POWER DRIVE

www.powerdrive.com

JAW COUPLING

Selection Procedure

Jaw Type Coupling Selection Process

The selection process for determining the proper jaw coupling size and elastomer requires using the table shown on the following pages. There are three components to be selected, two hubs and one elastomer. When the shaft size of the driver and driven of the application are of the same diameter, the hubs selected will be the same. When shaft diameters differ, hubs selected will differ accordingly

Information necessary before a coupling can be selected:

HP (or KW) and RPM or Torque of driver
Shaft sizes of driver and driven equipment and corresponding keyways
Application description
Environmental conditions (i.e. extreme temperature, corrosive
conditions, space limitations)

List of Tables provided for Selection:

Table 1 – Application Service Factors
Table 2 – Spider Performance Data
Table 3 – Nominal Rated Torque
Table 4 - Elastomers Dimensional Data
Table 5 - L Type Jaw Coupling Dimensions
Table 6 - L Type Inch Bore/ Keyway
Table 7 - L Type Metric Bore/ Keyway

Steps In Selecting A Jaw Coupling

Step 1:

Determine the Nominal Torque of your application by using the following formula:

$$\text{Nominal Torque} = \frac{(\text{HP} \times 63025)}{\text{RPM}} \text{ in-lb}$$

OR

$$\text{Nominal Torque} = \frac{(\text{KW} \times 9550)}{\text{RPM}} \text{ Nm}$$

Step 2:

Using the Application Service Factors Table- 1 (Page O-3) select the service factor which best corresponds to your application.

Step 3:

Calculate the Design Torque of your application by multiplying the Nominal Torque calculated in Step 1 by the Application Service Factor determined in Step 2.

Design Torque = Nominal Torque x Application Service Factor

Step 4:

Using the Spider Performance Data Table-2 (Page O-4), select the elastomer material which best corresponds to your application.

Step 5:

Using the Jaw Nominal Rated Torque Table- 3 (Page O-4), locate the appropriate elastomer material column for the elastomer selected in Step 4.

Scan down this column to the first entry where the Torque Value in the appropriate column is greater than or equal to the Design Torque calculated in Step 3.

Once this value is located, refer to the corresponding coupling size in the first column of the Jaw Nominal Rated Torque Table-3 (page O-4)

Step 6:

Compare the application driver/driven shaft sizes to the maximum bore size available on the coupling selected. If coupling bore size is not large enough for the shaft diameter, select the next largest coupling that will accommodate the driver/driven shaft diameters. Refer to Table- 3 (Page O-4).

Step 7:

Using L Type Bore/ Keyway Tables (Inch/Metric size-pages O-6&7), find the appropriate Bore and Keyway sizes required and check all dimensions which are given in table 4-5 and (Page O-5&6).
Select appropriate coupling as per your application.

Selection Procedure Example

Example:

A coupling is needed to connect a 20 HP standard electric motor rated at 1,800 RPM to a rotary pump. The shaft size of the electric motor (driver) is 2.0 inches and the pump (driven) is 1.75 inches. There are no special environmental conditions and the general operating temperature is normal room temperature of 72° F. Less than 1° of misalignment is expected.

Step 1:

Determine the Nominal Torque:

$$\text{Nominal Torque} = \frac{(\text{HP} \times 63025)}{\text{RPM}}$$

$$= \frac{(20 \times 63025)}{1800}$$

$$= 700.28 \text{ in-lb}$$

Step 2:

Using the Application Service Factors Table 1 (Page O-3), select the service factor which best corresponds to your application. The Application Service Factor for an electric motor with standard torque driving a rotary pump is 1.25. The value of 1.25 is found under the application category Pumps, Rotary, column: Electric Motor w/Standard Torque in Table 3.

Step 3:

Calculate the Design Torque of your application:

Design Torque = Nominal Torque x Service Factor
= 700.28 x 1.25
= 875.35 in-lb

Step 4:

Using the Spider Performance Data Table 2 (Page O-4), select the elastomer material which best corresponds to your application. Since there are no special environmental conditions, the operating temperature is 72° F and less than 1° of angular misalignment is required, the NBR elastomer material is selected.

Step 5:

Using the Jaw Nominal Rated Torque Table 3 (Page O-4), the NBR elastomer column is used to determine the proper coupling size. Scanning down the NBR column, the first entry to accommodate the Design Torque value of 875.35 in-lb is the size L150 with a nominal torque rating of 1,240 in-lb.

