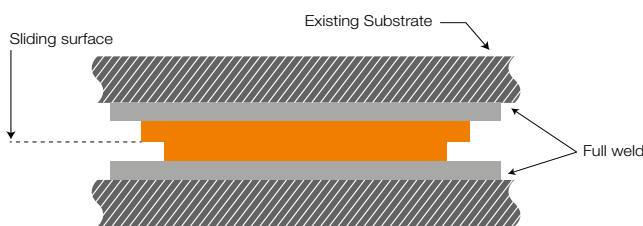
Load Capacity: 70kg/cm²
Temperature Range: -30°C to +120°C*.



FC SS 65-MS125T Recessed Bearing

6mm PTFE pad contained in a recessed backing plate, finished for tack or full welding or bolting. Counterfaced by a larger, mirror finished stainless steel plate or PTFE top plate.

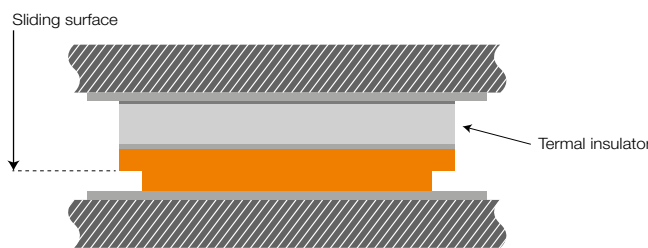
Load Capacity: 140kg/cm²
Temperature Range: -30°C to +120°C*.



FC 25120-MST Full Weld Bearing

2.5mm PTFE top pad bonded to 12mm backing plate for full welding to substrate. 2.5mm PTFE bottom pad bonded to 12mm backing plate for full welding to substrate.

Load Capacity: 70kg/cm²
Temperature Range: -30°C to +120°C*.



FC 2530-MS250TI Thermal Insulation Bearing

For pipeline temperature above 180°C. 2.5mm PTFE top pad bonded to 3mm backing plate, 25mm thermal insulator (Fluorex) and 3mm mounting plate for tack welding or bolting. 2.5mm PTFE bottom pad bonded to 3mm backing plate for welding or bolting.

Load Capacity: 70kg/cm²
Temperature Range: -30°C to +120°C*.



FC 2530-SSNRT Elastomeric Backed Bearing

2.5mm PTFE top pad bonded to 3mm backing plate for tack welding. 2.5mm PTFE bottom pad bonded to 3mm backing plate, 6mm elastomer to accommodate small angular misalignments and 3mm mounting plate for tack welding or bolting.

Load Capacity: 50kg/cm²
Temperature Range: -30°C to +120°C*.

Part Number Key

| | | |
|--------------------------|-----------------------------------|-----------------------|
| Backing Plate Materials: | MS Mild Steel | Al Aluminium |
| | SS Stainless Steel - EN SS304/316 | |
| Intermediate Materials: | NR Neoprene | TI Thermal Insulation |
| | VP Vibration Pad | |
| Installation Method: | T Tack Weld | L Full Weld |
| | B Bolted | |

The first figures in the part number indicate the thickness of the PTFE and backing plate, in mm x 10.
e.g. FC 2530 is 2.5mm PTFE bonded to a 3mm backing plate.

Figures following an Intermediate Material code indicate the thickness of that material, in mm x 10.
e.g. FC2530 - NR 60 has a 6mm Neoprene pad.

For variations in friction, bearing pressure and temperature restrictions please see graphs on p13.

*Specialised bonding systems are available for temperature outside this range



Our Range

Offshore Bridge Bearings



Typical assembly consists of a Lower Plate with reinforced Fluorinoid® PTFE FL129 which can be either surface mounted or recessed for high bearing pressure. The top plate is either Fluorinoid® FL129 or polished Stainless Steel.

In many bridge bearing applications dimpled Fluorinoid® PTFE FL129 lubricated with Fluoroslip® FL414 is used on the lower plate, this slides against the polished Stainless Steel top plate or another Fluorinoid® PTFE plate and ensures long service life. For arduous environments the Fluorinoid® PTFE FL129 is bonded into a recessed lower plate.

