TU™ & TP™ Steel-Backed - PTFE Lined Bearings

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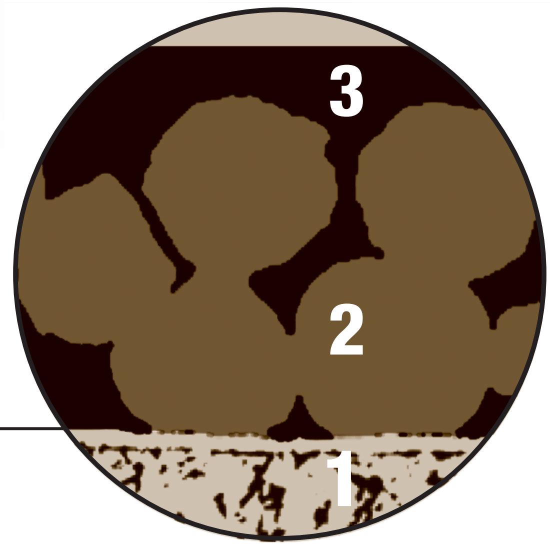
Detail Section: refer to explanations below



TU™ and TP™ are composites of the following materials which are used to produce self-lubricating dry sliding bearings

TU™ - STEEL-BACKED PTFE LINED

STRUCTURE

1. Low carbon **STEEL** backing allows for extremely high load capacity (0.50 - 2.7 mm thickness)
2. Sintered **BRONZE** offers optimal heat dispersion (0.20 - 3.5 mm thickness)
3. **PTFE** with lead sliding surface creates a low friction coefficient and allows for a wide temperature range (0.20 mm thickness)

FEATURES

Self-lubricating, dry running for use where many oiled bearings fail. Low cofficient of friction, low wear, forms an oxide type solid lubricant film, suitable for linear, rotary and oscillating applications. High chemical resistance and low moisture absorption and swelling. Performance increases with lubrication. REACH, DFARS compliant.

TP™- *LEAD-FREE* STEEL-BACKED PTFE LINED

STRUCTURE

1. Low carbon **STEEL** backing allows for extremely high load capacity (0.50 - 2.7 mm thickness)
2. Sintered **BRONZE** offers optimal heat dispersion (0.20 - 3.5 mm thickness)
3. **PTFE** with lead-free fibers creates a low friction coefficient and allows for a wide temperature range (0.02 mm thickness)

FEATURES

Lead-Free, self lubricating, dry running for use where many oiled bearing fail. Low cofficient of friction, low wear, forms an oxide type solid lubricant film, suitable for linear, rotary and oscillating applications. High chemical resistance and low moisture absorption and swelling. Performance increases with lubrication. RoHS, REACH, EVL, WEEE & DFARS compliant.

DESIGN PARAMETERS

LOADS - P Dynamic pressures up to 20,300 psi (140 N/mm^2); static loads up to 36,250 psi (250 N/mm^2)

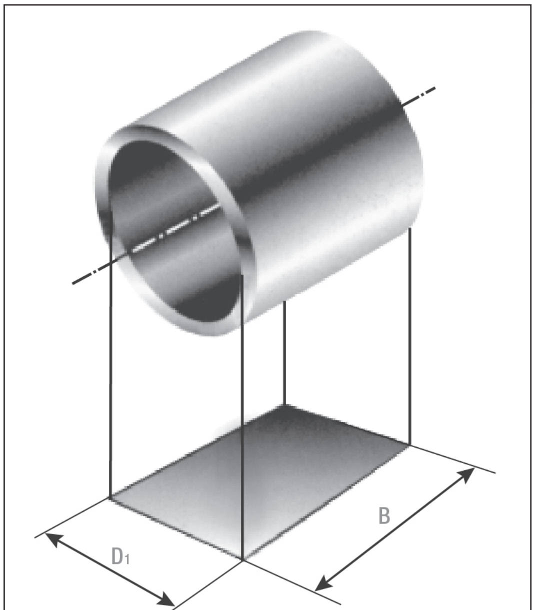
SPEEDS-V Speeds up to 2,000 sfpm (10 m/s) with lubrication

PERFORMANCE - PV PV's up to 51,000 psi-sfpm (1.8 N/mm^2 x m/s) for continuous loads, 102,000 psi-sfpm (3.6 N/mm^2 x m/s) for short-term use and 26,000 psi-sfpm (.9 N/mm^2 x m/s) for alternating loads. Performance increases when lubricated.

TEMPERATURES From -328 to +536° F (-200 to + 280° C).

CALCULATION of the SERVICE LIFE (L_h = hours)

Description	Symbol	Units of Measure
Internal diameter of the bearing	D_1	mm
Internal diameter of the thrust washer	D_4	mm
External diameter of the thrust washer	D_5	mm
Length of the bearing	B	mm
Load on the bearing	L	N=(Newton)
Speed of rotation	N	r.p.m.
Angle of oscillation	φ	° degrees
Frequency of oscillation	N_{osz}	cycles/minutes
Nominal life	L_h	hours
External radius of the thrust washer	R	mm
Internal radius of the thrust washer	r	mm



PV = (N/mm^2) (m/s)

V = m/s

P = N/mm^2

Metric Conversion Chart		
	Multiply by	
Inch [in]	25.4	Millimeters [mm]
Pounds/force [lbf]	4.4482	Newton [n]
foot/minute [ft/min]	0.00508	Meter / second [m/s]
Pounds per square inch [psi]	0.006895	Newton / square millimeter [N/mm^2]