Step 6:

Compare the application driver/driven shaft size to the maximum bore available in the coupling selected (Page O-4). The electric motor (driver) of this application has a shaft size of 2.0 inches and the pump (driven) has a shaft size of 1.75 inches. The L150 coupling has a maximum bore less than the driver shaft size. Continuing down the Maximum Bore column, in Table 3 (Page O-4), the L190 size is found to have a maximum bore size of 2.125 and is able to accommodate the driver/driven shaft sizes. Therefore, the proper coupling size for this application is a L190 with an NBR elastomer.

Step 7:

Using the L Type Inch Bore / Keyway Selection table, select the appropriate Bore / Keyway size which is Available or not check it in Table-.6 (Page O-7). The L Type Spider Table-4 (page O-5), and the L Type hub table-5 (page O-6), provides easy reference to the L Type Hub / Keyway table-6.

Locate the L Type Hub Table-6 (Page O-7). The first bore size to be located is for the 2 inch shaft on the electric motor. Scan down the Bore/Keyway column to the 2 inch bore entry. Read across to the L190 column .

The second bore size to be located is for the 1.75 inch shaft on the pump. Scan down the Bore/Keyway column to the 1-3/4 inch bore entry. Read across to the L190 column.

Service Factors

Table 1

	Service Factors				
	Electric Motor w/ StandardTorque	Electric Motor w/ High Torque	Steam Turbines & Engines w4 or more cyl*	Reciprocating Engines*	
				1Cyl	2Cyl
Agitators	1.00	1.25	1.00	1.7	1.3
Band Resaw (lumber)	1.50	1.75	1.50	2.2	1.8
Barge Haul Puller	2.00	2.25	2.00	2.7	2.3
Beaters	1.50	1.75	1.50	2.2	1.8
Blowers					
Centrifugal	1.00	1.25	1.00	1.7	1.3
Lobe, Vane	1.25	1.50	1.25	2.0	1.6
Bottling Machinery	1.25	1.50	1.25	2.0	1.6
Brew Kettles (distilling)	1.25	1.50	1.25	2.0	1.6
Can Filling Machinery	1.00	1.25	1.00	1.7	1.3
Car Dumpers	2.50	2.75	2.50	3.2	2.8
Car Pullers	1.50	1.75	1.50	2.2	1.8
Card Machine	1.75	2.00	1.75	2.5	2.0
Chiller (oil)	1.50	2.00	1.25	2.0	2.0
Compressors					
Centrifugal	1.00	1.25	1.00	1.7	1.3
Screw, Lobe	1.25	1.50	1.25	2.0	1.6
Reciprocating	See Note				
Conveyors, Uniformly Fed					
Assembly, Belt, Screw	1.00	1.25	1.00	1.7	1.3
Bucket, Sawdust	1.25	1.50	1.25	2.0	1.6
Live Roll, Shaker, Reciprocating	3.00	3.25	3.00	3.7	3.3
Conveyors, Not Uniformly Fed					
Assembly, Belt, Oven, Screw	1.20	1.45	1.20	1.9	1.5
Reciprocating	2.50	2.75	2.50	3.2	2.8
Shaker	3.00	3.25	3.00	3.7	3.3
Cookers—Brewing, Distilling, Food	1.25	1.50	1.25	2.0	1.6
Cranes & Hoist1	2.00	2.25	2.00	2.7	2.3
Crushers—Cane (sugar), Stone, or Ore	3.00	3.25	3.00	3.7	3.3
Dredges					
Cable reels	2.00	2.25	2.00	2.7	2.3
Conveyors, Pumps, Maneuvering Winches	1.50	1.75	1.50	2.2	1.8
Cutter Head Drives	2.50	2.75	2.50	3.2	2.8
Dynamometer	1.50	1.75	1.50	2.2	1.8
Evaporators	1.00	1.25	1.00	1.7	1.3
Fans					
