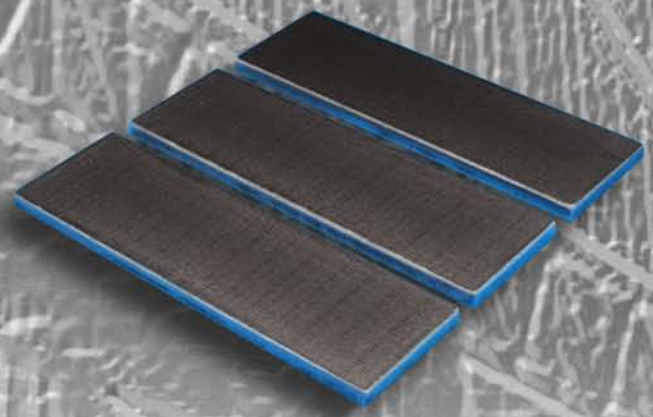
Structural

Lubron® TF

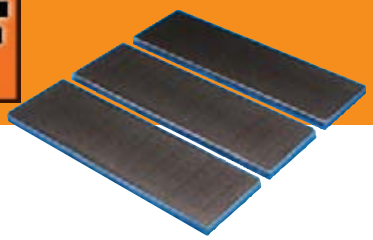
Self-Lubricating PTFE Expansion Bearings

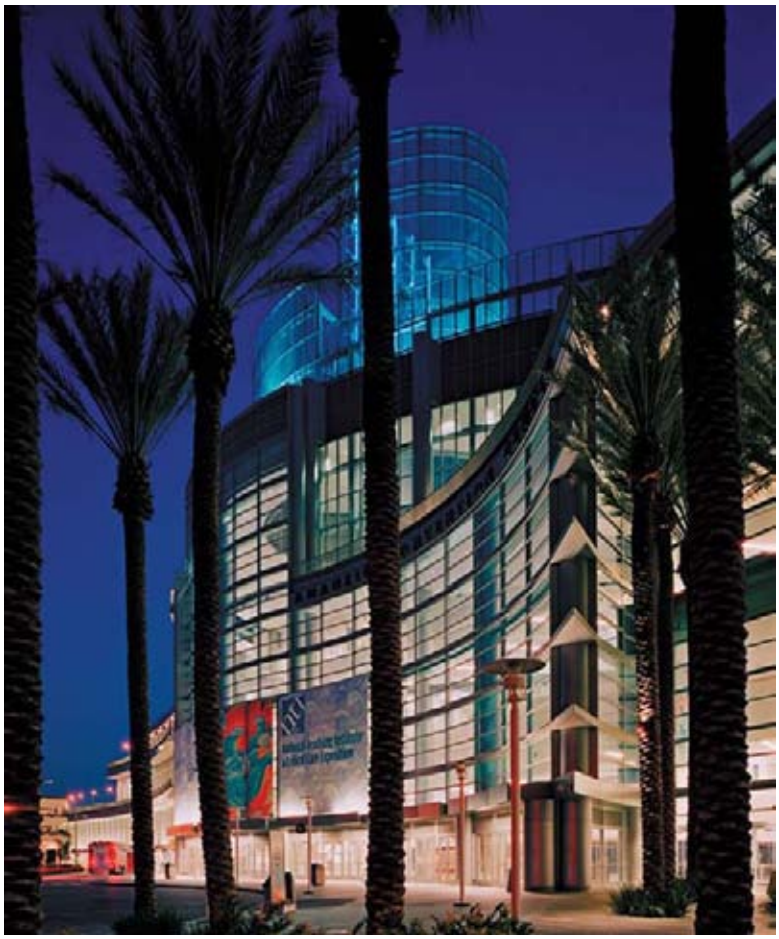


Lubron Bearing Systems

Bearings to move the world.

Lubron TF
Self-Lubricating PTFE Expansion Bearings





LUBRON® TF expansion bearings are designed to accommodate unidirectional and omni-directional sliding movement in a single plane, and are recommended for applications subject to limited angular misalignment. LUBRON TF expansion bearing assemblies typically consist of an upper sole plate and a lower bearing plate, and are available either unguided or guided.

