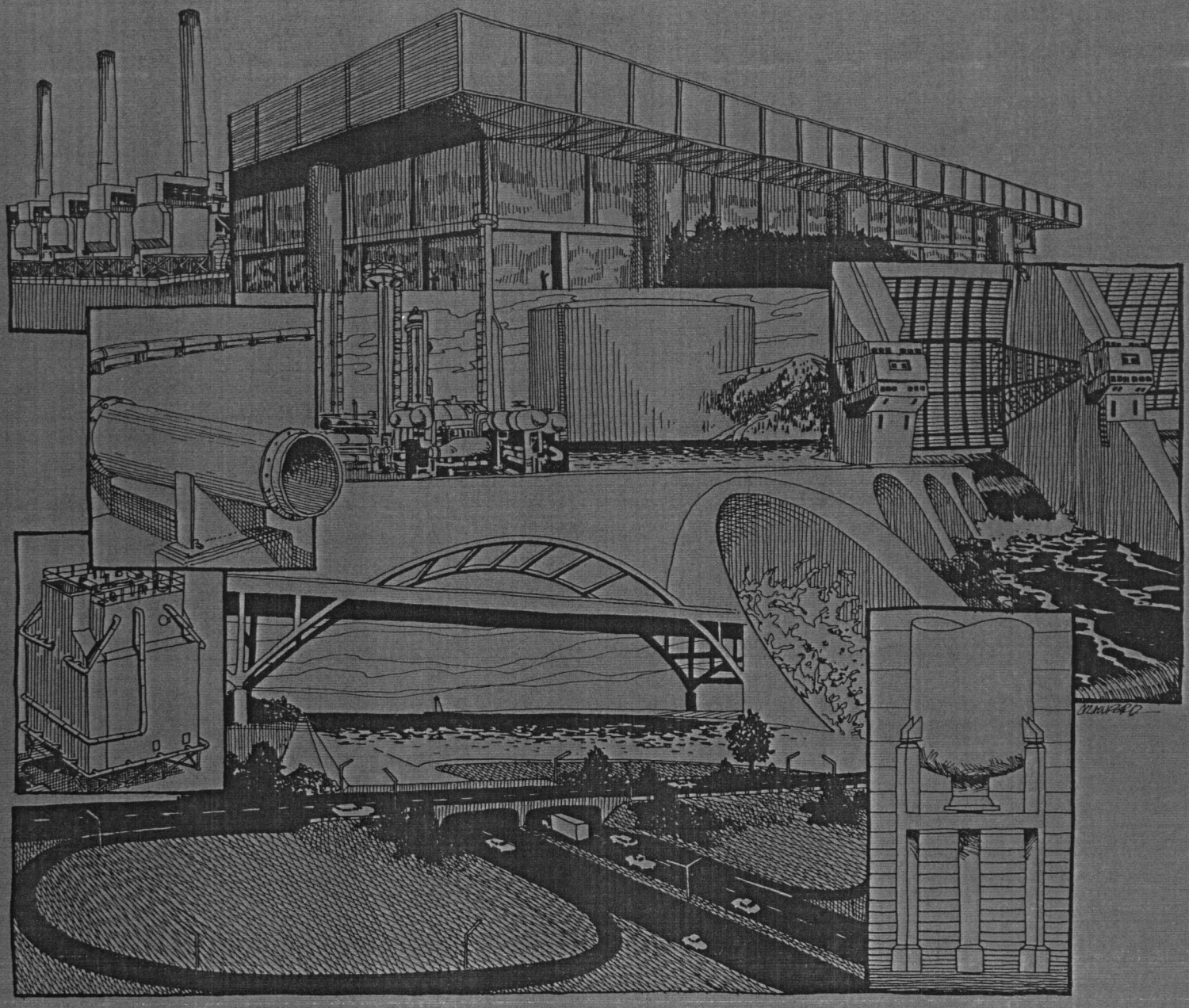
LUBRITE F®
EXPANSION BEARINGS



Lubrite® Technologies

LUBRITE F IS A COMPOSITE HIGH-COMPRESSION BEARING FOR STRUCTURAL APPLICATIONS.

The construction of Lubrite F® bearings is unique. A pad of woven Teflon® fiber is pressed onto the geometrically-grooved surface of a metal substrate. This creates a firm mechanical lock between the Teflon fabric and the substrate, providing very high shear resistance at the fabric/substrate interface.

Lubrite F with woven Teflon fiber has several important advantages over composite bearings which rely only on Teflon resin.

- Woven Teflon fiber has approximately 30 times the bearing strength of Teflon resin.
- The mechanical fabric/substrate lock circumvents the difficult chemical bonding process used to join a Teflon resin pad to its substrate.
- High bearing strength in combination with high shear resistance virtually eliminates cold flow under structural loads and maintains a low coefficient of friction.

The Woven Teflon Surface.

Teflon fiber is unaffected by weathering, moisture and severe chemical reagents. There are significant benefits in the bearing properties of Teflon fibers compared to Teflon resin, and a woven Teflon bearing is superior in many ways to a bearing utilizing Teflon resin only. The molecular orientation of the Teflon fiber results in compressive strength approximately 30 times that of resin. A proportional increase in resistance to cold flow is also experienced.

Comparison of properties of TEFLON PTFE fiber, PTFE resin provided by The Dupont Company.

	TEFLON PTFE FIBER	TEFLON PTFE RESIN
Density, g/cc	2.1	2.2
Ultimate Tensile Strength, psi*	52,500	2,000
Elongation at Break %*	19	300
Initial Modulus psi*	360,000	60,000
Load Bearing Capacity without cold flow, psi	60,000	2,000
Coefficient of friction low as	0.01	0.02

*At 70°F, 65% R.H.

