

Specifications

TORQUE SPECIFICATIONS

STANDARD TORQUE FOR METRIC FASTENERS

NOTE : Take care to avoid mixing metric and inch dimensioned fasteners. Mismatched or incorrect fasteners can result in vehicle damage or malfunction, or possible injury. Exceptions to these torques are given in the Service Manual where needed.

NOTE : Prior to installation of any hardware, be sure components are in near new condition. Bolt and nut threads must not be worn or damaged. Hardware must be free of rust and corrosion. Clean hardware with a non-corrosive cleaner and apply engine oil to threads and bearing face. If thread lock or other compounds are to be applied, do not apply engine oil.

| METRIC NUTS AND BOLTS | | |
|------------------------------|-----------------|------------|
| THREAD SIZE (mm) | STANDARD TORQUE | |
| | (N • m) | (lb • ft) |
| M6 | 12 ± 3 | 9 ± 2 |
| M8 | 28 ± 7 | 20 ± 5 |
| M10 | 55 ± 10 | 40 ± 7 |
| M12 | 100 ± 20 | 75 ± 15 |
| M14 | 160 ± 30 | 120 ± 22 |
| M16 | 240 ± 40 | 175 ± 30 |
| M20 | 460 ± 60 | 340 ± 44 |
| M24 | 800 ± 100 | 600 ± 75 |
| M30 | 1600 ± 200 | 1200 ± 150 |
| M36 | 2700 ± 300 | 2000 ± 225 |

| METRIC TAPERLOCK STUDS | | |
|-------------------------------|-----------------|-----------|
| THREAD SIZE (mm) | STANDARD TORQUE | |
| | (N • m) | (lb • ft) |
| M6 | 8 ± 3 | 6 ± 2 |
| M8 | 17 ± 5 | 13 ± 4 |
| M10 | 35 ± 5 | 26 ± 4 |
| M12 | 65 ± 10 | 48 ± 7 |
| M16 | 110 ± 20 | 80 ± 15 |
| M20 | 170 ± 30 | 125 ± 22 |
| M24 | 400 ± 60 | 300 ± 45 |
| M30 | 650 ± 80 | 480 ± 60 |
| M36 | 870 ± 100 | 640 ± 75 |

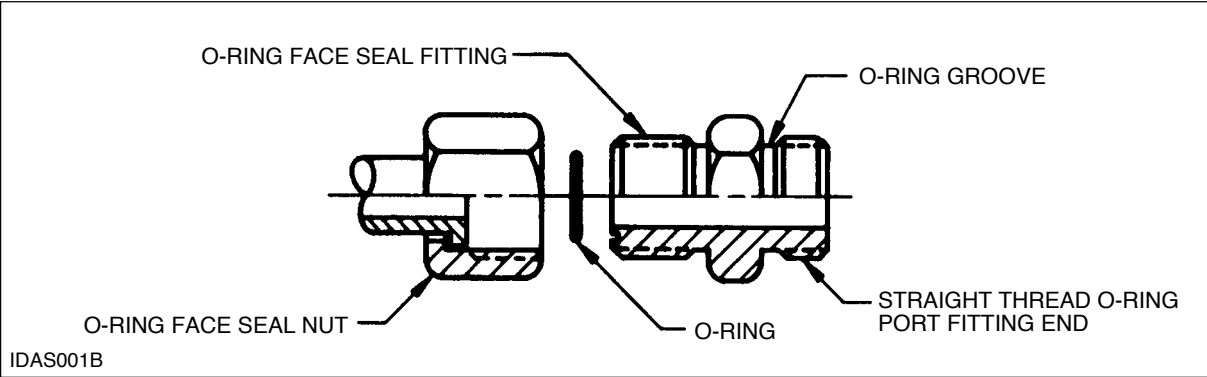
STANDARD TORQUE FOR INCH FASTENERS

Exceptions to these torques are given in the Service Manual where needed.

