



Instruction Manual for QD* and TAPER-LOCK® Bushing Reboring Guidelines

These instructions must be read thoroughly before installation or operation. This instruction manual was accurate at the time of printing. Please see dodgeindustrial.com for updated instruction manuals.

WARNING: To ensure the drive is not unexpectedly started, turn off and lock-out or tag power source before proceeding. Failure to observe these precautions could result in bodily injury.

WARNING: All products over 25 kg (55 lbs) are noted on the shipping package. Proper lifting practices are required for these products.

Reboring Instructions QD and Taper-Lock Bushings:

Reborable DODGE® bushings are made from the following materials having the approximate tensile strengths shown:

Cast Iron:	30 ksi
Ductile Iron:	60 ksi
Sintered Steel:	55 ksi (Properties similar to 1020 hot-rolled steel.)
Steel:	97 ksi
Stainless Steel:	85 ksi

1. Use high speed steel tools (not carbide) with the following geometry:

Nose radius:	0.005
Side relief angle:	12°
Front relief angle:	8°
Back rake angle:	16.5°
Side rake angle:	14°

WARNING: Because of the possible danger to person(s) or property from accidents which may result from the improper use of products, it is important that correct procedures be followed. Products must be used in accordance with the engineering information specified in the catalog. Proper installation, maintenance and operation procedures must be observed. The instructions in the instruction manuals must be followed. Inspections should be made as necessary to assure safe operation under prevailing conditions. Proper guards and other suitable safety devices or procedures as may be desirable or as may be specified in safety codes should be provided, and are neither provided by Dodge nor are the responsibility of Dodge. This unit and its associated equipment must be installed, adjusted and maintained by qualified personnel who are familiar with the construction and operation of all equipment in the system and the potential hazards involved. When risk to persons or property may be involved, a holding device must be an integral part of the driven equipment beyond the speed reducer output shaft.

2. For QD bushings, use QD hub, or similar 4° taper “pot” chuck with maximum runout of .002 T.I.R. For TAPER-LOCK bushings, use TAPER-LOCK hub, or similar 8° taper “pot” chuck with maximum runout of .002 T.I.R.
3. Based on the bushing material, use the appropriate cutting speed and feed rate as shown below for boring. (See Table 5 for the required bore tolerance.)

Cast/Ductile Iron:	80 - 90 SFM, 0.008” - 0.016” per Revolution
Sintered Steel:	90 - 100 SFM, 0.005” - 0.006” per Revolution
Steel:	60 - 70 SFM, 0.006” - 0.008” per Revolution
Stainless Steel:	30 - 40 SFM, 0.003” - 0.005” per Revolution

4. Use a high speed steel broach to cut keyway. (See Table 3 for standard keyway sizes.)
5. Use an “A” temper raker-tooth saw to cut the sawslot. Based on the bushing material, use the appropriate cutting speed and feed rate as shown below. (See Table 2 for required sawslot depths.)

Cast/Ductile Iron:	75 SFM, ½” per minute feed
Sintered Steel:	150 SFM, ½” per minute feed
Steel:	150 SFM, ½” per minute feed
Stainless Steel:	110 SFM, ¼” per minute feed

6. The sawslot is to be within width as shown in Table 1.

Slaw Slot width (Inches)	.040/.130	.050 / .200	.070 / .200	.075 / .250
Bushing Sizes	TL sizes through 3030	3525 3535 4040	4545 4535 5050 5040	7060 8065 10085 120100
	All QD		6050	

*QD is a trademark of Emerson Electric

IMPORTANT: Reborable QD and TAPER-LOCK bushings are supplied without sawslots. This allows for reboring under the best conditions to maintain concentricity. The sawslot must be the final operation and must be performed by the bushing to properly grip the shaft. All dimensional tolerances are held prior to cutting the sawslot. QD Bushings are only saw slotted thru one wall as shown in Figure 1. TL bushings have a depth into the second wall as defined in Figure 1 as G dimension and tabulated per size in Table 2.