The figures given in this table are for comparative purposes only. Compressive strengths and coefficients of friction of the resins and fibers vary considerably depending on a variety of factors in component design and use.

Teflon fiber has demonstrated exceptional stability in intermittent application at temperature extremes of 425°F and -100°F. The performance of Lubrite F bearings actually improves as loads and temperatures increase, providing a built-in safeguard against overloading.

The Metal Substrate.

Substrates are commonly formed in alloy steel, stainless steel and bronze. Since Lubrite has over 80 years of experience in high-compression bearings, the Lubrite engineering department can assist in the specification of the correct metal substrate.

Configuration.

Lubrite F bearings can be custom designed to accommodate expansion, rotation and/or deflection. The physical size of the Lubrite F pad is virtually unlimited.

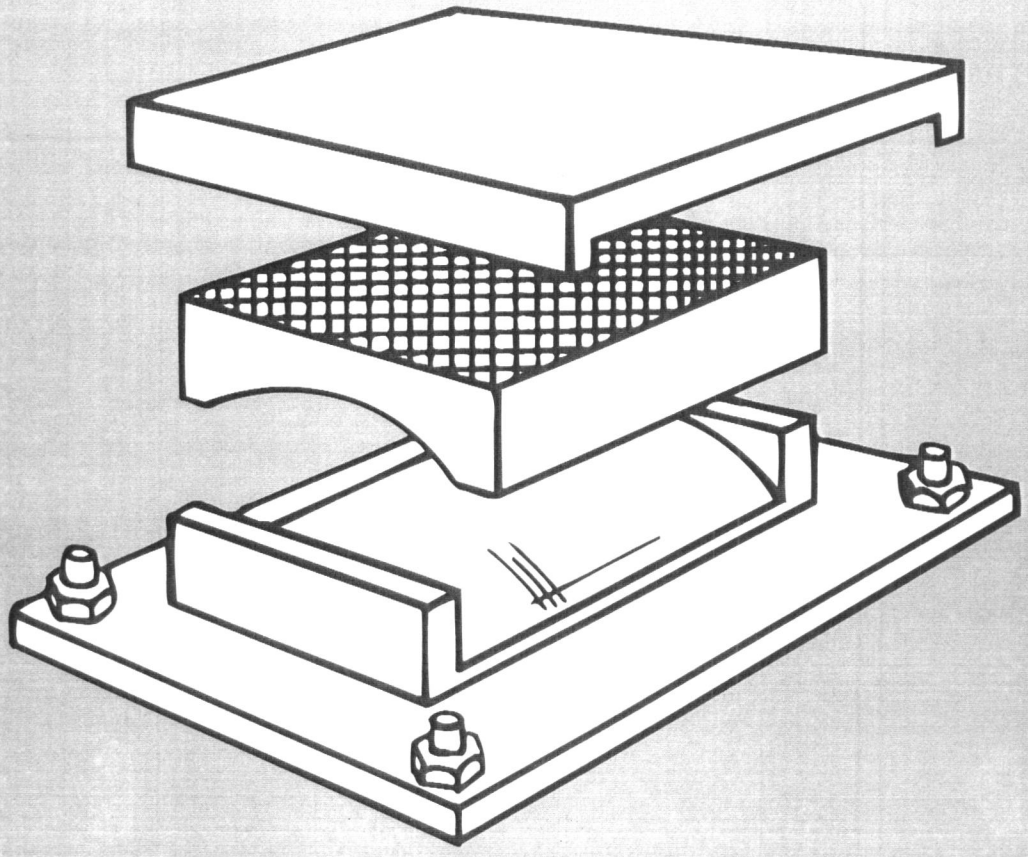
Coefficient of Fiction.

Operating under loads up to 6000 psi and temperatures between 425°F and -100°F, Lubrite F offers a coefficient of friction that is considerably lower than that of lubricated metal bearings. Specific information is available upon request.

Applications.

Lubrite F may be custom designed and built for virtually any heavy duty bearing application. Successful installations include bridges, buildings, pollution control equipment, tank and pipe supports as well as refinery and mass transit applications.

Contact the Lubrite Technologies Sales and Engineering Department with details of your application.



Lubrite F® radius plates are flat on one face and either concave or convex on the opposite face. The radius face accommodates the deflection or rotation of the structural member, while the flat face provides for linear expansion and contraction which may be guided or non-guided for movement in any direction.

LUBRITE F BEARING SPECIFICATIONS.

Bearings with PTFE Sliding Surfaces.

Polytetrafluoroethylene (PTFE) self-lubricating sliding surfaces shall be composed of 100% virgin unfilled Polytetrafluoroethylene fabric manufactured from oriented multifilament PTFE Fluorocarbon fibers. The resin from which these fibers are produced shall be 100% virgin material meeting the requirements of ASTM Designation D-1457. Specific gravity shall be 2.13 to 2.19 as determined by ASTM Method D-792, Test Al , A2 or A3.

The PTFE fabric shall have a minimum thickness of 1/32" and a maximum thickness of 1/8" after compression. The test for cold flow is to be ASTM D-621 at 2000 psi for 24 hours at 70°F Properties of PTFE fiber shall be as follows:

Load Borne without Cold Flow	60,000 psi
Ultimate Tensile Strength	52,500 psi
Elongation at Break	19%
Initial Modulus	360,000 psi
Maximum Coefficient of Friction @3500 psi, Static or Dynamic	.04

The Application Test Method for determination of Ultimate Tensile Strength and Elongation at Break shall be D-2256.

