

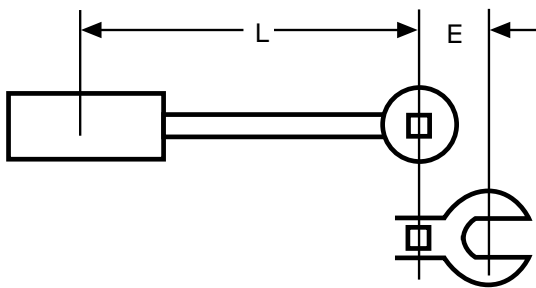
Tightening and Torque Recommendations for Hydraulic Couplings

The art of making leak-proof connection with hydraulic couplings is to tighten the couplings properly at the time of installation. An overtightened coupling may be just as apt to leak as an under-tightened coupling. Over-tightening a coupling may result in overstressing and/or cracking.

The torque values in the following tables give the minimum and maximum torque recommendations. The minimum value will create a leak-proof seal under most conditions. Applying torque values greater than the maximum recommendation will distort and/or crack the fitting. Values listed in SAE J514 are for qualification testing only and should not be used as the basis for setting up torque values for a production environment. These need to be established based on the coupling manufacturer's recommendations.

When tightening couplings, make sure that the hose does not twist on the adapter. Twisting will shorten hose life and scar the sealing surfaces of swivel type couplings (JIC, 45°, etc.), which can create leaks. For straight couplings, use a torque wrench on the hex, swivel, nut and a standard, box, wrench on the stem hex. Bent tube couplings can be restrained by holding onto the ferrule. When a crowsfoot wrench is used with a torque wrench, adjustments to the torque readings must be made otherwise overtightening will occur. The distance E, as shown below, from the center of the drive socket to the center of the crowsfoot must be added to the torque value reading.

The following equation can be used to make these adjustments:



Actual Torque = $\frac{(E+L)}{L}$ x (Torque Wrench Reading), where

- L is in inches
- E is in inches
- Torque is in lb.-in., lb.-ft, or Newton-Meters

An example of using this equation is shown below:

Torque wrench reading = 45 lb.-ft.

E = 1.5 inches

L = 12 inches

Actual Torque = $\frac{(1.5+12)}{12}$ x (45) = 50.6 lb.-ft

This example shows that the actual torque is approximately 10% higher than the reading indicates. All torque recommendations are based on dry threads. If oil or thread sealant is used, the maximum recommended torque values could be decreased by as much as 25%.

We do recommend lubricating all O-rings prior to insertion into flange head and ORS grooves. This will minimize the possibility of nicking the O-ring when it is installed. The torque values obtained from tightening pipe threads can vary considerably, depending on the conditions of the threads. Adequate sealing can occur at values much lower than the maximum values listed in the chart. However, the minimum torque values must be used to obtain adequate sealing.

Engineering & Technical Data

Coupling & Adapter Installation Torque Recommendation – Continued

For 37° & 45° (Machined or Flared) and MegaSeal®

Size		Steel				Brass			
Dash	Fractional (In.)	Ft. Lbs.		Newton-Meters		Ft. Lbs.		Newton-Meters	
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
-4	1/4	10	11	13	15	5	6	6-3/4	9
-5	5/16	13	15	18	20	7	9	10	13
-6	3/8	17	19	23	26	12	15	17	20
-8	1/2	34	38	47	52	20	24	27-2/3	33
-10	5/8	50	56	69	76	34	40	46-1/3	55
-12	3/4	70	78	96	106	53	60	72-1/3	82
-16	1	94	104	127	141	74	82	100-1/2	111
-20	1-1/4	124	138	169	188	75	83	101-1/2	113
-24	1-1/2	156	173	212	235	79	87	107	118
-32	2	219	243	296	329	158	175	214	237

For Flat-Face “O” Ring Seal (Steel)