Centrifugal	1.00	1.25	1.00	1.7	1.3
Cooling Towers	2.00	2.25	2.00	2.7	2.3
Forced Draft, Propeller	1.50	1.75	1.50	2.2	1.8
Induced draft w/damper control	2.00	2.25	2.00	2.7	2.3
Induced draft w/o damper control	1.25	1.50	1.25	2.0	1.6
Feeders					
Belt, Screw	1.00	1.25	1.00	1.7	1.3
Reciprocating	2.50	2.75	2.50	3.2	2.8
Filter, Press-oil	1.50	1.75	1.50	2.2	1.8
Generators					
Not Welding	1.00	1.25	1.00	1.7	1.3
Welding	2.00	2.25	2.00	2.7	2.3
Hoist	1.50	1.75	1.50	2.2	1.8
Hammermills	2.00	2.25	2.00	2.7	2.3
Kilns	1.50	1.75	1.50	2.2	1.8
Laundry Washers —					
Reversing	2.00	2.25	2.00	2.7	2.3
Lumber Machinery					
Barkers, Edger Feeder, Live Roll	2.00	2.25	2.00	2.7	2.3
Planer, Slab Conveyor	2.00	2.25	2.00	2.7	2.3
Machine Tools					
Punch Press-gear Driven, Plate Planer	2.00	2.25	2.00	2.7	2.3
Tapping Machinery, Bending Roll	2.00	2.25	2.00	2.7	2.3
Main Drive	1.50	1.75	1.50	2.2	1.8
Auxiliary Drives	1.00	1.25	1.00	1.7	1.3
Metal Forming Machines					
Draw Bench-carriage & Main Drive	2.00	2.25	2.00	2.7	2.3
Extruder, Forming Machine, Wire Drawing	2.00	2.25	2.00	2.7	2.3
Table Conveyors	2.50	2.75	2.50	3.2	2.8
Wire Winding, Coilers, Slitters	1.50	1.75	1.50	2.2	1.8
Mills, Rotary Type					
Ball, Kilns, Pebble, Rolling, Tube	2.00	2.25	2.00	2.7	2.3
Cement Kilns, Dryers, Coolers	2.00	2.25	2.00	2.7	2.3
Tumbling	1.50	1.75	1.50	2.2	1.8
Mixers					
Concrete, continuous	1.75	2.00	1.75	2.5	2.0
Muller	1.50	1.75	1.50	2.2	1.8
Paper Mills					
Agitator (mixers), Reel, Winder	1.20	1.45	1.20	1.9	1.5
Winder	1.20	1.45	1.20	1.9	1.5
Barker (mechanical), Log Haul, Chipper	2.00	2.25	2.00	2.7	2.3
Barking Drum (spur gear)	2.50	2.75	2.50	3.2	2.8
Beater, Pulper, Jordans, Dresses	2.00	2.25	2.00	2.7	2.3
Calenders, Dryers, Washers, Thickener	1.50	1.75	1.50	2.2	1.8
Converting Machines, Conveyors	1.20	1.45	1.20	1.9	1.5
Printing Presses	1.50	1.75	1.50	1.7	1.3
Pug Mill	1.75	2.00	1.75	2.0	1.6
Pumps					
Centrifugal	1.00	1.25	1.00	1.7	1.3
Gear, Rotary, Vane	1.25	1.50	1.25	2.0	1.6
Reciprocating:					
1–Cyl. Single or Double Acting	2.00	2.25	2.00	2.7	2.3
2–Cyl. Single Acting	2.00	2.25	2.00	2.7	2.3
2–Cyl. Double Acting	1.75	2.00	1.75	2.5	2.0
3 or more Cyl	1.50	1.75	1.50	2.2	1.8
Rubber Machinery					
Mixers	2.50	2.75	2.50	3.2	2.8
Rubber Calender	2.00	2.25	2.00	2.7	2.3
Screens					
Air washing, Water	1.00	1.25	1.00	1.7	1.3
Rotary—stone or gravel, Dewatering	1.50	1.75	1.50	2.2	1.8
Vibrating	2.50	2.75	2.50	3.2	2.8
Grizzly	2.00	2.25	2.00	2.7	2.3
Shredders	1.50	1.75	1.50	2.2	1.8
Steering Gears	1.00	1.25	1.00	1.7	1.3
Stokers	1.00	1.25	1.00	1.7	1.3
Suction Roll (paper)	1.50	1.75	1.50	2.2	1.8
Textile Machinery					
Dryers, Dyeing Machinery, Mangle	1.20	1.45	1.20	2.0	1.6
Loom, Spinner, Tenter frames	1.50	1.75	1.50	2.2	1.8
Tumbling Barrels	1.75	2.00	1.75	2.5	2.0
Windlass	2.00	2.25	2.00	2.7	2.3
Woodworking Mach	1.00	1.25	1.00	1.7	1.3