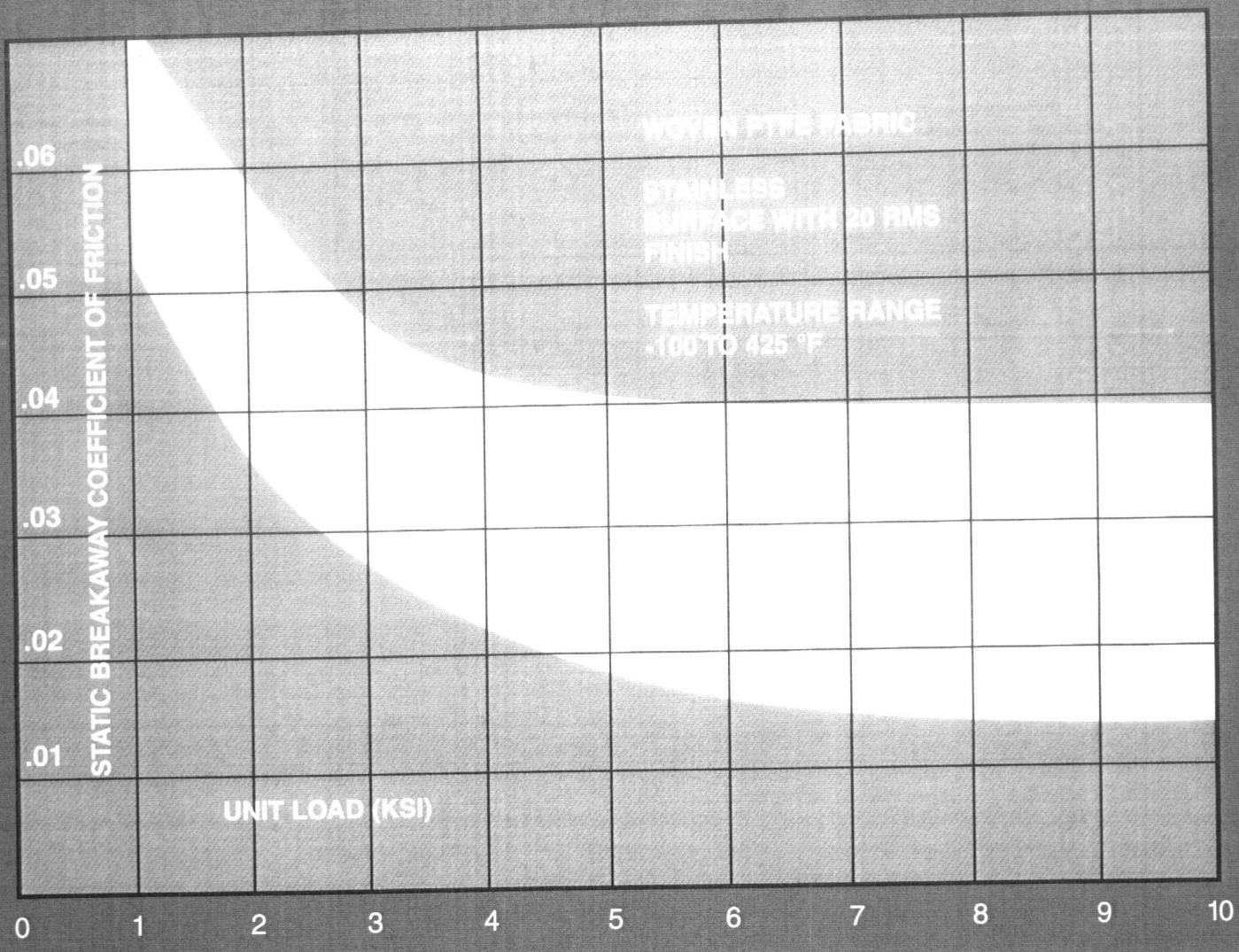
The Coefficient of Friction shall be evaluated in a test which simulates the application parameters. The Static Coefficient of Friction shall be determined at breakaway by dividing the horizontal force to start motion by the vertically applied force which shall be equivalent to application pressure. The Dynamic Coefficient of Friction shall be determined by the same method, but at a speed not exceeding 1" per minute in order to approximate actual conditions.

Welding to a steel plate which has a bonded PTFE surface may be permitted providing welding procedures are established which restrict the maximum temperature reached by the bond area to less than 300°F (150°C) as determined by temperature indicating wax pencils or other suitable means.

The PTFE fabric shall be mechanically interlocked with the steel substrate plate under factory controlled conditions in a manner approved by the engineer. The interlock should be equally distributed over no less than 25% of the bearing area and shall be sufficiently strong to develop 10% of the allowed vertical load in the horizontal shear plane. Adhesive material may be used to supplement the mechanical bond but the 10% development shall be by mechanical interlock only.

The stainless steel surface mating to the PTFE should be an accurate, flat, cylindrical or spherical surface as required by the design and shall have a surface finish of 20 micro inches. The stainless steel surface shall be attached by welding or other suitable mechanical means approved by the engineer.