LUBRON TF expansion bearings provide exceptionally low coefficient of friction and heavy load capability, and are fabricated, tested and inspected in accordance with the latest ASTM, ASHTO and State DOT standards, plans and specifications. LUBRON TF expansion bearings have been performing flawlessly in a variety of rigorous structural applications for more than 25 years.

SUPERIOR CONSTRUCTION

LUBRON TF woven PTFE fabric liners offer the most advanced design and construction available for high load and low coefficient of friction applications. LUBRON TF's proprietary construction provides full support of the individual PTFE fibers and insures a rigid bond of the fabric to the bearing substrate, two basic requirements that DuPont specifies for the successful use of Teflon® as a bearing surface. The effective entrapment of the PTFE and glass fibers with high strength bonding resins eliminates cold flow and minimizes heat buildup. Low shear stresses and 100% supported bearing surfaces are two important advantages LUBRON TF bearings offer over other mechanically locked systems.

Unguided Expansion Bearings- *bearings capable of sliding movement unrestricted in any horizontal direction.*

Guided Expansion Bearings- *bearings capable of sliding movement restricted to one horizontal direction.*

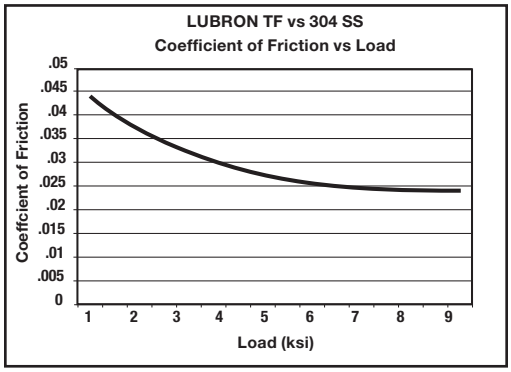
Teflon® is a registered trademark of DuPont

Lubron TF
Self-Lubricating PTFE
Expansion Bearings

HIGH LOAD CAPACITY

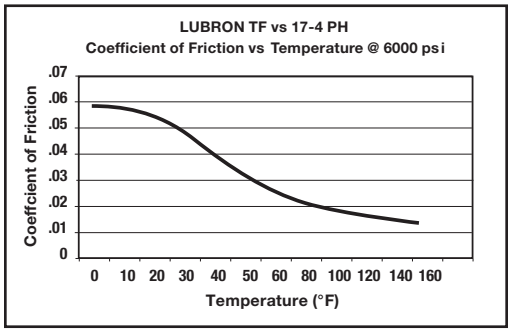
LUBRON TF expansion bearings are generally designed to accommodate bearing loads of 3.5 ksi (24 MPa) to 10 ksi (69 MPa), and can withstand loads in excess of 60 ksi (414 MPa) without cold flow.

The high molecular orientation of PTFE fiber gives it approximately 25 times the tensile strength of PTFE resins, making PTFE woven fabrics particularly suitable for heavy load applications.



LOW FRICTION

The coefficient of friction for PTFE fibers is the lowest of all known fibers. The static coefficient of friction is only slightly higher than the dynamic value, minimizing stick-slip. LUBRON TF expansion bearings typically exhibit coefficients of friction of less than 4.0%, depending on the bearing load, temperature, velocity, finish and hardness of the mating surface.



LOW WEAR RATE

LUBRON TF bearings have a very low rate of wear, which is defined in terms of volumetric loss of material over time. Volumetric wear is approximately proportional to the unit load multiplied by the distance traveled, and is generally expressed as follows:

$W = KPVT$

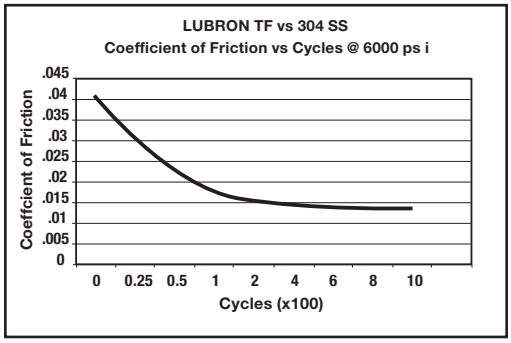
where W = wear depth, in (cm)