Performance Data

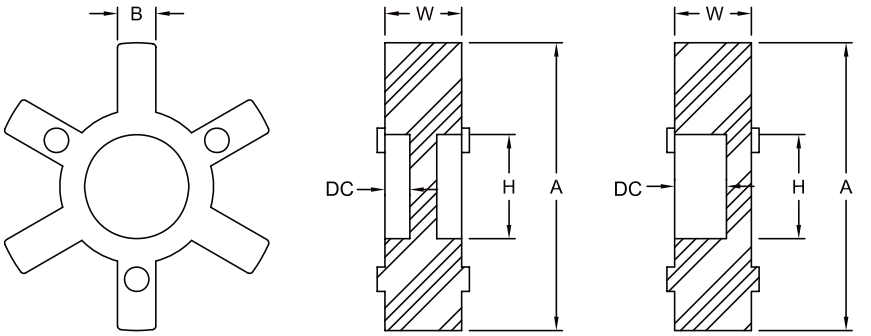
Table 2

Characteristics	Temperature Range	Misalignment		Shore Hardness	Dampening Capacity	Chemical Resistance2	Color
		Angular Degree	Parallel Inch				
SOX (NBR) Rubber – Nitrile Butadiene (Buna N) Rubber is a flexible elastomer material that is oil resistant, resembles natural rubber in resilience and elasticity and operates effectively in temperature range of -40° to 212° F (-40° to 100° C). Good resistance to oil. Standard elastomer. (Also applies to SXB Cushions.)	-40° to 212° F -40° to 100° C	1°	0.015	80A	HIGH	GOOD	BLACK
URETHANE – Urethane has greater torque capability than NBR (1.5 times), provides less dampening effect, and operates at a temperature range of -30° to 160° F (-34° to 71° C). Good resistance to oil and chemicals. Not recommended for cyclic or start/stop applications.	-30° to 160° F -34° to 71° C	1°	0.015	55D L050-L110 90-95A L150-L225	LOW	VERY GOOD	BLUE
HYTREL® – Hytrel is a flexible elastomer designed for high torque and high temperature operations. Hytrel can operate in temperatures of -60° to 250° F (-51° to 121° C) and has an excellent resistance to oil and chemicals. Not recommended for cyclic or start/stop applications.	60° to 250° F 51° to 121° C	1/2°	0.015	55D	LOW	EXCELLENT	TEN

Nominal Rated Torque Data

Table 3

Size	Max Bore		Spider Material					
			SOX (NBR) Torque		Urethane Torque		Hytrel Torque	
	in	mm	in-lbs	Nm	in-lbs	Nm	in-lbs	Nm
L035	0.375	9	3.5	0.4	—	—	—	—
L050	0.625	16	26.3	3	39	4.5	50	5.6
L070	0.75	19	43.2	4.9	65	7.3	114	12.9
L075	0.875	22	90	10.2	135	15.3	227	25.6
L090	1	25	144	16.3	216	24.4	401	45.3
L095	1.125	28	194	21.9	291	32.9	561	63.4
L099	1.188	30	318	35.9	477	53.9	792	89.5
L100	1.375	35	417	47.1	626	70.7	1,134	128
L110	1.625	42	792	89.5	1,188	134	2,268	256
L150	1.875	48	1,240.00	140	1,860	210	3,708	419
L150	1.875	48	1,450.00	163.8	—	—	—	—
L190	2.125	55	1,728.00	195	2,592	293	4,680	529
L225	2.625	65	2,340.00	264	3,510	397	6,228	704