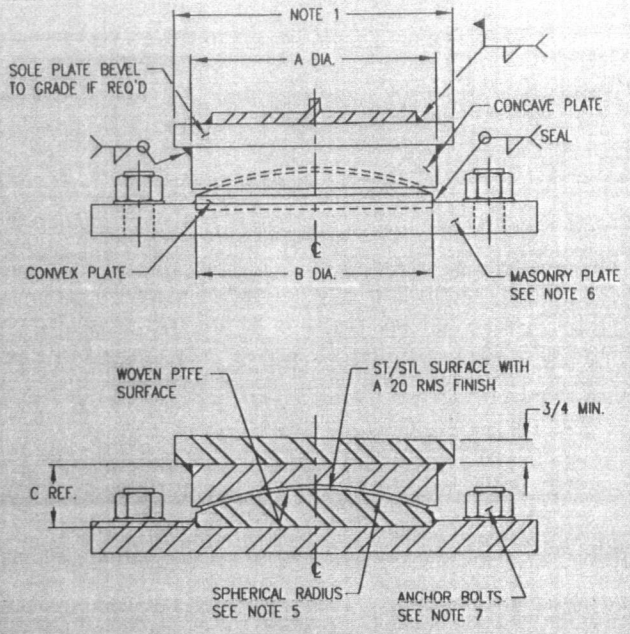
The manufacturer shall be required to furnish facilities for the testing and inspection of the complete bearings or representative samples in his plant or at an independent test facility. Manufacturer's certification of all materials used in the construction of the bearings shall be furnished.


.06
.05
.04
.03
.02
.01
STATIC BREAKAWAY COEFFICIENT OF FRICTION
WOVEN PTFE FABRIC
STAINLESS
SURFACE WITH 20 RMS
FINISH
TEMPERATURE RANGE
-100 TO 425 °F
UNIT LOAD (KSI)
0
1
2
3
4
5
6
7
8
9
10

LUBRITE F
SPHERICAL BEARINGS

BEARING LOADINGS (KIPS)				PLATE DIMENSIONS FOR 3 1/2 KSI BEARINGS					PLATE DIMENSIONS FOR 6 KSI BEARINGS				
				CONCAVE PLATE		CONVEX PLATE	OVERALL HGT		CONCAVE PLATE		CONVEX PLATE	OVERALL HGT	
							EXPAN.	FIXED				EXPAN.	FIXED
MAX. VERT. LOAD	MIN VERT. LOAD	LONGIT. LOAD	TRANS. LOAD	A	RADIUS	B	C	C	A	RADIUS	B	C	C
100	50	10	10	8	9	7	2 9/16	2 3/8	6 1/2	7	5 1/2	2 7/16	2 1/4
200	100	20	20	10 1/4	12	9 1/2	2 11/16	2 1/2	8 1/4	8	7 1/4	2 1/2	2 5/16
300	150	30	30	12	15	11 1/2	2 3/4	2 9/16	9 3/4	10	9	2	2
400	200	40	40	13 3/4	18	13 1/2	2 15/16	2 3/4	11	12	10 1/4	2 3/4	2 9/16
500	250	50	50	15 1/4	21	15	3	2 13/16	12	12	11 1/4	3	2 13/16
600	300	60	60	16 1/2	24	16 3/4	3 1/8	2 15/16	13	15	12 1/2	2 15/16	2 3/4
700	350	70	70	17 3/4	24	17 3/4	3 5/16	3 1/8	14	15	13 1/2	3 3/16	3
800	400	80	80	19	27	19 1/4	3 3/8	3 3/16	14 3/4	15	14 1/4	3 3/8	3 3/16
900	450	90	90	19 3/4	27	20	3 1/2	3 5/16	15 1/2	18	15	3 1/4	3 1/16
1000	500	100	100	20 3/4	30	21 1/4	3 9/16	3 3/8	16 1/4	18	16	3 1/2	3 5/16
1100	550	110	110	21 3/4	30	22 1/4	3 3/4	3 9/16	17 1/4	18	16 3/4	3 11/16	3 1/2
1200	600	120	120	22 3/4	33	23 1/2	3 3/4	3 9/16	17 3/4	21	17 3/4	3 9/16	3 3/8
1300	650	130	130	23 1/2	33	24 1/4	3 7/8	3 11/16	18 1/2	21	18 1/4	3 11/16	3 1/2
1400	700	140	140	24 1/4	36	25	3 13/16	3 5/8	19	21	18 3/4	3 13/16	3 5/8
1500	750	150	150	25 1/4	36	26 1/4	4 1/16	3 7/8	19 1/2	21	19 1/4	3	3
1600	800	160	160	26	39	27	4	3 13/16	20 1/4	24	20 1/4	3 13/16	3 5/8
1700	850	170	170	26 3/4	39	27 3/4	4 1/8	3 15/16	20 3/4	24	20 3/4	3 15/16	3 3/4
1800	900	180	180	27 1/2	39	28 1/2	4 5/16	4 1/8	21 1/2	24	21 1/2	4 1/8	3 15/16
1900	950	190	190	28	42	29 1/4	4 1/4	4 1/16	22	24	22	4 1/4	4 1/16
2000	1000	200	200	28 3/4	42	30	4 3/8	4 3/16	22 1/4	27	22 1/2	4 1/16	3 7/8

NOTES. 1. Minimum sole plate width must be equal to "A" plus 1.5 inches for expansion-guided (plus 1 inch for fixed) and also wider than beam flange by 1 inch to accommodate down hand welding. 2. Minimum sole plate length must be equal to "A" plus 1 inch plus maximum expansion. 3. Minimum free expansion sole plate width must be equal to "A" plus 1 inch plus maximum expansion wider than beam flange by 1 inch to accommodate down hand welding. 4. Fixed sole plate length must be greater than "A" plus 1 inch. 5. Spherical radius calculated using longitudinal and transverse loading equal to 10% of maximum vertical load, a minimum dead load of 50% of the maximum vertical load and plus or minus 2° rotation. 6. Masonry plate length width and thickness are dependent on allowable concrete unit loading, physical restrictions and bending moments. 7. Anchor bolt size and quantities per appropriate code. 8. All dimensions shown are for general concept only and may be modified to meet specific application parameters.