K = proportionality constant, in^3-min/ft-lb-hr (cm^3-min/m-kg-hr)

P = bearing pressure, psi (kg/cm^2)

V = surface velocity, ft/min (m/min)

T = elapsed time, hr



K values for LUBRON TF bearings have been derived from independent testing, and can be used to determine the amount of wear that will occur over a period of time. For most applications, a value of $K = 9.1 \times 10^{-10}$ in^3-min/ft-lb-hr is appropriate, which would be equivalent to 0.00045 inches of wear after 100,000 inches of travel at 3.5 ksi (24 MPa).

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HIGH SHEAR RESISTANCE

LUBRON TF woven PTFE fabric liner is permanently bonded to the substrate metallic surface, and will resist a minimum 25% of the allowable vertical load in horizontal shear between the adhering elements as tested in accordance with Federal Specification MMM-A-175 Method 1033.

THERMAL CAPABILITIES

LUBRON TF bearings have excellent thermal stability and are recommended for continuous operation from -148°F (-100°C) to 500°F (260°C) and intermittent exposure up to 550°F (288°C). Coefficient of friction generally decreases with an increase in surface temperature.

DESIGN PARAMETERS

LUBRON TF expansion bearings shall be designed in accordance with the following requirements unless otherwise specified by the Project Plans, Specifications and Special Provisions:

- Expansion bearings shall accommodate the maximum total vertical load required unless otherwise specified. Maximum vertical load is assumed to be the total dead and live loads.
- The projected area of the woven PTFE surface shall be designed for a working stress under full vertical load unless otherwise specified.
- Expansion bearings shall be designed to resist the maximum horizontal load, or at least 10% of the maximum vertical load, unless otherwise specified.
- Expansion bearings shall be designed to accommodate the total movement as specified. Unguided and guided sole plates shall completely cover the expansion plate in all longitudinal and lateral operating positions with a minimum 1/2” (12.7 mm) distance from the edge of the sole plate sliding surface to the edge of the bearing plate for every direction of movement.
- All welded and bolted connections shall be designed to resist the maximum horizontal load, or at least 10% of the maximum vertical load, unless otherwise specified.

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EXPANSION BEARING COMPONENTS

Bearing Plate

Lower component consisting of a woven PTFE fabric liner permanently bonded to carbon steel or stainless steel. The upper side of the bearing plate is permanently lubricated and maintenance-free. For guided expansion bearings, two sides of the bearing plate which slide against the guide bars may also be permanently lubricated and maintenance-free. The PTFE fabric liner is interwoven with secondary bondable glass fibers, impregnated with thermosetting resins, and bonded under temperature and pressure to the metallic substrate. The PTFE fibers predominate on the bearing surface, and provide low tangential shear stress and high wear resistance. The PTFE fabric liner varies in thickness from 1/32" (0.8 mm) to 3/32" (2.4 mm) depending on the application, and will accommodate edge loading and angular misalignment up to 1/32".

Sole Plate

Upper component with a stainless steel sliding surface, consisting of 1/8" (3.2 mm) thick ASTM A240 Type 304 stainless steel sheet full seam welded to carbon steel. Sole plates are also available in solid stainless steel or with a carbon steel sliding surface hard dense chromium plated in accordance to Federal Specification QQ-C-320B Class 2 with a Rockwell C60 hardness. Guided sole plates shall have guide bars secured to the sole plate by welding or high strength fasteners. The distance between the guide bars, as measured perpendicularly to the bars along the full length of the sole plate, shall have a tolerance of 1/32" (0.8 mm) of the nominal dimension. The sole plate and guide bar sliding surfaces shall be polished to a maximum 20 microinch (0.5 micrometer) finish.

SIZING GUIDE

To accommodate maximum horizontal movement, the required sole plate sizes for standard bearing plate sizes can be determined using the following Tables.