Solid Center

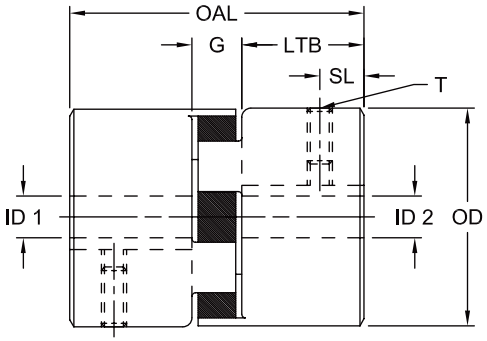
L095 & L225 NBR Only

Table 4

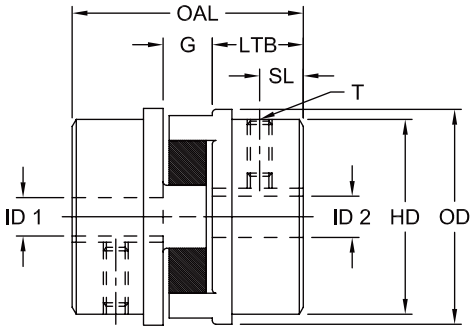
Size	Solid Center Spiders							
	Material Available			A	DC	H	W	B
	NBR SOX	Urethane URE	Hytrel® HYT					
L035	X	X	-	0.62	-	-	0.28	0.21
L050	X	X	X	1.07	-	-	0.42	0.27
L070	X	X	X	1.38	-	-	0.42	0.27
L075	X	X	X	1.75	-	-	0.44	0.27
L090/L095	X	X	X	2.12	0.18	0.88	0.44	0.36
L099/L100	X	X	X	2.54	0.25	1.03	0.61	0.43
L110	X	X	X	3.31	NBR.25 HYT.18	1.19	0.75	0.45
L150	X	X	X	3.75	NBR.31 HYT.21	1.25	0.88	0.59
L190	X	X	X	4.5	NBR.31 HYT.18	1.38	0.88	0.60
L225	X	X	X	4.98	NBR.38 HYT.18	1.75	0.88	0.73

X indicates available & - indicates not available.
All dimensions are in inch.

L Type Jaw Coupling



Style 1



Style 2

Table 5

Size	Type	OAL in	G in	LTB in	SL in	T in	ID1-ID2				OD in	HD in	Min Bore lbs	Max bore lbs	Moment of inertia (Solid) WR^2 lb-in^2
							Min Bore		Max. Bore						
							in	mm	in	mm					
L035	1	0.81	0.28	0.27	0.13	6-32	0.125	3	0.375	10	0.63	0.63	0.1	0.1	0.003
L050	1	1.71	0.48	0.62	0.31	1/4-20	0.25	6	0.625*	16	1.08	1.08	0.3	0.2	0.054
L070	1	1.98	0.48	0.75	0.38	1/4-20	0.25	6	0.75	19	1.36	1.36	0.6	0.4	0.115
L075	1	2.13	0.5	0.82	0.31	1/4-20	0.25	6	0.875	22	1.75	1.75	1	0.8	0.388
L090	1	2.15	0.52	0.82	0.44	1/4-20	0.25	6	1	25	2.11	2.11	1.5	1.2	0.772
L095	1	2.51	0.52	1	0.44	5/16-18	0.437	11	1.125	29	2.11	2.11	1.8	1.3	0.89
L099	1	2.84	0.71	1.06	0.44	5/16-18	0.437	11	1.188	30	2.54	2.54	2.5	2	2.048
L100	1	3.48	0.71	1.38	0.44	5/16-18	0.437	11	1.375	35	2.54	2.54	3.2	2.4	2.783
L110	1	4.22	0.88	1.68	0.75	3/8-16	0.625	16	1.625	41	3.32	3.32	6.6	5.3	8.993
L150	1	4.5	1	1.75	0.75	3/8-16	0.625	16	1.875	48	3.75	3.75	8.8	7	11.477
L190	2	4.86	1	1.94	0.88	1/2-13	0.75	19	2.125	54	4.5	4	15.3	12.3	39.256
L225	2	5.34	1	2.18	1	1/2-13	0.75	19	2.625	67	5	4.25	19.6	15	65
L276	2	7.82	1.58	3.12	1.56	1/2-13	0.875	22	2.875	73	6.18	5	40	30.5	188

Notes:

* indicate without keyway
hubs are standard with one set screw.

