Flange Ports

Large threaded port connections, such as SAE straight thread, require very high torque to assemble. This makes assembly very difficult, especially where wrench clearance is limited. Split flange connections solve this problem by dividing the hydraulic load among four bolts each requiring much less torque, smaller wrenches and smaller wrench clearance.

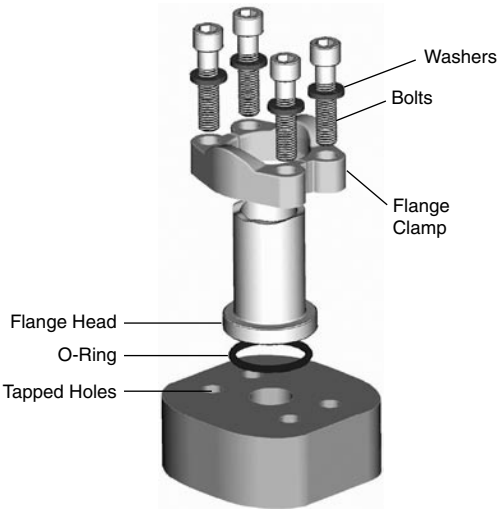

Fig. T9 – 4-Bolt Split Flange Components

There are two types of flange port connections:

- ISO 6162, Type 2
  - SAE Code 61 4-bolt split flange
  - SAE Code 62 4-bolt split flange
- ISO 6164

The 4-Bolt Split Flange consists of four main components:

- A body (flange head)
- An O-ring
- One “captive” or two “split” flange clamps
- Four bolts and washer

The four-bolt port is simply a circular opening (flow passage) surrounded by four tapped holes in a certain pattern for acceptance of the flange clamping bolts. The flat surface of the port compresses the O-ring contained in the groove in the flange head when the clamp bolts are torqued. In some instances, the groove is in the port and not in the flange head. The bolts, through the clamp halves, clamp down the flange head onto the flat surface of the port compressing and trapping the O-ring in the groove and leaving no gap for it to extrude under pressure. The hydraulic pressure is thus sealed by the compressed O-ring as long as the bolts are tightened enough to maintain solid metal to metal contact between the flange head at the outside diameter of the O-ring and the top of the port.

Flange Port Assembly

The steps to properly assemble the flange port clamping bolts are:

1. Inspect components to ensure that male and female port threads and sealing surfaces are free of burrs, nicks and scratches, or any foreign material.
2. Lubricate the O-ring.
3. Position flange and clamp halves.
4. Place lock washers on bolts and insert through clamp halves.
5. Hand tighten bolts.
6. Torque bolts in diagonal sequence (see Fig. T10) in small increments to the appropriate torque level listed in Table T6 or T7 below.

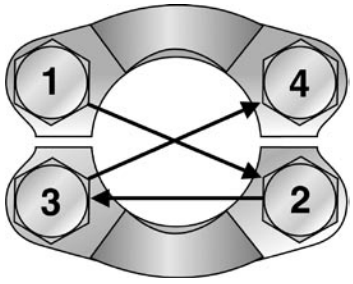

Fig. T10 – Flange Bolt Tightening Sequence

Dash Size	Flange Size	Inch Bolt (J518)	Torque ft. lbs.	Metric Bolt (ISO 6162)	Torque N-m
8	1/2	5/16-18	17 ± 2	M8	25
12	3/4	3/8-16	25 ± 4.5	M10	49
16	1	3/8-16	31 ± 4.5	M10	49
20	1-1/4	7/16-14	41 ± 5	M12*	85
24	1-1/2	1/2-13	52 ± 6	M12	85
32	2	1/2-13	60 ± 6	M12*	135
40	2-1/2	1/2-13	85 ± 9	M12	95
48	3	5/8-11	144 ± 15	M16	220
56	3-1/2	5/8-11	125 ± 8	M16	220
64	4	5/8-11	125 ± 8	M16	220
80	5	5/8-11	125 ± 8	M16	220

* Does not meet ISO 6162 specification.

Table T6 – Code 61 Flange Recommended Bolt Torque

Dash Size	Flange Size	Inch Bolt (J518)	Torque ft. lbs.	Metric Bolt (ISO 6162)	Torque N-m
8	1/2	5/16-18	17 ± 2	M8	25
12	3/4	3/8-16	30 ± 4.5	M10	49
16	1	7/16-14	46 ± 4.5	M12	85
20	1-1/4	1/2-13	69 ± 6	M14*	135
24	1-1/2	5/8-11	125 ± 8	M16	210
32	2	3/4-10	208 ± 20	M20	425

* Does not meet ISO 6162 specification.

Table T7 – Code 62 Flange Recommended Bolt Torque

Socket Screw Bolt Circle (LK)	Socket Head Cap Screws	Tightening Torques N-m
LK35	M6	10
LK40	M6	10
LK55	M8	25

Table T8 – Hydraulic Flange Recommended Bolt Torque

* In general, variances of torque for soft metal ports/manifolds (ie: aluminum block - 66% of specified torque)