PIX

Power Transmission Solutions

Driving growth!

Technical Manual
PIX-PowerWare® Pulleys & Bushes

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Taper Bush dimensions

Taper Bush Number	Taper Bush Code	Nominal Dia at the Larger End of Taper (mm)	Face Width (mm)	Minimum Bore (mm)	Maximum Bore (mm)
1008	TLB1008009 to TLB1008025	35.0	22	9	25
1108	TLB1108009 to TLB1108028	38.0	22	9	28
1210	TLB1210011 to TLB1210032	47.5	25	11	32
1215	TLB1215011 to TLB1215032	47.5	38	11	32
1310	TLB1310014 to TLB1310035	51.0	25	14	35
1610	TLB1610014 to TLB1610042	57.0	25	14	42
1615	TLB1615014 to TLB1615042	57.0	38	14	42
2012	TLB2012014 to TLB2012050	70.0	32	14	50
2517	TLB2517016 to TLB2517060	85.5	45	16	60
2525	TLB2525019 to TLB2525060	85.5	65	19	60
3020	TLB3020025 to TLB3020075	108.0	51	25	75
3030	TLB3030035 to TLB3030075	108.0	76	35	75
3525	TLB3525048 to TLB3525090	127.0	65	35	90
3535	TLB3535035 to TLB3535090	127.0	89	35	90
4040	TLB4040040 to TLB4040100	146.0	102	40	100
4545	TLB4545055 to TLB4545110	162.0	114	55	110
5050	TLB5050070 to TLB5050125	177.5	127	70	125

