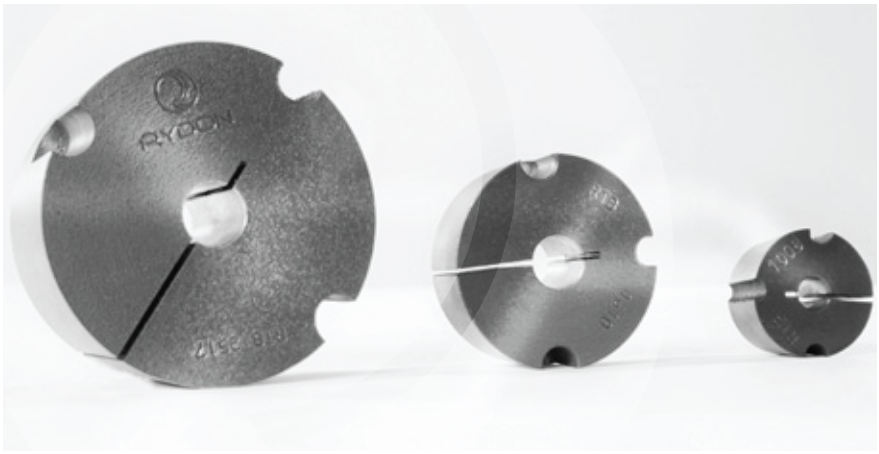


RYDON
DRIVES RELIABILITY

Taper Bushes

Application

- Rotors
- Pulleys
- Sprockets
- Impellers

INTRODUCTION

The Taper Lock bush, also referred to as a Taper bush or Taper Fit bush, is a locking mechanism commonly used in Power Transmission Drives for locating pulleys, sprockets, and couplings to shafts. The Taper Lock bush is pre-bored and keyed to match the required shaft and keyway diameters. The outside of the bush is tapered to match the component bore that is to be located on the shaft.

Taper bushes provide a low cost, simple, quick method of securing sprocket, pulleys and couplings to a wide range of standard metric and imperial dimensioned shafts of general commercial tolerances and finish.

The taper surfaces on the bush and mating hub are driven together by high tensile screws, causing the split bush to be firmly contracted onto the shaft. The strong clamping force which can be achieved enables transmission of high torque without the problems of fretting associated with simple keyseated drives.

The design ensures quick, easy installation of sprockets and pulleys onto shafts with simple positioning for alignment. Positive jacking-off of the bush during removal ensures quick disassembly without normal problems of seizure between shaft and pulley.

The Taper lock bush is manufactured from precision cast iron, and is machined to a high quality finish. Taper bushes are available in both imperial and metric shaft sizes, ranging from 0.375 inches up to 5 inches, and 9 mm up to 125 mm. All quality manufacturers will also supply an installation instruction sheet with the bush.

Taper Bushes are used to fit Pulleys and Chain Sprockets to shafts. They are a cost effective solution of mating to the shaft without additional costs of machining.

SERVICE FACTOR

Service Factor	Type of Loading
1.0	Light starting & steady running
1.5	Light starting & uneven running
2.0	Fairly heavy starting & steady or uneven running
2.5	Light or heavy starting & moderate shock running
3.0	Light or heavy starting & severe shock running, or reversing loads