Using the appropriate bearing design load and maximum vertical load, select the proper bearing plate size and corresponding sole plate size. The maximum bearing movement, dimensions "E" and "F", must be added to dimensions "C" and "D" respectively.

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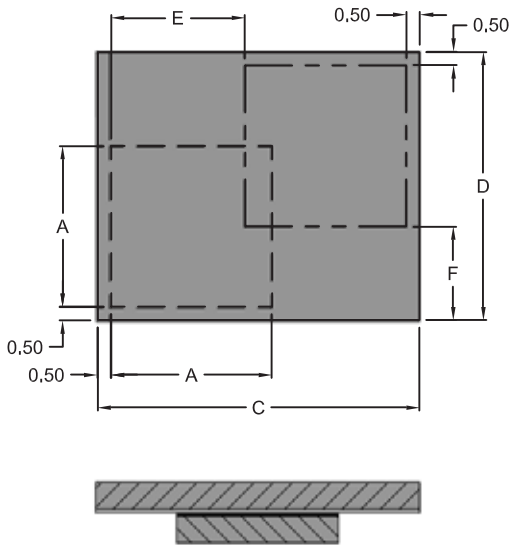
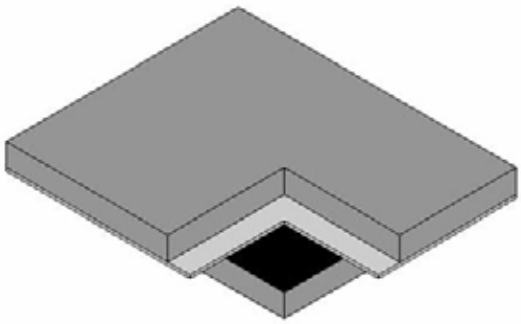
UNGUIDED BEARING ASSEMBLIES





SIZE CHART (INCHES)

BEARING DESIGN LOAD (ksi)				BRG PLATE	UNGUIDED SOLE PLATE	
3.5	5.0	7.0	10.0	A	C	D
MAXIMUM VERTICAL LOAD (kips)				(inches)	(inches)	(inches)
31	45	63	90	3	4.0 + E	4.0 + F
56	80	112	160	4	5.0 + E	5.0 + F
87	125	175	250	5	6.0 + E	6.0 + F
126	180	252	360	6	7.0 + E	7.0 + F
171	245	343	490	7	8.0 + E	8.0 + F
224	320	448	640	8	9.0 + E	9.0 + F
283	405	567	810	9	10.0 + E	10.0 + F
350	500	700	1000	10	11.0 + E	11.0 + F
423	605	847	1210	11	12.0 + E	12.0 + F
504	720	1008	1440	12	13.0 + E	13.0 + F
591	845	1183	1690	13	14.0 + E	14.0 + F
686	980	1372	1960	14	15.0 + E	15.0 + F
787	1125	1575	2250	15	16.0 + E	16.0 + F
896	1280	1792	2560	16	17.0 + E	17.0 + F
1011	1445	2023	2890	17	18.0 + E	18.0 + F
1134	1620	2268	3240	18	19.0 + E	19.0 + F
1263	1805	2527	3610	19	20.0 + E	20.0 + F
1400	2000	2800	4000	20	21.0 + E	21.0 + F

SIZE CHART (MM)

BEARING DESIGN LOAD (MPa)				BRG PLATE	UNGUIDED SOLE PLATE	
24	35	48	70	A	C	D
MAXIMUM VERTICAL LOAD (kN)				(mm)	(mm)	(mm)
135	197	270	394	75	100 + E	100 + F
240	350	480	700	100	125 + E	125 + F
375	547	750	1094	125	150 + E	150 + F
540	788	1080	1575	150	175 + E	175 + F
735	1072	1470	2144	175	200 + E	200 + F
960	1400	1920	2800	200	225 + E	225 + F
1215	1772	2430	3544	225	250 + E	250 + F
1500	2188	3000	4375	250	275 + E	275 + F
1815	2647	3630	5294	275	300 + E	300 + F
2160	3150	4320	6300	300	325 + E	325 + F
2535	3697	5070	7394	325	350 + E	350 + F
2940	4288	5880	8575	350	375 + E	375 + F
3375	4922	6750	9844	375	400 + E	400 + F
3840	5600	7680	11200	400	425 + E	425 + F
4335	6322	8670	12644	425	450 + E	450 + F
4860	7088	9720	14175	450	475 + E	475 + F
5415	7897	10830	15794	475	500 + E	500 + F
6000	8750	12000	17500	500	525 + E	525 + F