Taper Bush dimensions

Taper Bush Number	Bore	Weight approx Lbs	Weight approx Kgs	Bushing key seat	Shaft key seat
1108	1/2 to 9/16 5/8 to 7/8 15/16 to 1 1-1/16 to 1-1/8	0.33 0.27 0.22 0.17	0.15 0.12 0.10 0.08	1/8 x 1/16 3/16 x 3/32 1/4 x 1/8 1/4 x 1/16a	1/8 x 1/16 3/16 x 3/32 1/4 x 1/8 1/4 x 1/8
1210	1/2 to 9/16 5/8 to 7/8 15/16 to 1-1/4	0.61 0.55 0.49	0.28 0.25 0.22	1/8 x 1/16 3/16 x 3/32 1/4 x 1/8	1/8 x 1/16 3/16 x 3/32 1/4 x 1/8
1610	1/2 to 9/16 5/8 to 7/8 15/16 to 1-1/4 1-5/16 to 1-3/8 1-7/16 to 1-1/2 1-9/16 to 1-5/8	0.90 0.80 0.70 0.70 0.60 0.50	0.41 0.36 0.32 0.32 0.27 0.23	1/8 x 1/16 3/16x3/32 1/4 x 1/8 5/16 x 5/32 3/8 x 3/16 3/8 x 1/8a	1/8 x 1/16 3/16 x 3/32 1/4 x 1/8 5/16 x 5/32 3/8 x 3/16 3/8 x 3/16
1615	1/2 to 9/16 5/8 to 7/8 15/16 to 1-1/4 1-5/16 to 1-3/8 1-7/16 to 1-1/2 1-9/16 to 1-5/8	1.20 1.10 1.00 0.80 0.70 0.60	0.54 0.50 0.45 0.36 0.32 0.27	1/8 x 1/16 3/16 x 3/32 1/4 x 1/8 5/16 x 5/32 3/8 x 3/16 3/8 x 1/8a	1/8 x 1/16 3/16 x 3/32 1/4 x 1/8 5/16 x 5/32 3/8 x 3/16 3/8 x 3/16
2517	1/2 to 9/16 5/8 to 7/8 15/16 to 1-1/4 1-5/16 to 1-3/8 1-7/16 to 1-3/4 1-13/16 to 2-1/4 2-5/16 to 2-1/2	3.50 3.40 3.30 3.20 3.00 2.40 1.90	1.59 1.54 1.50 1.45 1.36 1.09 0.86	1/8 x 1/16 3/16 x 3/32 1/4 x 1/8 5/16 x 5/32 3/8 x 3/16 1/2 x 1/4 5/8 x 3/16a	1/8 x 1/16 3/16 x 3/32 1/4 x 1/8 5/16 x 5/32 3/8 x 3/16 1/2 x 1/4 5/8 x 5/16
3020	15/16 to 1-1/4 1-5/16 to 1-3/8 1-7/16 to 1-3/4 1-13/16 to 2-1/4 2-5/16 to 2-3/4 2-13/16 to 3	6.50 6.30 6.00 5.30 4.50 3.90	2.95 2.86 2.72 2.40 2.04 1.77	1/4 x 1/8 5/16 x 5/32 3/8 x 3/16 1/2 x 1/4 5/8 x 5/16 3/4 x 1/4a	1/4 x 1/8 5/16 x 5/32 3/8 x 3/16 1/2 x 1/4 5/8 x 5/16 3/4 x 3/8
3030	15/16 to 1-1/4 1-5/16 to 1-3/8 1-7/16 to 1-3/4 1-13/16 to 2-1/4 2-5/16 to 2-3/4 2-13/16 to 3	9.20 8.90 8.60 7.60 6.20 5.00	4.17 4.04 3.90 3.45 2.81 2.27	1/4 x 1/8 5/16 x 5/32 3/8 x 3/16 1/2 x 1/4 5/8 x 5/16 3/4 x 1/4a	1/4 x 1/8 5/16 x 5/32 3/8 x 3/16 1/2 x 1/4 5/8 x 5/16 3/4 x 3/8
3535	1-3/16 to 1-1/4 1-5/16 to 1-3/8 1-7/16 to 1-3/4 1-13/16 to 2-1/4 2-5/16 to 2-3/4 2-13/16 to 3-1/4 3-5/16 to 3-1/2	14.0 14.0 13.0 12.0 11.0 9.00 8.00	6.35 6.35 5.90 5.44 4.99 4.08 3.63	1/4 × 1/8 5/16 × 5/32 3/8 × 3/16 1/2 × 1/4 5/8 × 5/16 3/4 × 3/8 7/8 × 1/4a	1/4 × 1/8 5/16 × 5/32 3/8 × 3/16 1/2 × 1/4 5/8 × 5/16 3/4 × 3/8 7/8 × 7/16
4040	1-7/16 to 1-3/4 1-13/16 to 2-1/4 2-5/16 to 2-3/4 2-13/16 to 3-1/4 3-5/16 to 3-5/8 3-11/16 to 3-3/4 3-13/16 to 4	22.0 21.0 19.0 17.0 15.0 14.0 13.0	9.98 9.53 8.62 7.71 6.80 6.35 5.90	3/8 × 3/16 1/2 × 1/4 5/8 × 5/16 3/4 × 3/8 7/8 × 7/16 7/8 × 7/16 1 × 1/4a	3/8 × 3/16 1/2 × 1/4 5/8 × 5/16 3/4 × 3/8 7/8 × 7/16 7/8 × 7/16 1 × 1/2
4545	1-15/16 to 2-1/4 2-5/16 to 2-3/4 2-13/16 to 3-1/4 3-5/16 to 3-3/4 3-13/16 to 4-1/4 4-5/16 to 4-1/2	30.0 28.0 26.0 23.0 20.0 18.0	13.61 12.70 11.79 10.43 9.07 8.16	1/2 × 1/4 5/8 × 5/16 3/4 × 3/8 7/8 × 7/16 1 × 1/2 1 × 1/4a	1/2 × 1/4 5/8 × 5/16 3/4 × 3/8 7/8 × 7/16 1 × 1/2 1 × 1/2
5050	2-5/16 to 2-3/4 2-13/16 to 3-1/4 3-5/16 to 3-3/4 3-13/16 to 4-1/2 4-9/16 to 5	38.0 35.0 32.0 27.0 24.0	17.24 15.88 14.51 12.25 10.89	5/8 × 5/16 3/4 × 3/8 7/8 × 7/16 1 × 1/2 1-1/4 × 7/16a	5/8 × 5/16 3/4 × 3/8 7/8 × 7/16 1 × 1/2 1-1/4 × 5/8
6050	3-13/16 to 4-1/2 4-9/16 to 5-1/2 5-9/16 to 6	60.0 55.0 50.0	27.22 24.95 22.68	1 x 1/2 1-1/4 x 5/8 1-1/2 x 3/4	1 x 1/2 1-1/4 x 5/8 1-1/2 x 3/4
7060	4-9/16 to 5-1/2 5-9/16 to 6-1/2 6-9/16 to 7	85.0 75.0 65.0	38.56 34.02 29.48	1-1/4 x 5/8 1-1/2 x 3/4 1-3/4 x 3/4	1-1/4 x 5/8 1-1/2 x 3/4 1-3/4 x 3/4