| INCH NUTS AND BOLTS | | |
|----------------------------|-----------------|------------|
| THREAD SIZE inch | STANDARD TORQUE | |
| | (N • m) | (lb • ft) |
| 1/4 | 12 ± 3 | 9 ± 2 |
| 5/16 | 25 ± 6 | 18.0 ± 4.5 |
| 3/8 | 47 ± 9 | 35 ± 7 |
| 7/16 | 70 ± 15 | 50 ± 11 |
| 1/2 | 105 ± 20 | 75 ± 15 |
| 9/16 | 160 ± 30 | 120 ± 20 |
| 5/8 | 215 ± 40 | 160 ± 30 |
| 3/4 | 370 ± 50 | 275 ± 35 |
| 7/8 | 620 ± 80 | 460 ± 60 |
| 1 | 900 ± 100 | 660 ± 75 |
| 1-1/8 | 1300 ± 150 | 950 ± 100 |
| 1-1/4 | 1800 ± 200 | 1325 ± 150 |
| 1-3/8 | 2400 ± 300 | 1800 ± 225 |
| 1-1/2 | 3100 ± 350 | 2300 ± 250 |

| INCH TAPERLOCK STUDS | | |
|-----------------------------|-----------------|-----------|
| THREAD SIZE inch | STANDARD TORQUE | |
| | (N • m) | (lb • ft) |
| 1/4 | 8 ± 3 | 6 ± 2 |
| 5/16 | 17 ± 5 | 13 ± 4 |
| 3/8 | 35 ± 5 | 26 ± 4 |
| 7/16 | 45 ± 10 | 33 ± 7 |
| 1/2 | 65 ± 10 | 48 ± 7 |
| 5/8 | 110 ± 20 | 80 ± 15 |
| 3/4 | 170 ± 30 | 125 ± 22 |
| 7/8 | 260 ± 40 | 190 ± 30 |
| 1 | 400 ± 60 | 300 ± 45 |
| 1-1/8 | 500 ± 70 | 370 ± 50 |
| 1-1/4 | 650 ± 80 | 480 ± 60 |
| 1-3/8 | 750 ± 90 | 550 ± 65 |
| 1-1/2 | 870 ± 100 | 640 ± 75 |

O-RING FACE SEAL FITTINGS



| STRAIGHT THREAD O-RING FITTING (FOR O-RING FACE SEAL FITTING ONLY) | | |
|---|-----------------|--------------|
| THREAD SIZE inch | STANDARD TORQUE | |
| | (N • m) | (lb • ft) |
| 5/16-24 | 5.0 ± 1.5 | 45±15 lb•in |
| 3/8-24 | 12 ± 2 | 110±20 lb•in |
| 7/16-20 | 20 ± 4 | 15 ± 3 |
| 1/2-20 | 30 ± 5 | 22 ± 4 |
| 9/16-18 | 40 ± 5 | 30 ± 4 |
| 3/4-16 | 100 ± 15 | 75 ± 10 |
| 7/8-14 | 135 ± 15 | 100 ± 10 |
| 1 1/16-12 | 200 ± 25 | 150 ± 20 |
| 1 3/16-12 | 250 ± 25 | 185 ± 20 |
| 1 5/16-12 | 300 ± 40 | 225 ± 30 |
| 1 5/8-12 | 300 ± 40 | 225 ± 30 |
| 1 7/8-12 | 300 ± 40 | 225 ± 30 |
| 2 1/2-12 | 300 ± 40 | 225 ± 30 |

| O-RING FACE SEAL FITTING NUT | | |
|-------------------------------------|-----------------|-----------|
| THREAD SIZE inch | STANDARD TORQUE | |
| | (N • m) | (lb • ft) |
| 9/16-18 | 16 ± 3 | 12 ± 2 |
| 11/16-16 | 30 ± 4 | 22 ± 3 |
| 13/16-16 | 50 ± 7 | 37 ± 5 |
| 1-14 | 90 ± 10 | 65 ± 7 |
| 1 3/16-12 | 120 ± 15 | 90 ± 10 |
| 1 7/16-12 | 160 ± 20 | 120 ± 15 |
| 1 11/16-12 | 190 ± 20 | 140 ± 15 |
| 2-12 | 215 ± 25 | 160 ± 20 |

