

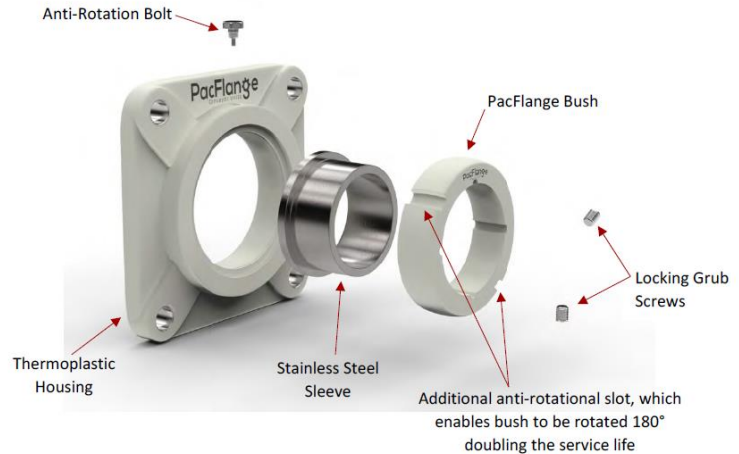
## PacFlange Application Selection & Guidance

**Statement:** PacFlange bearings are plane bearings.

What are plane bearings?

Plane bearings operate without rolling elements. The term 'plane' comes from the geometry of a simple bushing; it establishes the plane of operation of the centerline relative to the load.

Plane bearings can be made from a variety of materials (metals, woods, polymers, other materials) and rely entirely on the bushing material properties for their function and performance. Obviously, some bearing materials will perform better as bearings than others, while some are completely unsuited for bearing applications under most practical circumstances. Bearing-grade polymers incorporate self-lubricating additives in the chemical crystalline make-up of the material so they can operate without needing any grease. PacFlange specializes in crystalline thermoplastic plane bearings with top quality non-corrosive housings and shaft sleeves.



PacFlange bearings are an excellent choice on most applications where speed is not too fast or loads are not too high so as not to exceed the PV rating of the bearing. PacFlange bearings are NOT the solution to all bearing needs, but they bring a number of advantages to the user which can far out-weigh the load/speed limitations in many applications.

## Recommended Applications

PacFlange plane bearings are ideal for tough applications where ball bearings often have a very limited operating life, such as:

- Locations with risk of food product contamination
- Frequent wash-down and CIP - HACCP
- High or low temperature
- Splashing or steam exposure
- Exposure to processing liquids, chemicals
- Incomplete rotation or oscillating motion
- Fully submerged in liquids
- Locations difficult to regularly maintain



## Not Recommended

PacFlange plane bearings are not ideal for certain applications where high speeds and loads are likely to occur under normal operating conditions, such as

- High tension applications (V-belt drives, flat belt conveyors, urethane belts)
- High speed devices (fans, pumps, table top conveyors)
- Overhung loads (unsupported shaft mounted gear reducers)
- Trunnion applications

Where plane bearings are not suitable, other bearing designs should be selected.

## DESIGN

Plane bearing capacity is measured by PV which is a measure of the amount of heat generated in the bearing. PV is the relationship of the radial bearing load to the shaft speed in a bearing.

PacFlange bearing units use the proprietary thermoplastic polymer Thorplas-White which was developed by Thordon Bearings Inc. specifically for use as a self-lubricated bearing material. It is the only bearing material certified by ANSI under NSF 51 and NSF 61 for direct contact with food and beverage products.

These bearings can operate under dry and wet conditions and actually benefit from frequent CIP and wash down because it helps keep the running surfaces clean and has a cooling effect, which both help to extend bearing life.

Applications which respect the PV limits of Thorplas-White will provide long and reliable operational life times with no requirement for grease and no maintenance other than occasional inspections for mechanical damage.

Factors influencing PV limits (heat generation) include:

- Material selection
- Journal surface finish
- Bearing wall thickness
- Running clearance
- Proximity to moisture
- Ambient temperature
- Cycle time

The PV limits for Thorplas-White were determined by Thordon Bearings Inc. from extensive R&D and in-field operational experience.

The PV limit set For Thorplas-White operating under dry conditions = 3500 psi-ft/min

The operating PV limits for PacFlange units as applicable to different housing sizes are published in the Technical Brochure. These are reproduced below for convenience.

## Dynamic Load Ratings

The below tables show how much load can be directly applied on one bearing at various shaft speeds. As one shaft has two bearings, the applied load can be twice the given value below for a particular RPM. If the shaft size is unknown, use the housing size to find the load at the specific rpm.