Metric Bores and Keyways

Bore dia.	Keyway		Shallow Keyway Depth	BUSH SIZE																
	Width	Depth		1008	1108	1210	1610	1615	2012	2517	3020	3030	3525	3535	4030	4040	4535	4545	5040	5050
9	3	1.4	—	9	9															
10	3	1.4	—	10	10															
11	4	1.8	—	11	11	11														
12	4	1.8	—	12	12	12														
14	5	2.3	—	14	14	14	14	14	14											
15	5	2.3	—	15	15	15	15	15	15											
16	5	2.3	—	16	16	16	16	16	16	16										
18	6	2.8	—	18	18	18	18	18	18	18										
19	6	2.8	—	19	19	19	19	19	19	19										
20	6	2.8	—	20	20	20	20	20	20	20										
22	6	2.8	—	22	22	22	22	22	22	22										
24	8	3.3	1.3	24*	24	24	24	24	24	24										
25	8	3.3	1.3	25*	25	25	25	25	25	25	25									
28	8	3.3	1.3		***28****	28	28	28	28	28	28									
30	8	3.3	—			30	30	30	30	30	30									
32	10	3.3	—			32	32	32	32	32	32									
35	10	3.3	—				35	35	35	35	35	35	35	35						
38	10	3.3	—				38	38	38	38	38	38	38	38						
40	12	3.3	—				***40***	40	40	40	40	40	40	40	40	40				
42	12	3.3	2.2				***42****	***42****	42	42	42	42	42	42	42	42				
45	14	3.8	—						45	45	45	45	45	45	45	45				
48	14	3.8	—						48	48	48	48	48	48	48	48				
50	14	3.8	—						50	50	50	50	50	50	50	50				
55	16	4.3	—							55	55	55	55	55	55	55	55	55		
60	18	4.4	—							60	60	60	60	60	60	60	60	60		
65	18	4.4	—								65	65	65	65	65	65	65	65		
70	20	4.9	—								70	70	70	70	70	70	70	70	70	70
75	20	4.9	—								75	75	75	75	75	75	75	75	75	75
80	22	5.4	—										80	80	80	80	80	80	80	80
85	22	5.4	—										85	85	85	85	85	85	85	85
90	25	5.4	—										90	90	90	90	90	90	90	90
95	25	5.4	—										***95***		95	95	95	95	95	95
100	28	6.4	4.4										***100****		100	100	100	100	100	100
105	28	6.4	—												***105***		105	105	105	105
110	28	6.4	—												***110***		110	110	110	110
115	32	7.4	5.4												***115****		***115***		115	115
120	32	7.4	—														***120***		120	120
125	32	7.4	—														***125***		125	125

Dimensions in millimetres

Keyways are British Standard Metric B.S. 4235: Part 1:1972 and conform to I.S.O. recommendations except for the bore sizes marked* which are shallower.

Where a key is to be used it should be parallel and side fitting with top clearance. Depth of keyway is measured at CENTRE.

Bold Italic type indicates bushes made of steel or ductile iron.

Inch Bores and Keyways

Bore dia.	Keyway		Shallow Keyway Depth	BUSH SIZE																
	Width	Depth		1008	1108	1210	1610	1615	2012	2517	3020	3030	3525	3535	4030	4040	4535	4545	5040	5050
0.375	0.125	0.06	—	6	6															
0.500	0.125	0.06	—	8	8		8	8												
0.625	0.187	0.09	—	10	10	10	10	10												
0.750	0.187	0.09	—	12	12	12	12	12	12	12										
0.975	0.250	0.12	—	14	14	14	14	14	14	14										
1.000	0.250	0.12	0.052	100*	100	100	100	100	100	100										
1.125	0.312	0.11	0.064		***102****	102	102	102	102	102										
1.250	0.312	0.11	—			104	104	104	104	104	104	104								
1.375	0.375	0.11	—				106	106	106	106	106	106								
1.500	0.375	0.11	—				108	108	108	108	108	108	108	108						
1.625	0.437	0.13	0.103				110	110*	110	110	110	110	110	110						
1.750	0.437	0.13	—						112	112	112	112	112	112	112	112				
1.875	0.500	0.13	—						114	114	114	114	114	114	114	114				
2.000	0.500	0.13	—						200	200	200	200	200	200	200	200				
2.125	0.625	0.18	—							202	2502	202	202	202	202	202				
2.250	0.625	0.18	—							204	204	204	204	204	204	204	204	204		
2.375	0.625	0.18	—							206	206	206	206	206	206	206	206	206		
2.500	0.625	0.18	—							208	208	208	208	208	208	208	208	208		
2.625	0.750	0.21	—								210	210	210	210	210	210	210	210		
2.750	0.750	0.21	—								212	212	212	212	212	212	212	212	212	212
2.875	0.750	0.21	—								214	214	214	214	214	214	214	214	214	214
3.000	0.750	0.21	—								300	300	300	300	300	300	300	300	300	300
3.125	0.875	0.26	—										302	302	302	302	302	302	302	302
3.250	0.875	0.26	—										304	304	304	304	304	304	304	304
3.375	0.875	0.26	—										306	306	306	306	306	306	306	306
3.500	0.875	0.26	—										308	308	308	308	308	308	308	308
3.750	1.000	0.32	0.245										***312****		312	312	312	312	312	312
4.000	1.000	0.32	0.155										***400****		400	400	400	400	400	400
4.250	1.250	0.37	—												***404***		404	404	404	404
4.500	1.250	0.37	0.255												***408****		408	408	408	408
4.750	1.250	0.37	—														***412***		412	412
5.000	1.250	0.37	0.258														***500****		500	500