Lubron TF
Self-Lubricating PTFE
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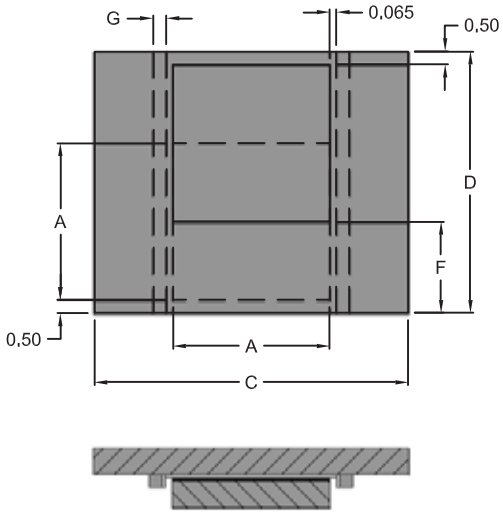
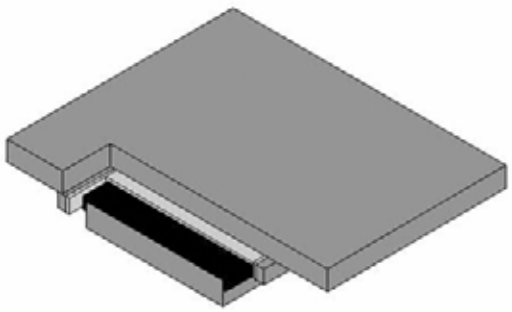
GUIDED BEARING ASSEMBLIES





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MAXIMUM VERTICAL LOAD (kips)				(inches)	(inches)	(inches)
31	45	63	90	3	4.0 + 2G	4.0 + F
56	80	112	160	4	5.0 + 2G	5.0 + F
87	125	175	250	5	6.0 + 2G	6.0 + F
126	180	252	360	6	7.0 + 2G	7.0 + F
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5415	7897	10830	15794	475	500 + 2G	500 + F
6000	8750	12000	17500	500	525 + 2G	525 + F

Lubron TF
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Expansion Bearings

MATERIALS

All materials used in the manufacture of LUBRON TF expansion bearings shall meet the following requirements unless otherwise specified in the Project Plans, Specifications and Special Provisions:

- Structural steel shall conform to the requirements of ASTM A36, ASTM A709 Grade 36 (250), ASTM A709 Grade 50 (345), ASTM A572 Grade 50 (345), ASTM A709 Grade 50W (345W) or ASTM A588 Grade A.
- Stainless steel shall conform to the requirements of ASTM A240 Type 304 or Type 316.
- Hard chromium plating shall conform to the requirements of Federal Specification QQ-C-320B Class 2.
- High strength bolts and studs shall conform to the requirements of ASTM A325 Type 1 or ASTM A449 Type 1 unless otherwise specified. Heavy hex nuts shall conform to the requirements of ASTM A194 Grade 2H or ASTM A563 unless otherwise specified, and hardened steel washers shall conform to the requirements of ASTM F436 unless otherwise specified.
- PTFE (polytetrafluoroethylene) surfaces shall consist of unfilled PTFE woven fabric made from oriented multi-filament 100% virgin PTFE fibers and other reinforcing fibers. The resin in the filaments shall be virgin PTFE material (not reprocessed) meeting the requirements of ASTM Designation D4441 Type VI (superceding ASTM Designation D1457). The PTFE fabric shall have a minimum thickness of 1/32" (0.8 mm) and a maximum thickness of 3/32" (2.4 mm) after compression.