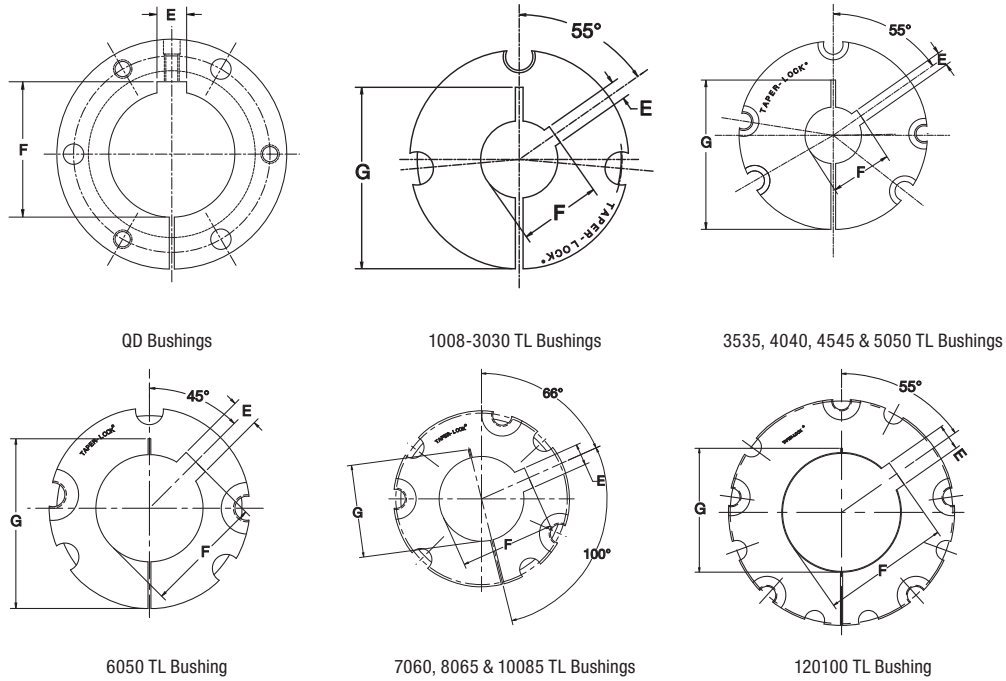


Figure 1 - Orientation & Variables for TL and QD bushings

Table 2 - Sawslot Depth for TL Bushings

Bushing Size	G (in.)	Bushing Size	G (in.)
1008	1.16	4030/4040	4.63
1108	1.25	4535/4545	5.13
1210/1215	1.41	5040/5050	5.63
1310	1.30	6050	7.75
1610/1615	1.81	7060	8.38
2012	2.25	8065	9.38
2517/2525	2.84	10085	12.38
3020	3.50	120100	14.63
3030	3.56		
3525/3535	4.00		

Note: All QD bushings are sawslot on only one side. Cutting sawslot to depth shown may result in sawslot on only one side.

Table 3 - Standard Keyway Sizes								
Inch					Metric (mm)			
Shaft Size (Dia)		Keyway Width (E)	Standard Keyway Depth (H)	Shallow Keyway Depth (H)	Shaft Size (DIA)		Keyway Width (E)	Keyway Depth (H)
Over	To [Incl.]				Over	To [Incl.]		
5/16	7/16	3/32	3/64	-	10	12	4	1.8
7/16	9/16	1/8	1/16	3/64	12	17	5	2.3
9/16	7/8	3/16	3/32	1/16	17	22	6	2.8
7/8	1-1/4	1/4	1/8	3/32	22	30	8	3.3
1-1/4	1-3/8	5/16	5/32	1/8	30	38	10	3.3
1-3/8	1-3/4	3/8	3/16	1/8	38	44	12	3.3
1-3/4	2-1/4	1/2	1/4	1/8	44	50	14	3.8
2-1/4	2-3/4	5/8	5/16	3/16	50	58	16	4.3
2-3/4	3-1/4	3/4	3/8	1/4	58	65	18	4.4
3-1/4	3-3/4	7/8	7/16	1/4	65	75	20	4.9
3-3/4	4-1/2	1	1/2	1/4	75	85	22	5.4
4-1/2	5-1/2	1-1/4	5/8	1/4	85	95	25	5.4
5-1/2	6-1/2	1-1/2	3/4	1/4	95	110	28	6.4
6-1/2	7-1/2	1-3/4	3/4	1/4	110	130	32	7.4
7-1/2	9	2	3/4	3/8	130	150	36	8.4
9	11	2-1/2	7/8	3/8	150	170	40	9.4
11	12	3	1	3/8	170	200	45	10.4
-	-	-	-	-	200	230	50	11.4
-	-	-	-	-	230	260	56	12.4
-	-	-	-	-	260	290	63	12.4
-	-	-	-	-	290	330	70	14.4

* MM Bore and Keyway dimensions conform to ISO standard recommendation R773, for "Free" fit. ISO standard Method for Measuring Keyseat Depth.