Dimensions in inches.

All Keyways are parallel and to British Standard 46: Part 1:1958, with the exception of those marked* which are shallower.

Where a key is to be used it should be side fitting, with top clearance. Depth of keyway is measured at the CENTRE.

Bold Italic type indicates bushes made of steel or ductile iron.

MINIMUM DIAMETERS OF TAPER BORED HUBS

The following table shows the recommended minimum diameter in mm for bespoke component hubs that are to be drilled, tapped and taper bored for use with taper lock bushes. The table differentiates between grey iron and ductile materials of various minimum tensile strength grades (in N/mm² or MN/m² units, which are numerically equal).

All standard taper lock products are tested to ensure that they are capable of safely containing the radial and circumferential hub stresses generated by the wedging mechanism which makes taper lock the equivalent of a shrink-on fit.

Taper Lock Bush	Minimum Hub Diameters (mm) for Various Materials			
	Tensile Strength N/mm²			
	Cast Iron 180	Cast Iron 250	Steel/Ductile Iron 420	Steel 600
1008	62	54	51	47
1108	64	57	54	50
1210	104	86	78	69
1610	109	92	85	78
1615	90	81	77	73
2012	121	106	99	90
2517	130	119	113	108
3020	160	146	140	132
3030	144	136	132	127
3525	211	191	178	167
3535	191	176	168	160
4030	224	207	197	186
4040	209	195	188	180
4535	223	212	205	198
4545	215	205	200	194
5040	240	229	223	216
5050	233	223	219	213

AVERAGE SLIPTORQUES FOR TAPER LOCK FIXING (WITHOUT KEY)

The following table shows emperically derived average slip torque values in Nm for each basic taper lock bush size with a variety of common metric bore diameters. The values assume that the assembly uses a taper lock bush fitted, in accordance with the instructions supplied with every bush, to a hub prepared to the specification. Slip will tend to occur at the bbush/hub interface at a greater torque value related to the ratio of bush outer diameter to bore diameter.

Formula to calculate the slip torque if a key is used : $^{\text{Large end diameter}}/_{\text{Bush bore}}$ * Average slip torque value Nm

Bush	Bore	Average Slip Torque (Nm)
1008	12	29
	19	51
	24	66
1108	12	28
	19	49
	24	64
	28	79
1210	16	82
	19	105
	24	142
	32	210
1610	19	98
	24	135
	38	240
	42	265
2012	24	165
	38	320
	42	340
	48	400
	50	420
2517	24	220
	38	380
	42	430
	48	510
	55	600
	60	670

Bush	Bore	Average Slip Torque (Nm)
3020	38	520
	48	730
	55	890
	60	970
	75	1300
3525*	42	1000
	60	1580
	75	2150
	90	2600
	100*	3075
4030*	48	1700
	60	2300
	75	3150
	100	4400
	115*	5150
4535*	55	2500
	75	3900
	100	5500
	110	6300
	125*	6625
5040	75	3950
	100	5650
	125	7370

Large bores marked * are only available in bush sizes marked *

Taper bushes work effectively on shaft diameters of: Nominal +0.05/-0.125mm

INSTALLATION AND REMOVAL

TO INSTALL

1. After ensuring that the mating tapered surfaces, bore and shaft are completely clean and free from oil or dirt, insert bush in hub so that holes line up.

2. Sparingly oil thread and point of grub screws, or thread and under head of cap screws. Place screws loosely in holes threaded in hub.