SECTION X-X

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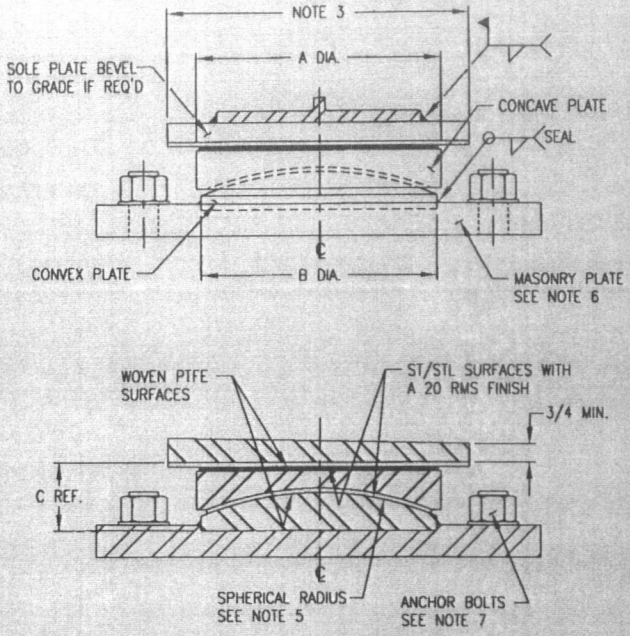
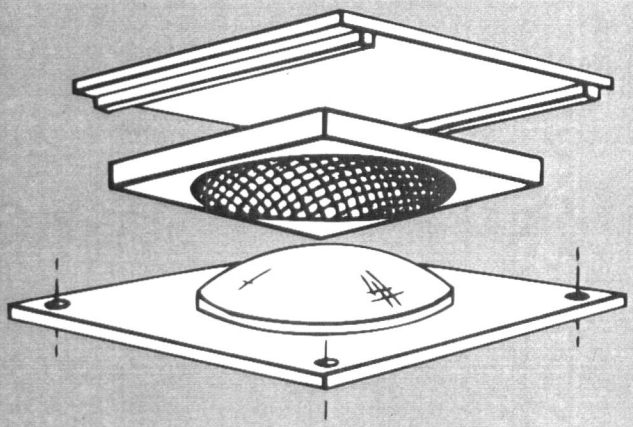
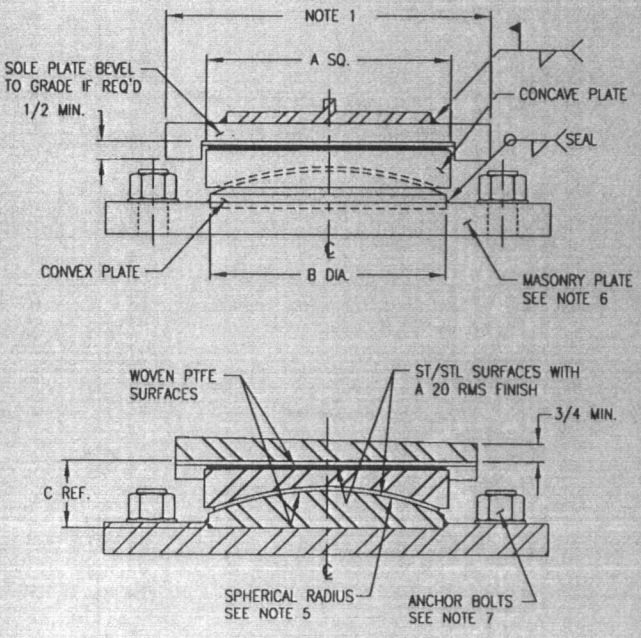


SECTION Y-Y

EXPANSION (NON-GUIDED)



Lubrite F® spherical plates may provide for motion on the flat face as well as the concave or convex face. Spherical provide for rotation or deflection in any direction as well as normal expansion and contraction.



SECTION Z-Z

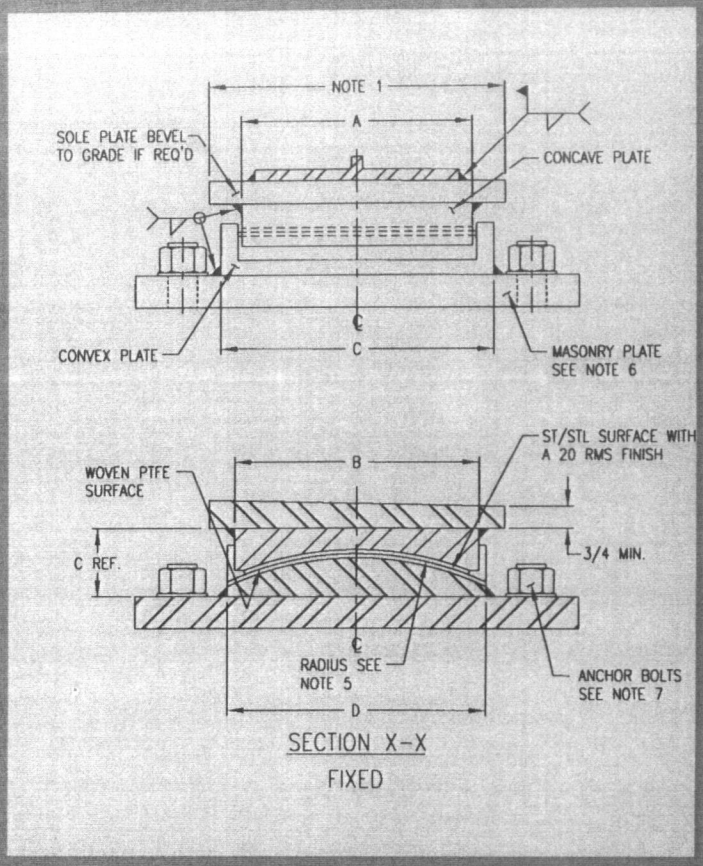
EXPANSION (GUIDED)