Higher shaft speeds must be given special consideration.

Shaft dia. (d)		Housing size	10 RPM		20 RPM		30 RPM		40 RPM		50 RPM		60 RPM	
mm	inch		Kg	N	Kg	N	Kg	N	Kg	N	Kg	N	Kg	N
20	3/4	204	218	2141	113	1106	74	728	55	539	44	432	37	367
25	1	205	246	2416	123	1208	84	820	62	610	50	485	40	388
30	1 1/8 1 1/4	206	267	2621	130	1278	87	858	65	636	52	512	43	426
35	1 1/4 1 3/8	207	276	2708	138	1354	92	901	69	674	55	539	46	448
40	1 1/2	208	298	2923	152	1489	100	982	75	734	60	588	50	491
45	1 3/4	209	318	3118	156	1532	105	1025	79	771	63	615	52	512
50	2	210	319	3128	157	1537	105	1030	79	771	63	615	52	512
55	2	211	355	3484	178	1742	118	1160	88	863	70	690	59	577
60	2 1/4	212	370	3625	182	1785	122	1192	92	901	73	717	61	599
65	2 1/2	213	380	3722	190	1861	127	1241	95	928	76	744	63	620
70	2 1/2	214	389	3819	197	1931	130	1278	98	960	79	771	65	642
75	3	215	408	3997	204	1996	135	1321	101	992	81	793	67	658

## HOW TO CALCULATE Pressure Velocity (PV)

PV -  $P \times V$

P - pressure in PSI (lbs/sq in)

V - velocity in SFM (surface ft/min)

$P = F/A$

where

F = force (load) on bearing (lbs)

A = shaft dia (in) x LTB (LTB = bearing length through the bore in inches)

Peripheral Surface Velocity (ft/min)

$V = .262 \times D \times \text{RPM}$

where

D = shaft diameter (in)

RPM = shaft revolutions/min

## FOR DESIGN ASSISTANCE

To help focus on the critical application considerations, please complete the following forms to the fullest extent possible while taking into consideration the Installation Guidelines

- Customer Evaluation
- Application Review
- Installation Guidelines

## ADDITIONAL PRECAUTIONS

- **Tension Belts** ensure that you do not over tension the conveyor belt, PacFlange is not suitable for highly tensioned belts.
- **Do not pair with a greased roller bearing** it is best to pair a PacFlange unit with another PacFlange unit (at a conveyor end) as the clearances are different which can sometimes cause misalignment and point loading, exceeding the bearings limits.
- **Pressure-Velocity Limits** it is important to be aware of these limits which are listed on page 5 onwards in the brochure (KG -RPM). We can significantly increase the PV limitations by add a supply of clean cooling water, please contact us for review.
- **Maximum wear** every application is different so it is hard to estimate the bearings life however if installed correctly and within limits we would expect many years of grease free service. It is recommended to replace the PacFlange bush & housing when the groove depth has reduced to 0.5-1.0mm (0.02"-0.04"). You can rotate the bush 180° with the additional anti-rotation groove to double the bearings wear life.
- **Protective covers** not essential however may be required by plant safety policy or in areas where excessive amounts of abrasives are present. Recommended not to use if possible so you can visually inspect bearing wear.

- **Floating Drive motors and Torque Arms**, be cautious with drive motors which are not statically mounted or mounted with **Torque Arms** as this arrangement applies significant force directly onto the bearings.
- **Alignment** it is paramount that the shaft alignment is set correctly when installing a unit, especially on the drive motor end. If you are just replacing one unit, the other side needs to be re-fixed to ensure load is evenly distributed between the two bearings, the drive motor then needs to be re-aligned to the shaft after this.
- **Squeaking sounds** are either caused by “machining high spots” which will gradually disappear after a few days operation or the stainless shaft sleeve flange rubbing against the PacFlange bush. Not an indication of bearing failure. To eliminate apply 1 spray of food grade silicon (i.e. Rocol Foodlube)
- **Bent shaft** if significant could cause bearing failure or reduce the bearing life.
- **Do not mix and match PacFlange bushes** to other bearing housings as the interference is slightly different between each housing style and/or housing make. E.g. a PacFlange bush supplied in a 4-bolt flange (F205) housing will not suit a pillow block (P205) housing
- **Replacing PacFlange bush** when it comes time to replace your worn PacFlange bush you must replace your bush and housing at the same time, (you can remove and reuse the stainless sleeve). As there is variance in the housings ID tolerance, each bush is hand fitted and checked with all housings. it is imperative that the bearing clearance is correct.