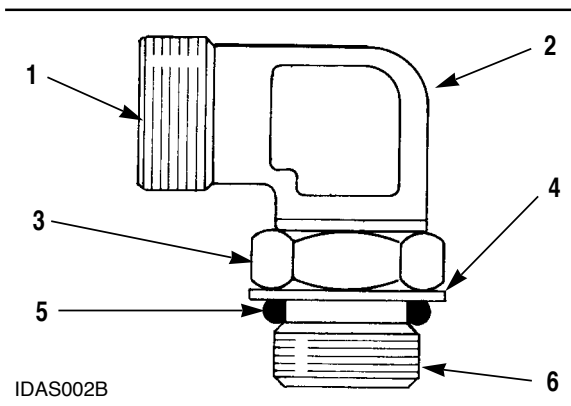
FITTING INSTALLATION

HYDRAULIC LINE INSTALLATION

1. For a metal tube to hose installation, install the tube and tighten all bolts finger tight.
2. Tighten the bolts at the rigid end.
3. Install the hose and tighten all bolts finger tight.
4. Put the hose in a position so that it does not make contact with the machine or another hose.
5. Tighten the bolts on both connections.
6. Start the engine.
7. Move the implement control levers to all positions.
8. Look at the hose during movement of the implement. Make sure hose is not in contact with the machine or other hoses.
9. Shut off the engine.
10. If necessary, put the hose in a new position where it will not make contact when the implement is moved.

ASSEMBLY OF FITTINGS WITH STRAIGHT THREADS AND O-RING SEALS

This type of fitting is used in many applications. The tube end of the fitting will be different in design so that it can be used in many different applications. However, the installation procedure of the fitting is the same. If the tube end of the fitting body is the same as in the illustration (either an elbow or a straight body) it will be necessary to assemble the sleeve on the tube before connecting the tube to the end.



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ELBOW BODY ASSEMBLY

- (1) End of fitting body (connects to tube). (2) Fitting body.
 (3) Lock-nut. (4) Backup washer. (5) O-ring seal. (6) End of fitting that goes into other part.

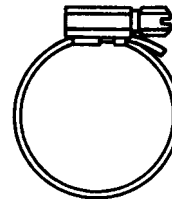
1. Put locknut (3), backup washer (4) and O-ring seal (5) as far back on fitting body (2) as possible. Hold these components in this position. Turn the fitting into the part it is used on until backup washer (4) just makes contact with the face of the part it is used on.
2. To put the fitting assembly in its correct position, turn the fitting body (2) out (counterclockwise) a maximum of 359°. Tighten locknut (3) to the torque shown in the correct chart for the fitting used.

NOTE: If the fitting is a connector (straight fitting), the hex on the body takes the place of the locknut. To install this type fitting, tighten the hex against the face of the part it goes into.

TORQUES FOR FLARED AND O-RING FITTINGS

The torques shown in the charts that follow are to be used on the nut part of 37° Flared, 45° Flared and Inverted Flared fittings (when used with steel tubing), O-ring plugs, O-ring fittings and swivel nuts when used in applications to 3000 psi (20 700 kPa).