WELDING

Welding of expansion bearing components shall be performed in accordance with the requirements of ANSI/AASHTO/AWS D1.1, AWS D1.5 or AWS D1.6 unless otherwise specified. Welding of the expansion plate shall be permitted providing welding procedures are established which restrict the maximum temperature reached by the bonded area to less than 300°F (150°C) as determined by temperature-indicating wax pencils or other suitable means.

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CORROSION PROTECTION

Corrosion protection including painting and metallic coating of all exposed carbon steel plates and fasteners shall be performed in accordance with Project Plans, Specifications and Special Provisions.

TESTING

Expansion bearing assemblies shall be tested if required in full compliance with the Project Plans, Specifications and Special Provisions. Testing shall be performed in-house or by an independent testing laboratory subject to the approval of the Project Engineer. Bearings which do not fully satisfy all the testing and inspection requirements shall be replaced or repaired to the satisfaction of the Project Engineer.

QUALITY ASSURANCE

Quality Assurance requirements for the manufacture and inspection of expansion bearing assemblies shall be in strict accordance with the requirements ISO 9002. Every phase of manufacture shall be monitored by Quality Control personnel to ensure that all materials and workmanship meet or exceed the requirements of the Project Plans, Specifications and Special Provisions.

ENGINEERING SERVICES

We offer a variety of engineering services from the selection of bearing materials to in-house testing of bearing assemblies to simulate load, movement, velocity, temperature and other environmental conditions present during the actual operation of LUBRON TF bearings. Bearing design, AutoCAD® drawing preparation, testing, consulting and on-site engineering services are available upon request.

GUARANTEED PERFORMANCE

Our leadership and reputation for service and product knowledge has been achieved through a strong commitment to total customer satisfaction. Every LUBRON TF bearing is guaranteed to perform reliably and trouble-free, and every effort is made to accommodate our customer's delivery requirements in the shortest time possible.

ORDERING INFORMATION

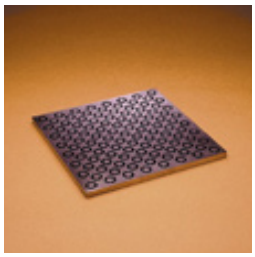
Information for ordering LUBRON TF expansion bearing assemblies shall include the following:

- Type of bearing (unguided or guided)
- Maximum total vertical load (dead & live)
- Maximum allowable concrete bearing load
- Maximum longitudinal and transverse movements
- Bearing offset if required
- Anchorage required
- Corrosion protection required
- Proof testing required

LUBRON Self-Lubricating Bearings for Structural Applications

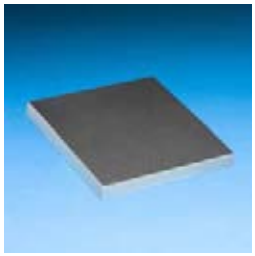
LUBRON SL

LUBRON SL bearings are widely used in structural applicatons for loads up to 8,000 psi. Available in a variety of high strength bronze alloys, LUBRONB SL bearings are permanently embedded with solid lubricants contained in trepanned or circular recesses.



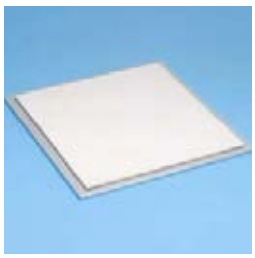
LUBRON TF

LUBRON TF woven PTFE fiber bearings are designed to provide the lowest possible coefficient of friction for high load structural applications. Interwoven with secondary glass fibers and bonded under pressure and temperature to carbon steel or stainless steel substrates, LUBRON TF bearings are capable of static loads up to 60,000 psi.



LUBRON TR

LUBRON TR resin slide bearings provide an economic alternative for low friction applications with loads up 2,000 psi. LUBRON TR slide bearings consist of PTFE resin sheets bonded to either a combination of carbon steel, stainless steel, elastomer, or fabric pads. For higher loads, LUBRON TR bearings are also available reinforced with the addition of up to 25% glass fibers.



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