Note: The "F" dimension is calculated as follows:

For inch bores:
$$F = H + \frac{\text{Dia} + \sqrt{\text{Dia}^2 - E^2}}{2} \quad [\text{in}]$$

For Metric bores:
$$F = \text{Dia} + H \quad [\text{mm}]$$

Table 4 - Keyway Tolerance			
Inch		Metric [mm]	
"E" Dimension	Tolerance	"E" Dimension	Tolerance
0 - 0.500	+ .002 / - .000	2 - 3	+ .060 / + .020
0.500 - 1.000	+ .003 / - .000	4 - 6	+ .078 / + .030
> 1.000	+ .004 / - .000	8 - 10	+ .098 / + .040
		12 - 18	+ .120 / + .050
		20 - 28	+ .149 / + 0.065
		32 - 50	+ .180 / + .080
		56 - 80	+ .220 / + .100

Table 5 - Required Bore Tolerance			
TL Bushing Size	Bore Tolerance [in.]	QD Bushing Size	Bore Tolerance [in.]
1008 - 3020	+ 0.0035 / - 0.000	H, JA, SH, SDS, SD, SK, SF, E, F	+ .003 / -.000
3030	+ 0.0045 / - 0.001	J	+ .0035 / - .0000
3535 - 120100	+ 0.006 / - 0.003	M, N, P	+ .004 / - .000
		W, S	+ .0045 / - .0000

Table 6 - Minimum and Maximum Bore Sizes for Taper-Lock Bushings

				Maximum Bore [in]			Maximum Bore [mm]	
Size	Part Number	Stock Bore	Material	Standard Keyway	Shallow Keyway	No Keyway*	Standard Keyway	No Keyway*
1008	119187	1/2	Sintered Steel	7/8	1	1	22	25
	119432	1/2	Steel	7/8	1	1	22	26
	119410	1/2	Stainless Steel	7/8	1	1	22	25
1108	119361	1/2	Sintered Steel	1	1-1/8	1-1/8	25	29
	119433	1/2	Steel	1	1-1/8	1-1/8	25	29
	119411	1/2	Stainless Steel	1	1-1/8	1-1/8	25	29
1210	119206	1/2	Sintered Steel	1-1/4	1-1/4	1-1/4	32	32
	119434	1/2	Steel	1-1/4	1-1/4	1-1/4	32	32
	119412	1/2	Stainless Steel	1-1/4	1-1/4	1-1/4	32	32
1215	119023	1/2	Sintered Steel	1-1/4	1-1/4	1-1/4	32	32
	119435	1/2	Steel	1-1/4	1-1/4	1-1/4	32	32
	119413	1/2	Stainless Steel	1-1/4	1-1/4	1-1/4	32	32
1310	119386	1/2	Sintered Steel	1-3/8	1-3/8	1-3/8	35	35
	119436	1/2	Steel	1	1-7/16	1-7/16	35	36
	119414	1/2	Stainless Steel	1-3/8	1-3/8	1-3/8	35	35
1610	119209	1/2	Sintered Steel	1-1/2	1-5/8	1-5/8	39	40
	119421	1/2	Steel	1-5/8	1-11/16	1-11/16	42	44
	119415	1/2	Stainless Steel	1-1/2	1-5/8	1-5/8	39	40
1615	119067	1/2	Sintered Steel	1-1/2	1-5/8	1-5/8	39	40
	119437	1/2	Steel	1-5/8	1-11/16	1-11/16	42	44
	119416	1/2	Stainless Steel	1-1/2	1-5/8	1-5/8	39	40
2012	119272	1/2	Sintered Steel	1-7/8	2	2	50	51
	119422	1/2	Steel	2	2-1/8	2-1/8	50	55
	119417	1/2	Stainless Steel	1-7/8	2	2	50	51
2517	119141	1/2	Sintered Steel	2-1/4	2-1/2	2-1/2	57	64
	119423	1	Steel	2-7/16	2-11/16	2-11/16	65	68
	119418	5/8	Stainless Steel	2-1/4	2-1/2	2-1/2	57	64
2525	119429	1-7/16	Steel	2-3/8	2-11/16	2-11/16	65	68
3020	117147	7/8	Sintered Steel	2-3/4	3	3	75	76
	117149	1-11/16	Sintered Steel	2-3/4	3	3	75	76
	119430	1-7/16	Steel	3	3-1/4	3-1/4	80	82
	119419	7/8	Stainless Steel	2-3/4	3	3	75	76