LUBRITE F RADIAL BEARINGS

BEARING LOADINGS (KIPS)			PLATE DIMENSIONS FOR 3 1/2 KSI BEARINGS						
			CONCAVE PLATE			CONVEX PLATE		OVERALL HGHT.	
								EXPAN.	FIXED
MAX. VERT. LOAD	MIN. DEAD LOAD	HORIZ. LOAD	A	B	RADIUS	C	D	E	E
100	50	10	6 1/4	6 3/4	10	7 3/4	6 1/2	2 3/16	2
150	75	15	7 1/4	8	12	8 3/4	8	2 3/8	2 3/16
200	100	20	8 1/4	9	15	9 3/4	9	2 3/8	2 3/16
250	125	25	9 1/4	9 3/4	15	10 3/4	9 3/4	2 1/2	2 5/16
300	150	30	10 1/4	10 3/4	18	11 3/4	11	2 1/2	2 1/2
400	200	40	11 1/4	12 1/4	21	12 3/4	12 3/4	2 5/8	2 7/16
500	250	50	12 1/4	13 3/4	24	13 3/4	14 1/4	2 3/4	2 9/16
600	300	60	14 1/4	14	24	15 3/4	14 3/4	2 13/16	2 5/8
700	350	70	15 1/4	15 1/4	27	16 3/4	16 1/4	2 15/16	2 3/4
800	400	80	16 1/4	16 1/4	30	17 3/4	17 1/4	2 15/16	2 3/4
900	450	90	17 1/4	17	30	18 3/4	18 1/4	3 1/16	2 7/8
1000	500	100	17 1/4	18 3/4	36	18 3/4	20 1/4	3 1/8	2 15/16
PLATE DIMENSIONS BELOW ARE FOR 6 KSI BEARINGS									
100	50	10	5 1/4	5 1/2	7	6 3/4	5 1/4	2	2 3/16
150	75	15	6 1/4	6 1/4	8	7 3/4	6	2 1/4	2 1/16
200	100	20	6 1/4	7 3/4	11	7 3/4	7 1/2	2 5/16	2 1/8
250	125	25	7 1/4	8 1/4	12	8 3/4	8 1/4	2 3/8	2 3/16
300	150	30	8 1/4	8 1/2	12	9 3/4	8 1/4	2 3/8	2 3/16
400	200	40	9 1/4	10	15	10 3/4	10 1/4	2 9/16	2 3/8
500	250	50	10 1/4	10 1/2	15	11 3/4	10 3/4	2 11/16	2 1/2
600	300	60	11 1/4	11 3/4	18	12 3/4	12 1/4	2 3/4	2 9/16
700	350	70	11 1/4	13 1/2	21	12 3/4	13 1/2	2 3/4	2 9/16
800	400	80	12 1/4	13 1/2	21	13 3/4	13 1/2	2 3/4	2 9/16
900	450	90	13 1/4	15	24	14 3/4	15 1/2	2 13/16	2 3/4
1000	500	100	13 1/4	16 1/2	27	14 3/4	17	3	2 13/16

NOTES.

1. Minimum sole plate width must be equal to "A" plus 1.5 inches for expansion-guided (plus 1 inch for fixed) and also wider than beam flange by 1 inch to accommodate down hand welding. 2. Minimum sole plate must be equal to "B" plus 1 inch plus maximum expansion. 3. Minimum free expansion sole plate width must be equal to "A" plus 1 inch plus maximum expansion and wider than beam flange by 1 inch to accommodate down hand welding. 4. Fixed sole plate length must be greater than "B" plus 1 inch. 5. Radius calculated using horizontal loading equal to 10% of the maximum vertical load, a minimum dead load of 50% of the maximum vertical load and plus or minus 2° rotation. 6. Masonry plate length, width and thickness are dependent on allowable concrete unit loading, physical restrictions and bending moments. 7. Anchor bolt size and quantities per approximate code. 8. All dimensions shown are for general concept only and may be modified to meet specific application parameters.