If required an elastomeric element can be incorporated to accommodate rotation of the bridge during life with structures in areas of turbulent wind and sea.



Our Range

Flare Stack Bearing



Specific bearing assemblies are available for flare stack installation when high service temperatures are anticipated.

The Fluoroglide® Flare Stack Bearings comprise of a polished stainless steel top plate sliding against a graphite recessed bearing.

Graphite bearings are used in a temperature range between 200°C to 1000°C, and have a maximum bearing pressure of 25kg/cm² and coefficient of friction 0.15-0.30.

Graphite/Nickel thermal spray finish is available up to 480°C usage.

Our Range

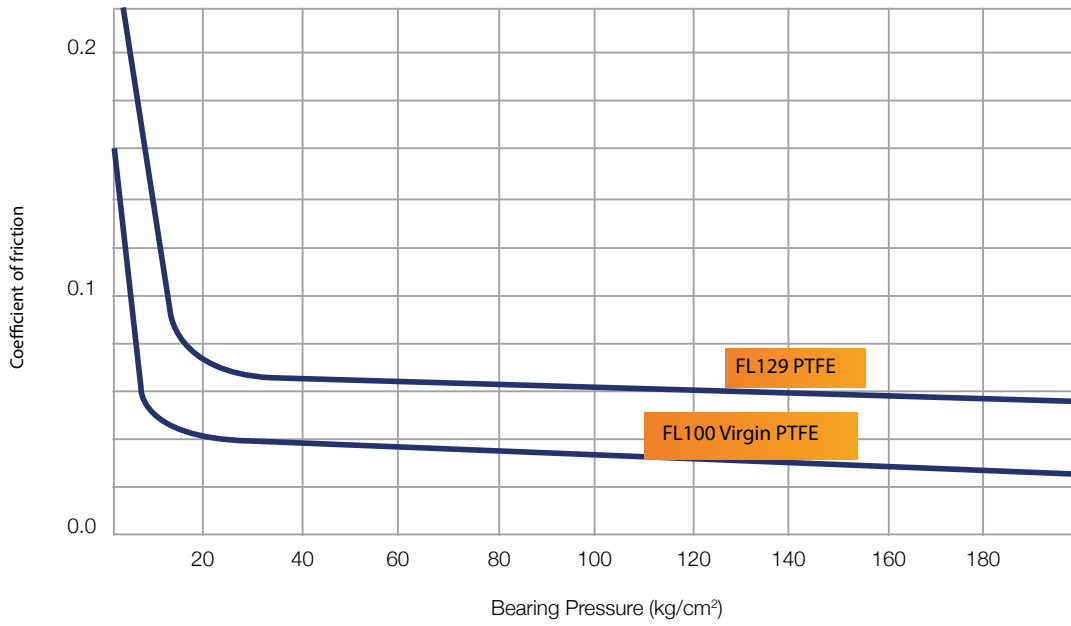
P TFE Slide Bearings Technical Data

Technical advantages of Fluoroglide® PTFE
Skidways and Fluoroglide® PTFE Slide
Expansion Bearings