Table 6 - Minimum and Maximum Bore Sizes for Taper-Lock Bushings

				Maximum Bore [in]			Maximum Bore [mm]	
Size	Part Number	Stock Bore	Material	Standard Keyway	Shallow Keyway	No Keyway*	Standard Keyway	No Keyway*
3030	117045	15/16	Cast Iron	2-3/4	3	3	75	76
	119431	1-7/16	Steel	3	3-1/4	3-1/4	80	82
3525	119700	1- 3/16	Cast Iron	3-1/4	3-1/2	3-1/2	83	89
	119701	1-3/16	Ductile Iron	3-1/2	3-15/16	3-15/16	91	100
3535	117250	1-3/16	Cast Iron	3-1/4	3 -1/2	3-1/2	83	89
	117205	1-7/16	Ductile Iron	3-1/2	3-15/16	3-15/16	91	100
4030	119789	1-7/16	Cast Iron	3-5/8	4	4	95	102
	119790	1-15/16	Ductile Iron	4	4-7/16	4-7/16	10	113
4535	119766	1-15/16	Cast Iron	4-1/2	4-1/2	4-1/2	100	114
	119767	2-7/16	Ductile Iron	4-1/2	4-15/16	4-15/16	115	125
4040	117345	1-7/16	Cast Iron	3-5/8	4	4	95	102
	117307	1-15/16	Ductile Iron	4	4-7/16	4-7/16	103	113
4545	117448	1-15/16	Cast Iron	4-1/2	4-1/2	4-1/2	110	114
	117414	2-7/16	Ductile Iron	4-1/2	4-15/16	4-15/16	114	125
5040	119768	2-7/16	Cast Iron	4-1/2	5	5	120	127
	119769	2-15/16	Ductile Iron	5	5-5/16	5-5/16	127	134
5050	117451	2-7/16	Cast Iron	4-1/2	5	5	120	127
	117455	2-15/16	Ductile Iron	5	5-5/16	5-5/16	127	134
6050	117472	3-7/16	Cast Iron	6	6	6	152	152
	117471	3-7/16	Ductile Iron	6	6	6	152	152
7060	117498	3-15/16	Cast Iron	7	7	7	177	177
	117505	3-15/16	Ductile Iron	7	7	7	177	177
8065	117502	4-7/16	Cast Iron	8	8	8	203	203
	117506	4-7/16	Ductile Iron	8	8	8	203	203
10085	117489	7	Cast Iron	10	10	10	254	254
120100	117504	8	Cast Iron	12	12	12	304	304

* Reduced torque capacity, contact ABB's Dodge Engineering group before reboring. (864) 294-5700

Table 7 -Minimum and Maximum Bore Sizes for QD Bushings

				Maximum Bore [in]			Maximum Bore [mm]
Size	Part Number	Stock Bore	Material	Standard Keyway	Shallow Keyway	No Keyway ^①	Standard Keyway
H	120595	3/8	Sintered Steel	1-1/4	1-1/2	1-1/2	32
JA	120050	1/2	Sintered Steel	1	1-1/16	1-1/16	25
M	120051	1/2	Sintered Steel	1-1/4	1-1/4	1-1/4	30
	119876	1/2	Ductile Iron	1-3/8	1-5/8	1-11/16	35
SDS	120052	1/2	Sintered Steel	1-9/16	1-5/8	1-5/8	40
	119877	1-7/16	Ductile Iron	1-5/8	1-15/16	2	42
SD	120053	1/2	Sintered Steel	1-9/16	1-9/16	1-9/16	40
	119878	1-9/16	Ductile Iron	1-11/16	1-15/16	2	42
SK	120054	1/2	Sintered Steel	2	2-1/16	2-1/16	50
	119879	2	Ductile Iron	2-1/8	2-1/2	2-5/8	55
SF	120055	1/2	Sintered Steel	2-1/4	2-3/8	2-3/8	55
	119880	2-5/16	Ductile Iron	2-5/16	2-15/16	2-15/16	60
E	120056	7/8	Sintered Steel	2-3/4	3	3	79
	119881	7/8	Ductile Iron	2-7/8	3-1/2	3-1/2	89
F	120057	1	Sintered Steel	3-1/4	3-7/16	3-7/16	90
	119882	1	Ductile Iron	3-1/4	3-15/16	4	101
J	120058	1-1/2	Sintered Steel	3-3/4	3-7/8	3-7/8	100
	119883	1-1/2	Ductile Iron	3-3/4	4-1/2	4-1/2	114
M	119938	2	Sintered Steel	4-3/4	5	5	120
	119884	2	Ductile Iron	4-3/4	5-1/2	5-1/2	139
N	119963	2-7/16	Sintered Steel	5	5-1/4	5-1/4	130
	119885	2-7/16	Ductile Iron	5	6	6	149
P	119979	3-7/16	Sintered Steel	5-15/16	7	7	160
	119886	3-7/16	Ductile Iron	5-15/16	7	7	177
W	120276	4	Cast Iron	7-1/2	8	8	200
S	-	-	Cast Iron	8-1/2	10	10	250

① Reduced torque capacity, contact ABB's Dodge Engineering group before rebore (864) 284-5700

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