a: Shallow key furnished for these sizes

Metric bores, keyway, keys & screws

Bush No.	Nominal Diameter at Larger End	Taper Bush Code	Bore Diameter (mm)	Keyway (mm)		Key (mm)		Screw Tightening Torque(Nm)	Screw Details	
				Width (w)	Depth (h)	Width (w)	Depth (h)		Qty.	Size
1008	35	TLB1008009 to TLB1008025	9 - 10	3	1.4	3	3	5.6	2	1/4"
			11 - 12	4	1.8	4	4			
			13 - 17	5	2.3	5	5			
			18 - 22	6	2.8	6	6			
			23 - 25	8	3.3	8	7			
1108	38	TLB1108009 to TLB1108028	9 - 10	3	1.4	3	3	5.6	2	1/4"
			11 - 12	4	1.8	4	4			
			13 - 17	5	2.3	5	5			
			18 - 22	6	2.8	6	6			
			23 - 28	8	3.3	8	7			
1210	47.5	TLB1210011 to TLB1210032	11 - 12	4	1.8	4	4	20	2	3/8"
			13 - 17	5	2.3	5	5			
			18 - 22	6	2.8	6	6			
			23 - 30	8	3.3	8	7			
			31 - 32	10	3.3	10	8			
1215	47.5	TLB1215011 to TLB1215032	11 - 12	4	1.8	4	4	20	2	3/8"
			13 - 17	5	2.3	5	5			
			18 - 22	6	2.8	6	6			
			23 - 30	8	3.3	8	7			
			31 - 32	10	3.3	10	8			
1310	51	TLB1310014 to TLB1310035	14 - 17	5	2.3	5	5	20	2	3/8"
			18 - 22	6	2.8	6	6			
			23 - 30	8	3.3	8	7			
			31 - 35	10	3.3	10	8			
1610	57	TLB1610014 to TLB1610042	14 - 17	5	2.3	5	5	20	2	3/8"
			18 - 22	6	2.8	6	6			
			23 - 30	8	3.3	8	7			
			31 - 38	10	3.3	10	8			
			39 - 42	12	3.3	12	8			
1615	57	TLB1615014 to TLB1615042	14 - 17	5	2.3	5	5	20	2	3/8"
			18 - 22	6	2.8	6	6			
			23 - 30	8	3.3	8	7			
			31 - 38	10	3.3	10	8			
			39 - 42	12	3.3	12	8			
2012	70	TLB2012014 to TLB2012050	14 - 17	5	2.3	5	5	31	2	7/16"
			18 - 22	6	2.8	6	6			
			23 - 30	8	3.3	8	7			
			31 - 38	10	3.3	10	8			
			39 - 44	12	3.3	12	8			
			45 - 50	14	3.8	14	9			
2517	85.5	TLB2517016 to TLB2517060	16 - 17	5	2.3	5	5	48	2	1/2"
			18 - 22	6	2.8	6	6			
			23 - 30	8	3.3	8	7			
			31 - 38	10	3.3	10	8			
			39 - 44	12	3.3	12	8			
			45 - 50	14	3.8	14	9			
			51 - 58	16	4.3	16	10			
			59 - 60	18	4.4	18	11			
2525	85.5	TLB2525019 to TLB2525060	19 - 22	6	2.8	6	6	48	2	1/2"
			23 - 30	8	3.3	8	7			
			31 - 38	10	3.3	10	8			
			39 - 44	12	3.3	12	8			
			45 - 50	14	3.8	14	9			
			51 - 58	16	4.3	16	10			
			59 - 60	18	4.4	18	11			