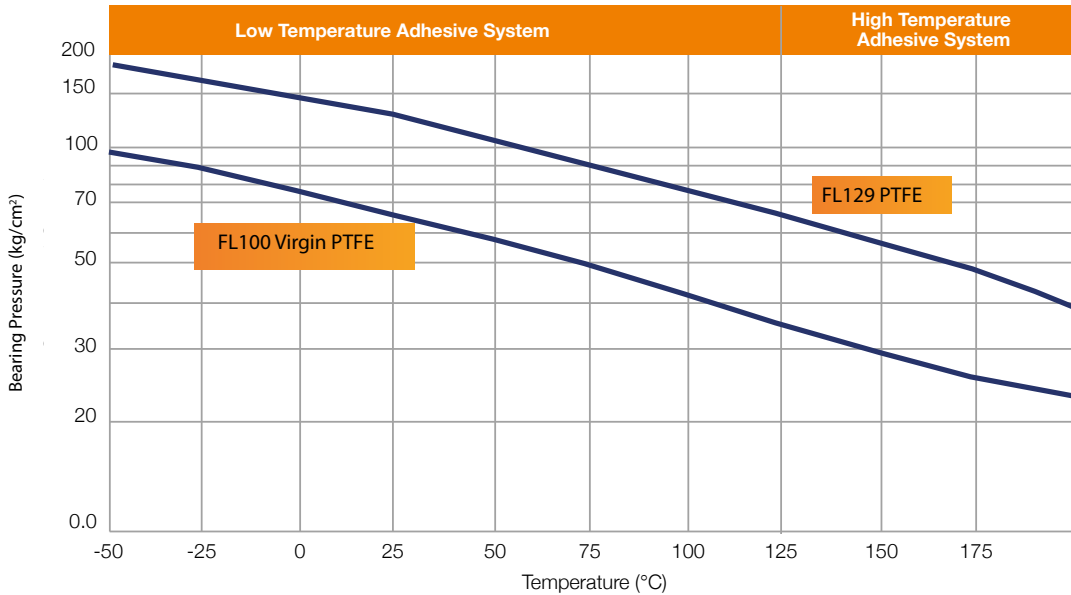
- PTFE has the lowest coefficient of friction of any known solid 'engineering material' including lubricated metal
- No stick-slip action
- Fluoroglide® bearings have a near infinite life, since chemicals and weather have no effect on PTFE - moisture absorption is less than 0.01% even under icing conditions or immersion and the material is chemically inert
- No maintenance required
- Fluorinoid® PTFE will never cold weld to itself
- Fluoroglide® Bearings are easily installed on site
- Fluoroglide® PTFE Bearings are less bulky than alternative assemblies
- There is no possibility of fatigue failure
- Small particles which may become embedded do not cause any binding of the surfaces
- Fluoroglide® Bearings can accommodate some misalignment in construction



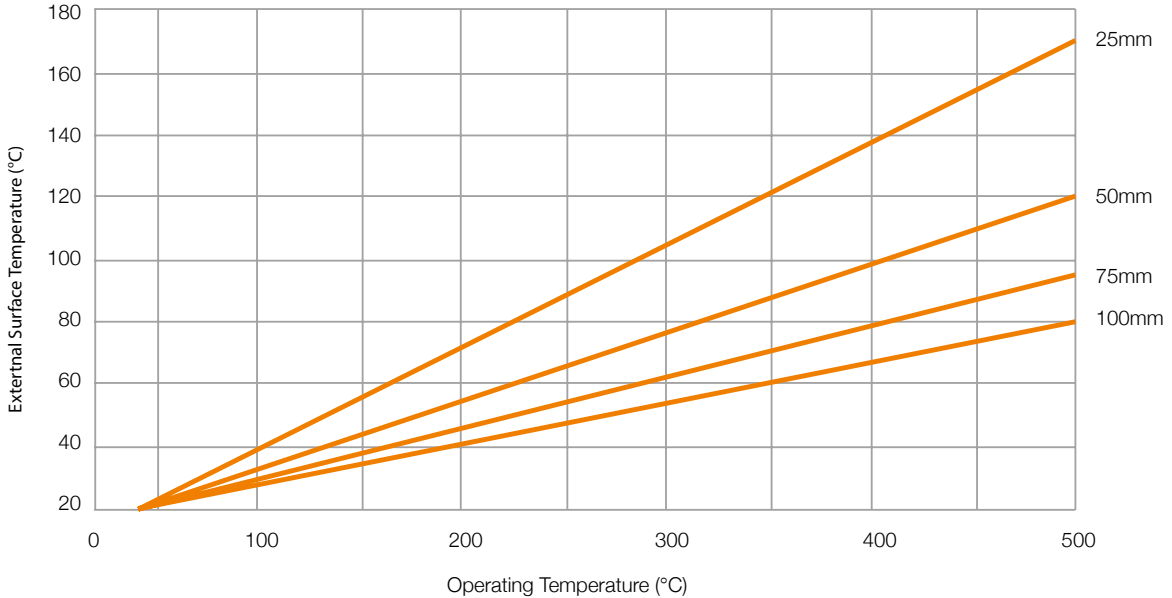
Coefficient of friction: Effect of Load



Recommended maximum Bearing Pressure against Temperature



Fluorex 500: Temperature change for various thickness



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