SECTION X-X

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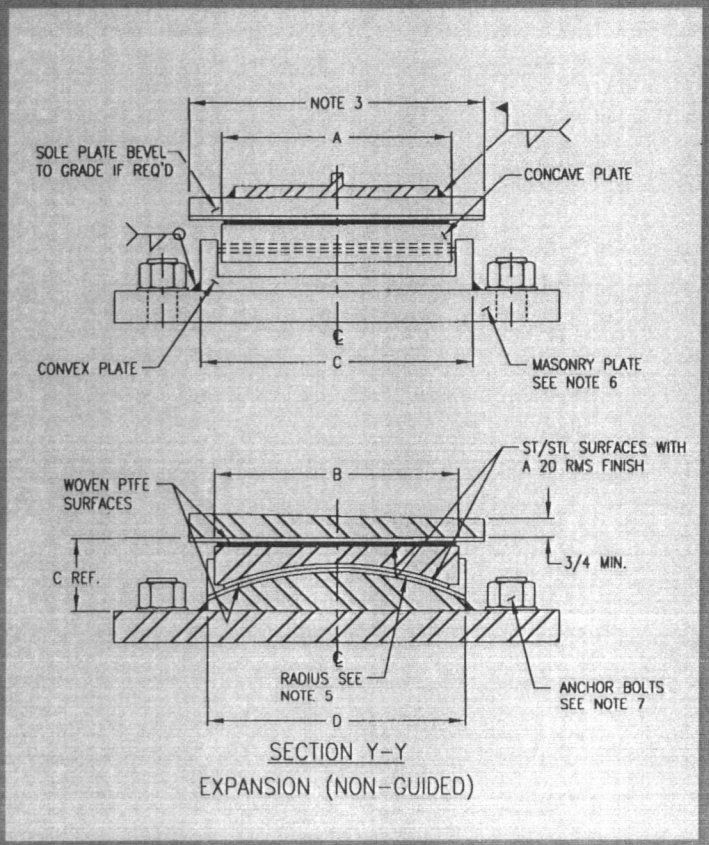
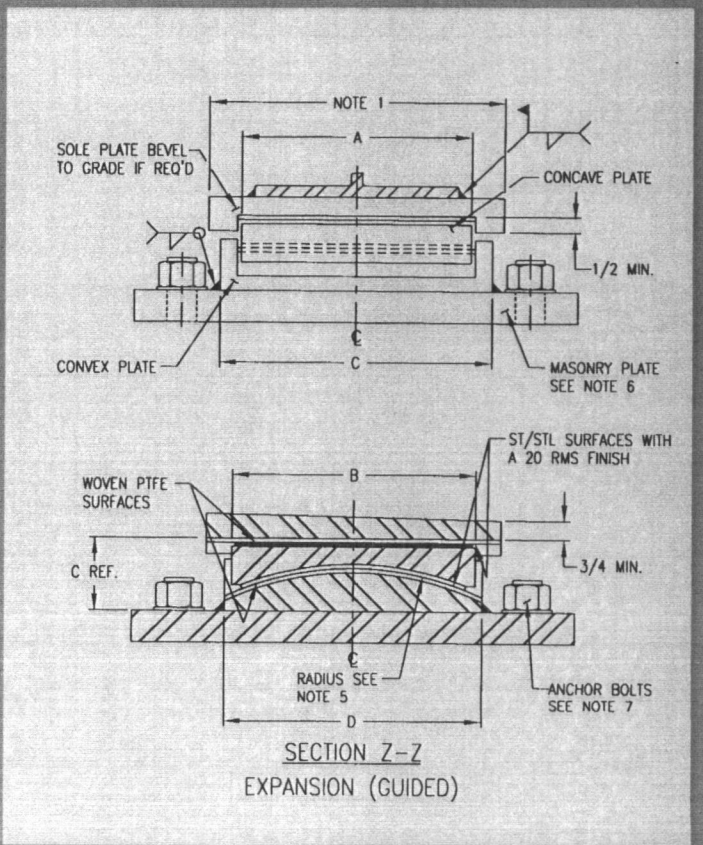


SECTION Y-Y

EXPANSION (NON-GUIDED)



SECTION Z-Z

EXPANSION (GUIDED)