Metric bores, keyway, keys & screws

Bush No.	Nominal Diameter at Larger End	Taper Bush Code	Bore Diameter (mm)	Keyway (mm)		Key (mm)		Screw Tightening Torque(Nm)	Screw Details	
				Width (w)	Depth (h)	Width (w)	Depth (h)		Qty.	Size
3020	108	TLB3020025 to TLB3020075	25 - 30	8	3.3	8	7	90	2	5/8"
			31 - 38	10	3.3	10	8			
			39 - 44	12	3.3	12	8			
			45 - 50	14	3.8	14	9			
			51 - 58	16	4.3	16	10			
			59 - 65	18	4.4	18	11			
			66 - 75	20	4.9	20	12			
3030	108	TLB3030035 to TLB3030075	35 - 38	10	3.3	10	8	90	2	5/8"
			39 - 44	12	3.3	12	8			
			45 - 50	14	3.8	14	9			
			51 - 58	16	4.3	16	10			
			59 - 65	18	4.4	18	11			
			66 - 75	20	4.9	20	12			
3525	127	TLB3525048 to TLB3525090	35 - 38	10	3.3	10	8	113	3	1/2"
			39 - 44	12	3.3	12	8			
			45 - 50	14	3.8	14	9			
			51 - 58	16	4.3	16	10			
			59 - 65	18	4.4	18	11			
			66 - 75	20	4.9	20	12			
			76 - 86	22	5.4	22	14			
			86 - 90	25	5.4	25	14			
3535	127	TLB3535035 to TLB3535090	35 - 38	10	3.3	10	8	113	3	1/2"
			39 - 44	12	3.3	12	8			
			45 - 50	14	3.8	14	9			
			51 - 58	16	4.3	16	10			
			59 - 65	18	4.4	18	11			
			66 - 75	20	4.9	20	12			
			76 - 86	22	5.4	22	14			
			86 - 90	25	5.4	25	14			
4040	146	TLB4040040 to TLB4040100	40 - 44	12	3.3	12	8	170	3	5/8"
			45 - 50	14	3.8	14	9			
			51 - 58	16	4.3	16	10			
			59 - 65	18	4.4	18	11			
			66 - 75	20	4.9	20	12			
			76 - 86	22	5.4	22	14			
			86 - 96	25	5.4	25	14			
4545	162	TLB4545055 to TLB4545110	96 - 100	28	6.4	28	16	192	3	3/4"
			55 - 58	16	4.3	16	10			
			59 - 65	18	4.4	18	11			
			66 - 75	20	4.9	20	12			
			76 - 86	22	5.4	22	14			
			86 - 96	25	5.4	25	14			
5050	177.5	TLB5050070 to TLB5050125	96 - 110	28	6.4	28	16	271	3	7/8"
			70 - 75	20	4.9	20	12			
			76 - 86	22	5.4	22	14			
			86 - 96	25	5.4	25	14			
			96 - 110	28	6.4	28	16			
			111 - 125	32	7.4	32	18			

Note:

- Key ways are British standard metric B.S. 4235: Part 1:1972 and conform to I.S.O recommendations. Where a key is to be used it should be parallel and side fitting with top clearance. Depth of key way is measured at the center.
- Taper Bush with Imperial bores can also be supplied.

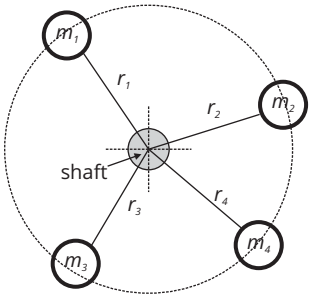
Pulley balancing

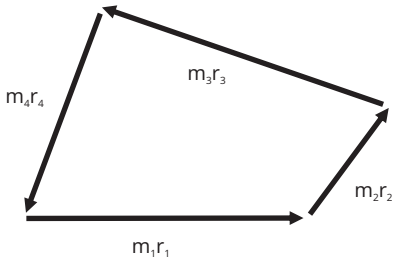
Static Balancing

Concept: When the Pulley is statically balanced, then the center of mass lies on the axis of rotation.
Cross-check: Rotate the Pulley to any angular position and leave it. If it is statically balanced, then the Pulley will retain its position.

Procedure:

a) You are provided with 4 different masses (in the from of bars) and thus "the shaft + 4 masses" constitutes your system.
b) As of now you assume that the center of mass of the bars is at equidistant from the axis of rotation.





c) Orient the masses on the shaft in such a way that center of mass = $\sum m_1r_1=0$
d) For that randomly orient masses m_1 and m_2 (i.e.2) and then analytically solve for getting orientation of 3 and 4 (i.e. 4).
e) Manually orient m_3 and m_4 at calculated angles '4' and then see if there is an unbalance, there will be most probably.
f) You then need to finely adjust the orientations of any two masses to make the system statically stable.

Need of balancing:

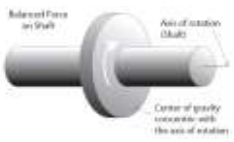
If the pulleys are not properly balanced, it results in the increasing the loads on bearings and also produce vibrations. To minimise the pressure on bearings, balancing is necessary.