Size		Ft.-Lbs.		Newton-Meters	
Dash	Fractional (In.)	Min.	Max	Min.	Max.
-6	3/8	18	20	24	27
-8	1/2	32	40	43	54
-10	5/8	46	56	60	75
-12	3/4	65	80	90	110
-14	7/8	65	80	90	110
-16	1	92	105	125	240
-20	1-1/4	125	140	170	190
-24	1-1/2	150	180	200	245

For SAE O-Ring Boss (Steel) & Gates Adapterless

Size		Ft.Lbs. Working Pressures 4,000 psi (27.5 Mpa) and below		Newton-Meters Working Pressures 4,000 psi (27.5 Mpa) and below		Ft.Lbs. Working Pressures Above 4,000 psi (27.5 Mpa)		Newton-Meters Working Pressures Above 4,000 psi (27.5 Mpa)	
Dash	Fractional (In.)	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
-4	1/4	14	16	20	22	14	16	20	22
-5	5/16	—	—	—	—	18	20	24	27
-6	3/8	24	26	33	35	24	26	33	35
-8	1/2	37	44	50	60	50	60	68	78
-10	5/8	50	60	68	81	72	80	98	110
-12	3/4	75	83	101-1/2	113	125	135	170	183
-14	7/8	—	—	—	—	160	180	215	245
-16	1	111	125	150	170	200	220	270	300
-20	1-1/4	133	152	180	206	210	280	285	380
-24	1-1/2	156	184	212	250	270	360	370	490

For BSP 30° Inverted Cone

Size		Ft.-Lbs.		Newton-Meters	
Dash	Fractional (In.)	Min.	Max	Min.	Max.
-4	1/4	11	18	15	24
-6	3/8	19	28	26	38
-8	1/2	30	36	41	49
-10	5/8	37	44	50	60
-12	3/4	50	60	68	81
-16	1	79	95	107	129
-20	1-1/4	127	152	172	206
-24	1-1/2	167	190	226	258
-32	2	262	314	355	426

For DIN 2353 12°, 30° and Universal Inverted Cone

Size		Ft.-Lbs.		Newton-Meters	
Light Series Tube O.D. (mm)	Heavy Series Tube O.D. (mm)	Min.	Max	Min.	Max.
-8	—	15	26	20	35
-10	-8	18	30	25	40
-12	-10	22	33	30	45
-14	-12	26	37	35	50
-15	-14	30	52	40	70
—	-16	30	52	40	70
-18	—	44	74	60	100
-22	-20	59	89	80	120
-28	-25	74	111	100	150
—	-30	74	162	150	220
-35	—	133	184	180	250
-42	-38	148	221	200	300

Maximum Recommended Torque for Dry NPTF (Tapered) Pipe Threads*

Size	Ft.-Lbs.	Newton-Meters
-2	20	25
-4	25	35
-6	35	45
-8	45	60
-12	55	75
-16	65	90
-20	80	110
-24	95	130
-32	120	160

*NOTES:

- The torque values obtained from tightening pipe threads can vary considerably depending on thread condition. Adequate sealing can occur at values much lower than the maximum values listed above. Only enough torque to achieve adequate sealing should be used.
- When using a male tapered pipe thread with a female straight or parallel pipe thread, maximum values are 50% of those listed in the table.
- If thread sealant is used, maximum values shown should be decreased by 25%.

For 4-Bolt Flange Connections

Bolt Size	Line Size	Torque Nm	Torque Lb-Ft
.31	-8	23	17
.38	-12	35	26
.44	-16	58	43
.50	-20	88	65
.63	-24	176	130
.75	-32	298	220

- The 4-bolt flange seal is a face seal. The shoulder which contains the seal must fit squarely against the mating surface and be held there with even tension on all bolts.
- Torque values apply to plated bolts and bolts with light engine oil.
- Lubricate o-ring with a light oil (SAE 10W or 20W) before assembly.
- Finger tighten all four bolts making sure the flange and fitting shoulder are started square.
- Tighten all bolts evenly by partially tightening each bolt as shown in the figure below and repeating the sequence until all bolts are tightened to the specific torque in the table.