L Type Inch Bore / Keyway

Table 6

Bore	Keyway	L035	L050	L075	L075	L090	L095	L099	L100	L110	L150	L190	L225
1/8	No Keyway	x	—	—	—	—	—	—	—	—	—	—	—
3/16	No Keyway	x	—	—	—	—	—	—	—	—	—	—	—
1/4	No Keyway	x	x	x	x	x	—	—	—	—	—	—	—
1/4	1/8 x 1/16	—	—	—	x	—	—	—	—	—	—	—	—
5/16	No Keyway	x	x	x	x	x	—	—	—	—	—	—	—
3/8	No Keyway	x	x	x	x	x	—	—	—	—	—	—	—
3/8	3/32 x 3/64	—	x	x	x	x	—	—	—	—	—	—	—
3/8	1/8 x 1/16	—	x	x	x	x	—	—	—	—	—	—	—
7/16	No Keyway	—	x	x	x	x	x	x	x	—	—	—	—
7/16	3/32 x 3/64	—	x	x	x	x	x	x	x	—	—	—	—
7/16	1/8 x 1/16	—	—	x	x	x	x	x	x	—	—	—	—
1/2	No Keyway	—	x	x	x	x	x	x	x	—	—	—	—
1/2	1/8 x 1/16	—	x	x	x	x	x	x	x	—	—	—	—
9/16	No Keyway	—	x	x	x	x	x	x	x	—	—	—	—
9/16	1/8 x 1/16	—	x	x	x	x	x	x	x	—	—	—	—
5/8	No Keyway	—	x	x	x	x	x	x	x	x	x	—	—
5/8	5/32 x 5/64	—	—	x	x	x	x	x	x	x	x	—	—
5/8	3/16 x 3/32	—	—	x	x	x	x	x	x	x	x	—	—
11/16	3/16 x 3/32	—	—	x	x	x	x	x	x	x	x	—	—
3/4	No Keyway	—	—	x	x	x	x	x	x	—	—	x	x
3/4	1/8 x 1/16	—	—	x	x	x	x	x	x	x	x	x	—
3/4	3/16 x 3/32	—	—	x	x	x	x	x	x	x	x	x	x
13/16	3/16 x 3/32	—	—	—	x	x	x	x	x	x	x	x	x
7/8	No Keyway	—	—	—	x	—	—	x	—	—	—	—	—
7/8	3/16 x 3/32	—	—	—	x	x	x	x	x	x	x	x	x
7/8	1/4 x1/8	—	—	—	—	x	x	x	x	x	x	x	x
15/16	1/4 x1/8	—	—	—	—	x	x	x	x	x	x	x	x
1	1/4 x1/8	—	—	—	—	x	x	x	x	x	x	x	x
1	3/16 x 3/32	—	—	—	—	x	x	x	x	x	x	x	x
1-1/16	1/4 x1/8	—	—	—	—	—	x	x	x	x	x	x	x
1-1/8	1/4 x1/8	—	—	—	—	—	x	x	x	x	x	x	x
1-3/16	1/4 x1/8	—	—	—	—	—	—	x	x	x	x	x	x
1-1/4	1/4 x1/8	—	—	—	—	—	—	—	x	x	x	x	x
1-1/4	5/16 x 5/32	—	—	—	—	—	—	—	x	x	x	x	x
1-5/16	5/16 x 5/32	—	—	—	—	—	—	—	x	x	x	x	x
1-3/8	5/16 x 5/32	—	—	—	—	—	—	—	x	x	x	x	x
1-3/8	3/8 x 3/16	—	—	—	—	—	—	—	x	x	x	x	x
1-7/16	3/8 x 3/16	—	—	—	—	—	—	—	—	x	x	x	x
1-1/2	5/16 x 5/32	—	—	—	—	—	—	—	—	x	x	x	x
1-1/2	3/8 x 3/16	—	—	—	—	—	—	—	—	x	x	x	x
1-9/16	3/8 x 3/16	—	—	—	—	—	—	—	—	x	x	x	x
1-5/16	3/8 x 3/16	—	—	—	—	—	—	—	—	x	x	x	x
1-11/16	3/8 x 3/16	—	—	—	—	—	—	—	—	—	x	x	x
1-3/4	3/8 x 3/16	—	—	—	—	—	—	—	—	—	x	x	x
1-3/4	7/16 x7/32	—	—	—	—	—	—	—	—	—	x	x	x
1-13/16	1/2 x 1/4	—	—	—	—	—	—	—	—	—	x	x	x
1-7/8	1/2 x 1/4	—	—	—	—	—	—	—	—	—	x	x	x
1-15/16	1/2 x 1/4	—	—	—	—	—	—	—	—	—	—	x	x
2	1/2 x 1/4	—	—	—	—	—	—	—	—	—	—	x	x
2-1/16	1/2 x 1/4	—	—	—	—	—	—	—	—	—	—	x	x
2-1/8	1/2 x 1/4	—	—	—	—	—	—	—	—	—	—	x	x
2-3/16	1/2 x 1/4	—	—	—	—	—	—	—	—	—	—	—	x
2-1/4	1/2 x 1/4	—	—	—	—	—	—	—	—	—	—	—	x
2-3/8	5/8 x 5/16	—	—	—	—	—	—	—	—	—	—	—	x
2-5/8	5/8 x 5/16	—	—	—	—	—	—	—	—	—	—	—	x
2-7/8	3/4 x 3/8	—	—	—	—	—	—	—	—	—	—	—	—