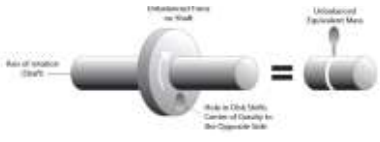
Benefits of balancing:

- Free from noise
- Free from vibrations
- Improved bearing life
- Improved shaft life as well as protection from bending by eliminating cantilever effect
- Improved belt life
- Safety: unbalanced pulleys running on higher R.P.M. can even breaks into pieces which can cause for major accident / damage.

Static balancing: One-Plane Balancing (DIN-2211 part 1)

Static balancing is adopted for the pulleys where peripheral speed is less than 20 m/s. If the pulley is not balanced, the shaft will turn until the heavier side is on the bottom. A hole is bored until the pulley is in static balance, or remains mobile regardless of what position it is placed in.





Pulley balancing

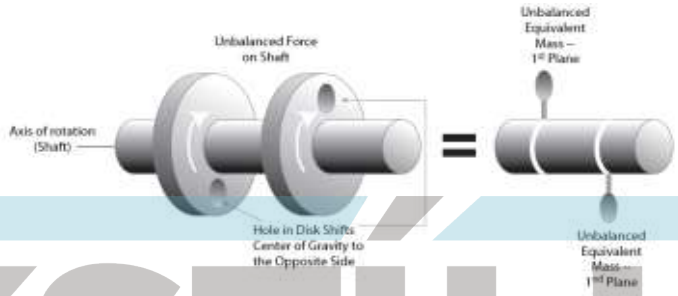
Dynamic balancing:

Dynamic balancing is necessary when

- Surface speed is greater than 30 m/s and large diameter Pulleys.
- Ratio of Pulley diameter to Pulley face width d : w < 4
- Dynamic or two plane balancing :
- Balance corrections are made and measured at 2 planes on the component axis.
- Non balanced units of masses are spread along the length of the component.

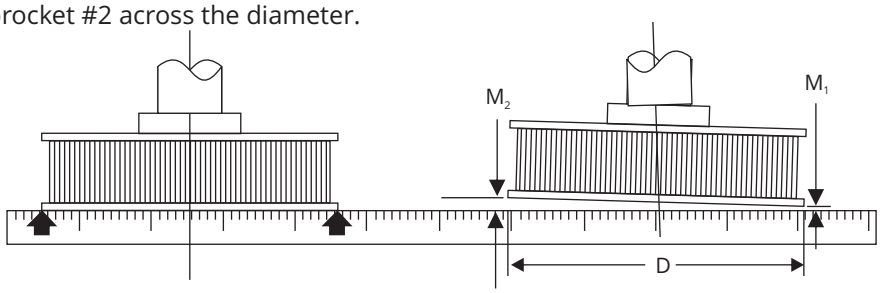
Dynamic or two plane balancing (As per DIN-2211 part 1)

A two-plane balance is recommended only in certain cases where the product face width is relatively large and the operational speed relatively fast, or where balance is considered very critical.



Pulley alignment inspection

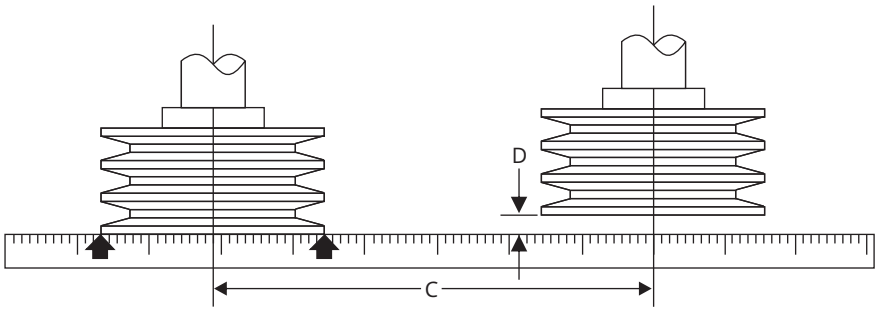
Misalignment can either be quantified mathematically, or be compared to some general rules of thumb for quicker and easier results. While using a straight edge to project the plane of the outside face of the sheave or sprocket #1 with respect to sheave or sprocket #2, angular misalignment can be quantified as the difference in clearance between the straight edge and the outside surface of the sheave or sprocket #2 across the diameter.



$$\text{Misalignment} = \text{Tan}^{-1}\left[\frac{M_2 - M_1}{D}\right]$$

The angle of parallel misalignment can be quantified as the difference in clearance between the straight edge and the outer surfaces of the two sheaves or sprockets across the separation distance.