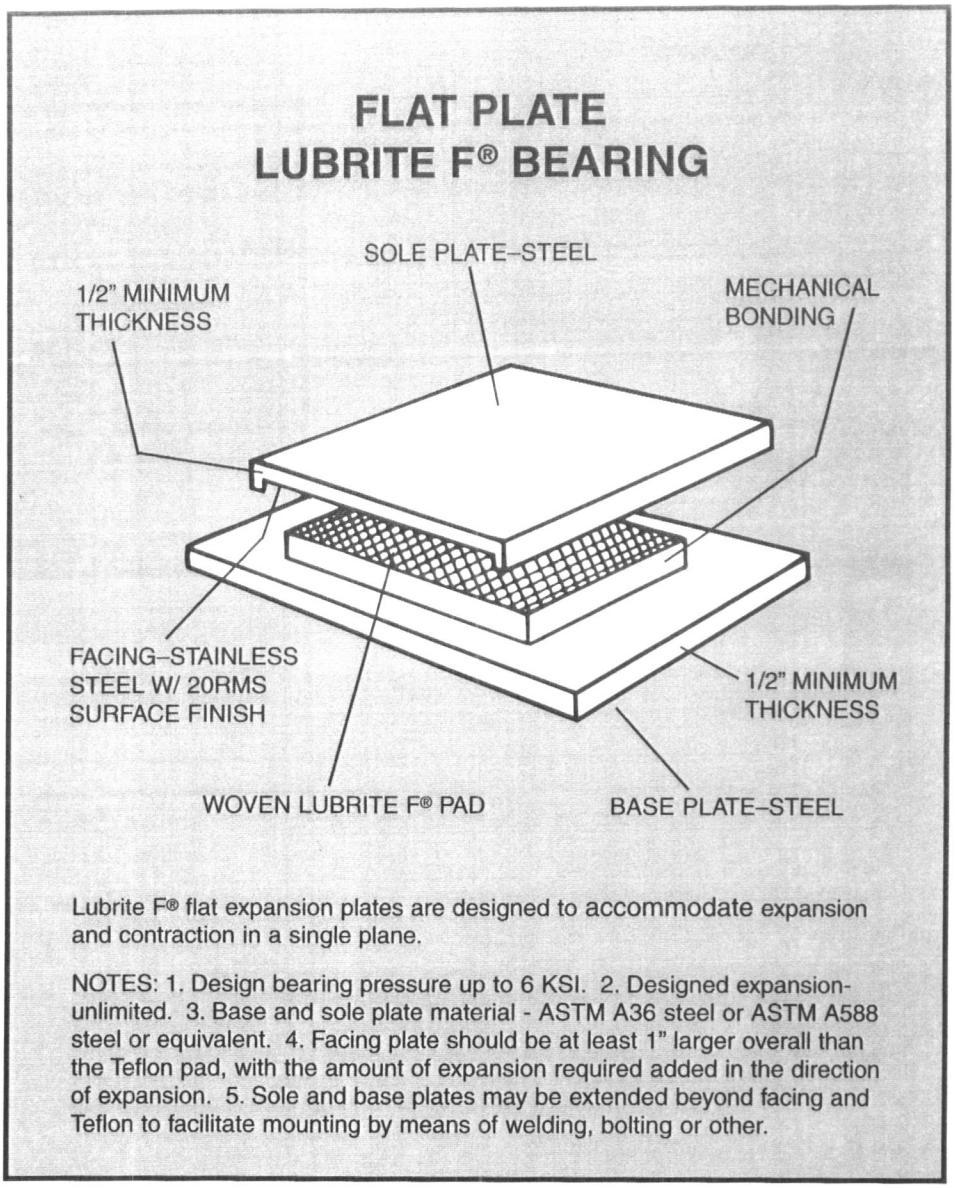
Design Assistance

More than 80 years of research, engineering and manufacturing know-how stand behind every Lubrite bearing.

As a result, Lubrite's engineering group has at its fingertips a comprehensive data-bank on bearing design and performance. This knowledge is supplemented by state-of-the-art computer-assisted design and engineering programs.

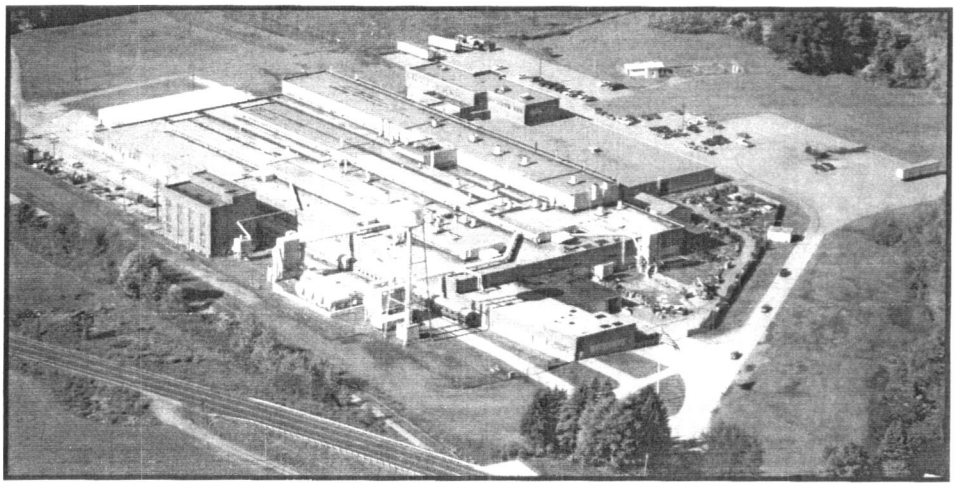
All of these resources are available to you to ensure the success of your application. Services can be provided ranging from preliminary design assistance up through field engineering.

We strongly urge you to consult with our engineers before finalizing your design, since small changes in application parameters and bearing specifications can significantly affect performance, helping you to improve results at little or no additional cost.



Lubrite F® flat expansion plates are designed to accommodate expansion and contraction in a single plane.

NOTES: 1. Design bearing pressure up to 6 KSI. 2. Designed expansion-unlimited. 3. Base and sole plate material - ASTM A36 steel or ASTM A588 steel or equivalent. 4. Facing plate should be at least 1" larger overall than the Teflon pad, with the amount of expansion required added in the direction of expansion. 5. Sole and base plates may be extended beyond facing and Teflon to facilitate mounting by means of welding, bolting or other.



Meadville Plant

DESIGN DATA

Lubrite engineers can assist you with the design of your bearing when you provide the following information. Make a copy of this page, fill in the appropriate data and fax (781-871-1492) or E-mail (sales@lubritetechnologies.com) for prompt assistance.

Maximum vertical load (design).
Minimum dead load (Including wind uplift, seismic, etc.).
Longitudinal force (or load).
Transverse force (or load).
Maximum allowable rotation (±2° is minimum unless otherwise specified. Includes design rotation and erection discrepancies).
Maximum allowable unit loading (AASHTO)
Specifying agency (AASHTO/state/AREA etc.).
Amount of total movement (Expansion, contraction, shrinkage, etc. ±)
Type of bearing (Expansion all directions, guided for one direction, fixed).
Allowable concrete load for masonry plate and/or sole plate.
Method of retention (Weld, bolts, etc.) for both the upper sole plate and lower masonry plate. Are bearings to be removeable?
Physical dimensional restrictions. (Pier cap size, etc.)
Type of steel (A36, A588, etc.) or other material requirements.
Environmental conditions (Temperature extremes if outside -100°F to +250°F, marine environment, etc.).
Name of project. (For identification).
Span length between piers/abutments.
Sole plates if beveled, slope and direction of slope.
Paint requirements, if any.
Inspection or testing requirements.
Person to contact should questions arise.

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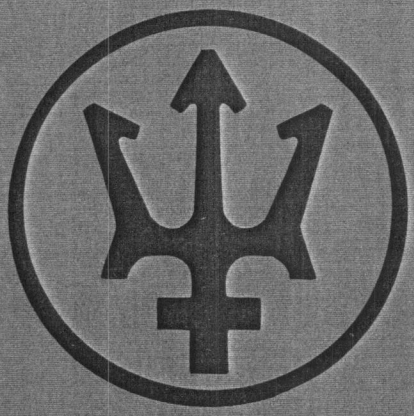

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