3. If a key is to be fitted place it in the shaft keyway before fitting the bush. It is essential that it is a parallel key and side fitting only and has top clearance.

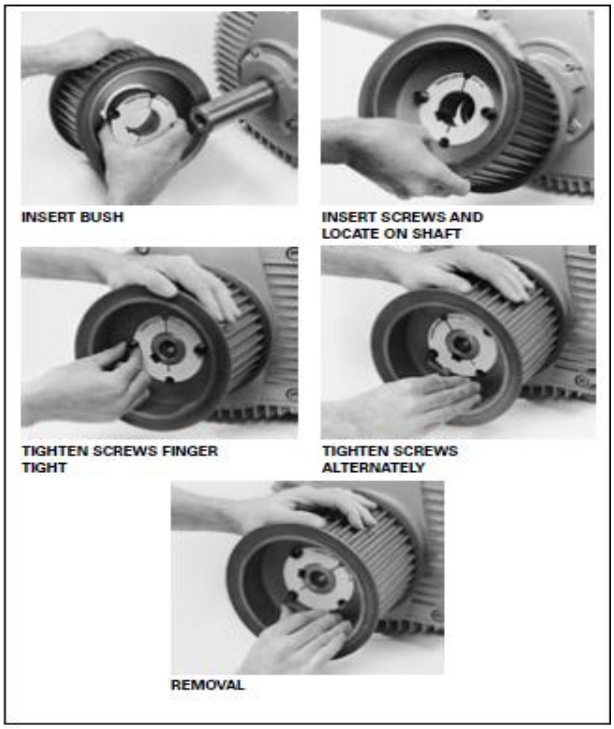
4. Clean shaft and fit hub to shaft as one unit and locate in position desired, remembering that bush will nip the shaft first and then hub will be slightly drawn on to the brush.

5. Using a hexagon wrench tighten screws gradually and alternately to torque

6. Hammer against large-end of bush, using a block or sleeve to prevent damage. (This will ensure that the bush is seated squarely in the bore). Screws will now turn a little more. Repeat this alternate hammering and screw tightening once or twice to achieve maximum grip on the shaft.

7. After drive has been running under load for a short time stop and check tightness of screws.

8. Fill empty holes with grease to exclude dirt.

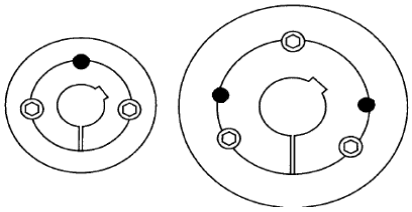


TO REMOVE

1. Slacken all screws by several turns, remove one or two according to number of removal holes shown thus • in diagram. Insert screws into removal holes after oiling thread and under head of cap screws.

2. Tighten screws alternately until bush is loosened in hub and assembly is free on the shaft.

3. Remove assembly from shaft.



REMOVAL HOLES ●

Bush size		1008	1108	1210	1610	1615	2012	2517	3020	3030	3525	3535	4030	4040	4535	4545	5040	5050
Screw tightening torque (Nm)		5.6	5.6	20	20	20	30	50	90	90	115	115	170	170	190	190	270	270
Screw details	Qty	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3
	Size (BSW)	1/4"	1/4"	3/8"	3/8"	3/8"	7/16"	1/2"	5/8"	5/8"	1/2"	1/2"	5/8"	5/8"	3/4"	3/4"	7/8"	7/8"
	Hex. Socket size (mm)	3	3	5	5	5	6	6	8	8	10	10	12	12	14	14	14	14
Large end dia. (mm)		35.0	38.0	47.5	57.0	57.0	70.0	85.5	108	108	127	127	146	146	162	162	178	178
Bush length (mm)		22.3	22.3	25.4	25.4	38.1	31.8	44.5	50.8	76.2	63.5	89.0	76.2	102	89.0	114	102	127
Approx mass (kg)		0.1	0.1	0.2	0.3	0.5	0.7	1.5	2.7	3.6	3.8	5.0	5.6	7.7	7.5	10.0	11.1	14.0