Pulley alignment inspection



$$\text{Misalignment} = \text{Tan}^{-1}\left[\frac{D}{C}\right]$$

The total allowable misalignment recommended for V-Belts, in general, is 1/2-degree. While individual V-Belts are known to be capable of handling greater amounts of misalignment before becoming unstable, maintaining the misalignment to within 1/2-degree will maximize Belt life.

The total amount of misalignment recommended for synchronous, banded Belts and poly-V Belts is 1/4-degree. These drives are less tolerant of misalignment than conventional V-Belt drives, and must be aligned more accurately.
For V-Belt drives:

1/2-degree angle = approximately 1/10-inch per foot of distance traveled.
For synchronous, 60-degree angle, and V-ribbed drives:

Bush key-size details

Bush No.	Wrench size	Tightening torque (Nm)
1008	3	5.6
1108	3	5.6
1210	5	20
1610	5	20
1615	5	20
2012	6	30
2517	6	50
3020	8	90
3030	8	90
3525	10	115
3535	10	115
4030	12	170
4040	12	170
4535	14	190
4545	14	190
5040	14	270
5050	14	270

Installation of taper bush pulley

Caution: Switch off the power supply before commencing work on electrical components.

Step 1:
Make sure the bush is taken out of the hub if it's already installed. Clean the taper bush thoroughly, remove oil, dirt, grease, and metal filings.

Also clean the bore, the shaft, the outer surface of the bush.

Step 2:
Put the bush within the hub and align with the half threaded holes of pulley with those of the un-threaded half holes of bush to fix the position.

Step 3:
Lubricate inserting tip and threads of the set screws. Put the screws in the holes that are threaded hub-side. Tighten the set screws manually in alternate pattern till possible rotations.

Step 4: Put the assembly onto the shaft and keep it in the right position. Insert the right sized key into the shaft keyway and ensure that the key is the most suitable fit into the shaft keyway. Further tighten the alternate set screws until every screw is pulled up and the bushing has been perfectly placed into the hub.

Step 5: Then tighten the screws further. Use a torque wrench to do so until they are all set to require tightening torque from the table for exact size.

Step 6: Run the drive under load for short time and re-check tightness of screws, if loosen; tighten for specified tightening torque.

Step 7: Fill the other holes with grease to Restrict foreign particle contamination.

Disassembling the Taper Bush Pulley:

Step 1:
Take out the set screws from taper bush pulley.

Step 2: Put screws into the holes threaded on the bushing part. Skip one screw that is not used while removing the bushing.

Step 3: Tighten the placed screws until the bushing gets to loosen up in the hub. In case it's not loosening instantly, tap on the hub (use Wooden /Teflon hammer) to help it remove.

Step 4: Remove the pulley, including the bush, from shaft

Types of Pulleys

V-Pulleys

Poly-V Pulleys

Timing Pulleys

Sheet metal Pulleys

Self cooling Pulleys

QD Bush Pulleys

Non-standard Pulleys

Grading Pulleys

Service Equipment

PIX-Service Kit

PIX Service Kit is a composite gear with all essential tools required by the users in maintaining the drive.

PIX-X'Align (Laser-guided Pulley Alignment Instrument)

Robust and highly effective maintenance tool, used to correct the misalignment of pulleys in a drive.

PIX-Digital Tension Meter

PIX Digital Tension Meter is used to correct the tension factor in a drive, thus helping the users' to attain the optimum Belt-tension.

PIX-Pulley Gauges

PIX-Pulley Gauges are specially designed for checking the profiles of the grooves of various conventional and dual-section pulleys.

PIX at a Glance..

- Fastest emerging global player in the mechanical power transmission products
- Over five decades of expertise of manufacturing quality products
- Strong global brand identity
- Distribution network in over 100 countries
- Global product approvals, quality management systems
- Global presence, subsidiary operations in U.K., Germany and UAE
- State-of-art infrastructure for the development, manufacturing and testing of products
- Dedicated and committed R&D team

IATF 16949:2016	ISO 450001:2018	ISO 9001:2015	ISO 14001:2015

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