(Load) must be in Newtons

Bushing

$$\frac{L}{D_1 \times B}$$

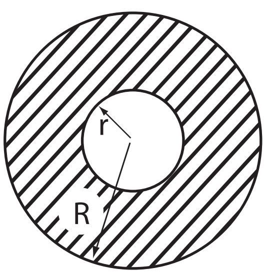
Thrust Washer

$$P = \frac{L}{\pi\,(R^2 - r^2)}$$

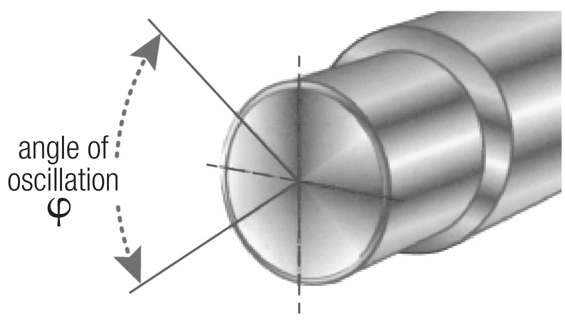
I.D. & O.D. & Radius must be in millimeters

Due to the many different factors involved, the Life formula should only be treated as a rough estimate.

ROTATION of BEARING	OSCILLATION of BEARING
$V = \dfrac{\pi \times D_1 \times N}{60 \times 10^3}$	$V = \dfrac{\pi \times D_1 \times 2\varphi \times N_{osz}}{60 \times 10^3 \times 360}$
ROTATION of WASHER	**OSCILLATION of WASHER**
$V = \dfrac{\pi \times D_5 \times N}{60 \times 10^3}$	$V = \dfrac{\pi \times D_5}{60 \times 10^3} \times \dfrac{2\varphi \times N_{osz}}{360}$



Thrust Washer

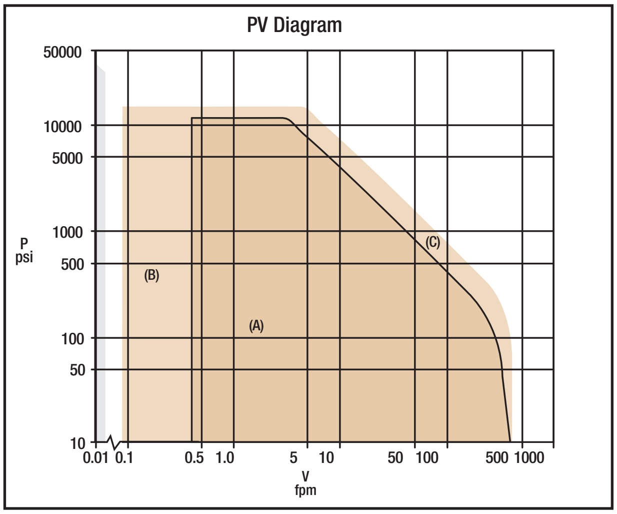


CALCULATION of the SERVICE LIFE (L_h = hours)

The operating life for dry applications of TU™ Self-lubricating bearings is inversely proportional to the load factor (p x v) but, in order to achieve a close approximation of the figure, the following corrective factors must be introduced:

- K_a = constant relative to the type of application;
- f_p = load correction factor;
- f_c = application characteristics and temperature
- f_d = correction factor;
- f_m = bearing size correction factor;
  shaft material correction factor.

$$L_h = \frac{K_a}{pv^{1.2}} \times f_p \times f_c \times f_d \times f_m$$



A. Service life calculation may be used.
B. Quasi-static: Call before using this Calculation
C. Requires optimal heat removal.

f_p = load correction factor

p = N/mm² or psi				
N/mm²	<10	<25	<50	> 60
psi	<1450	<3625	<7252	<8702
	1	0.3	0.2	0.1

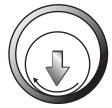
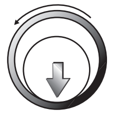
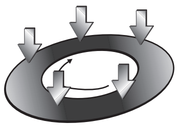
f_c = application characteristics and temperature correction factor

Characteristics	Heat Dissipation	Temperature °C 20	60	100	150	200	280
Continuous Dry Operation	Good	1.0	0.8	0.6	0.4	0.2	0.1
Continuous Dry Operation	Poor	0.5	0.4	0.3	0.2	0.1	-
Intermittent Operation Interval > 10 x Operating Time	Good	2.0	1.6	1.2	0.8	0.4	0.2
Constant Immersion in Water		2.0	1.6	0.8	-	-	-
Alternating Immersion in Water		0.4	0.2	0.1	-	-	-
Constant Immersion in Lubricant		3.0	2.4	1.8	1.2	0.8	-

f_m = shaft material correction factor

Material	f_m
Low carbon steel	1
Hardened steel	1.5
Stainless Steel	2
Cast iron (0.4 RQ)	1
Aluminum	0.4
Bronze	0.4
Plating	**f_m**
Zinc Cadmium	0.2
Nickel	0.2
Chrome	2
Anodized aluminum	2

K_a = constant relative to the type of application

UNIDIRECTIONAL LOAD	ROTATING LOAD	THRUST LOAD
		
400	800	250

f_d = bearing size correction factor

Shaft diameter (mm)					
(mm)	≤ 20	≤ 40	≤100	≤150	>150
(inch)	< .8	< 1.6	< 3.9	< 5.9	> 5.9
	1.0	0.9	0.7	0.5	0.4