Note:
x Available Size
- Not Available

L Type Metric Bore / Keyway

Table 7

Bore	keyway	L035	L050	L075	L075	L090	L095	L099	L100	L110	L150	L190	L225
4	No Keyway	x	—	—	—	—	—	—	—	—	—	—	—
5	No Keyway	x	x	—	—	—	—	—	—	—	—	—	—
6	No Keyway	x	x	—	—	—	—	—	—	—	—	—	—
7	No Keyway	x	x	x	—	—	—	—	—	—	—	—	—
8	No Keyway	x	x	x	—	x	—	—	—	—	—	—	—
9	3 × 1.4		x	x	x	—	—	—	—	—	—	—	—
10	No Keyway		x	x	x	—	—	—	—	—	—	—	—
10	3 × 1.4		x	x	x	x	—	—	—	—	—	—	—
11	4 × 1.8	—	x	x	x	—	x	—	—	—	—	—	—
12	No Keyway	—	x	x	—	x	—	—	—	—	—	—	—
12	4 × 1.8	—	x	x	x	x	x	—	x	—	—	—	—
14	No Keyway	—	x	x	—	x	x	—	—	—	—	—	—
14	5 × 2.3	—	x	x	x	x	x	x	x	—	—	—	—
15	No Keyway	—	x	—	x	—	x	x	x	—	—	—	—
15	5 × 2.3	—	x	x	x	x	x	x	x	—	—	—	—
16	5 × 2.3	—	x	x	x	x	x	x	x	x	x	—	—
17	5 × 2.3	—	—	x	x	—	x	—	x	x	x	—	—
18	6 × 2.8	—	—	x	x	x	x	x	x	x	—	—	—
19	No Keyway	—	—	—	—	x	—	—	—	x	—	—	—
19	6 × 2.8	—	—	x	x	x	x	x	x	x	x	x	—
20	6 × 2.8	—	—	—	x	x	x	x	x	x	x	x	—
22	6 × 2.8	—	—	—	x	x	x	x	x	x	x	—	—
24	8 × 3.3	—	—	—	—	x	x	x	x	x	x	x	—
25	8 × 3.3	—	—	—	—	x	x	x	x	x	x	x	—
28	No Keyway	—	—	—	—	—	—	—	—	—	x	x	—
28	8 × 3.3	—	—	—	—	—	x	x	x	x	x	x	—
30	8 × 3.3	—	—	—	—	—	—	x	x	x	x	x	x
32	No Keyway	—	—	—	—	—	—	—	—	—	x	x	x
32	10 × 3.3	—	—	—	—	—	—	—	—	—	x	x	x
35	No Keyway	—	—	—	—	—	—	—	x	x	x	x	x
35	10 × 3.3	—	—	—	—	—	—	—	—	—	x	x	x
38	10 × 3.3	—	—	—	—	—	—	—	x	x	x	x	x
40	12 × 3.3	—	—	—	—	—	—	—	—	x	x	x	x
42	12 × 3.3	—	—	—	—	—	—	—	—	x	x	x	x
45	14 × 3.8	—	—	—	—	—	—	—	—	x	x	x	x
48	No Keyway	—	—	—	—	—	—	—	—	—	x	—	—
48	14 × 3.8	—	—	—	—	—	—	—	—	—	x	x	x
50	No Keyway	—	—	—	—	—	—	—	—	—	—	x	x
50	14 × 3.8	—	—	—	—	—	—	—	—	—	—	x	x
55	No Keyway	—	—	—	—	—	—	—	—	—	—	x	x
55	16 × 4.3	—	—	—	—	—	—	—	—	—	—	x	x
60	No Keyway	—	—	—	—	—	—	—	—	—	—	—	x
60	18 × 4.4	—	—	—	—	—	—	—	—	—	—	—	x
65	No Keyway	—	—	—	—	—	—	—	—	—	—	—	—
65	18 × 4.4	—	—	—	—	—	—	—	—	—	—	—	x
70	20 × 4.9	—	—	—	—	—	—	—	—	—	—	—	—

Note:
x Available Size
- Not Available