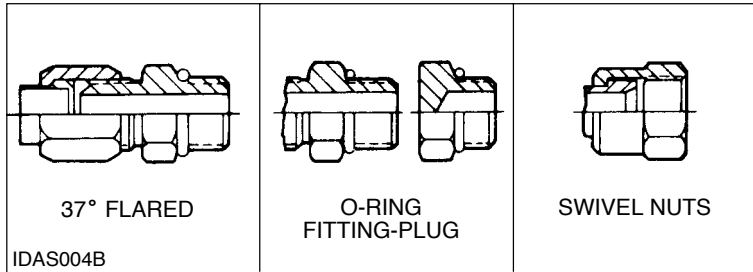
HOSE CLAMP-BAND TYPE



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| CLAMP WIDTH | TORQUE ON NEW HOSE | RETIGHTENING TORQUE |
|----------------------|-----------------------------------|-----------------------------------|
| 7.9 mm (.312 in) | 0.9 ± 0.2 N • m 8 ± 2 lb • in | 0.7 ± 0.2 N • m 6 ± 2 lb • in |
| 13.5 mm (.531 in) | 4.5 ± 0.5 N • m 40 ± 5 lb • in | 3.0 ± 0.5 N • m 25 ± 5 lb • in |
| 15.9 mm (.625 in) | 7.5 ± 0.5 N • m 65 ± 5 lb • in | 4.5 ± 0.5 N • m 40 ± 5 lb • in |

37° FLARED AND STRAIGHT THREAD O-RING FITTINGS

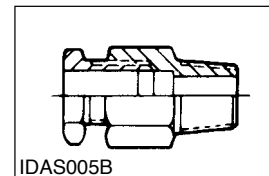


| 37° FLARED AND STRAIGHT THREAD O-RING FITTINGS (EXCEPT O-RING FACE SEAL FITTINGS) | | | | |
|--|-------|------------------------|-----------------|-----------|
| NOMINAL TUBE O.D. | | THREAD SIZE inch | STANDARD TORQUE | |
| METRIC | INCH | | (N • m) | (lb • ft) |
| 3.18 | .125 | 5/16 | 5.0 ± 1.5 | 4 ± 1 |
| 4.76 | .188 | 3/8 | 11.0 ± 1.5 | 8 ± 1 |
| 6.35 | .250 | 7/16 | 16 ± 2 | 12 ± 1 |
| 7.94 | .312 | 1/2 | 20 ± 5 | 15 ± 4 |
| 9.52 | .375 | 9/16 | 25 ± 5 | 18 ± 4 |
| 9.52 | .375 | 5/8 | 35 ± 5 | 26 ± 4 |
| 12.70 | .500 | 3/4 | 50 ± 7 | 37 ± 5 |
| 15.88 | .625 | 7/8 | 65 ± 7 | 48 ± 5 |
| 19.05 | .750 | 1-1/16 | 100 ± 10 | 75 ± 7 |
| 22.22 | .875 | 1-3/16 | 120 ± 10 | 90 ± 7 |
| 25.40 | 1.000 | 1-5/16 | 135 ± 15 | 100 ± 11 |
| 31.75 | 1.250 | 1-5/8 | 180 ± 15 | 135 ± 11 |
| 38.10 | 1.500 | 1-7/8 | 225 ± 15 | 165 ± 11 |
| 50.80 | 2.000 | 2-1/2 | 320 ± 30 | 240 ± 22 |

TIGHTENING OTHER FITTINGS

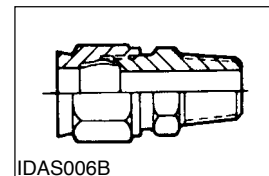
Hi Duty (Shear sleeve) Tube Fittings

After tube has been put through the nut and makes contact against the tube shoulder in the fitting body, turn the nut with a wrench until a small decrease in torque is felt. This is an indication that the sleeve has been broken off the nut. Hold the tube to prevent turning and tighten the nut 1-1/2 turns.

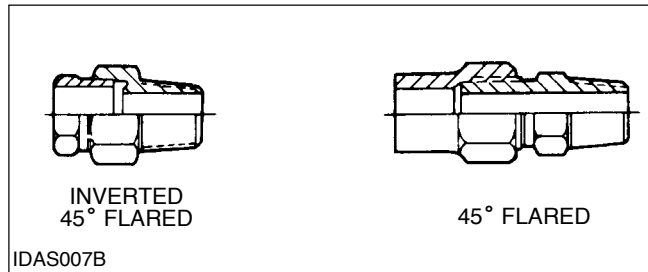


Hi Seal Fittings

Put nut and sleeve over the tubing with the short heavy end of the sleeve facing the end of tubing. Put the tube end against the counterbore in the body of the fitting and tighten until nut is over the last thread on the body. The remainder of space is used whenever the fitting is removed and installed again.



45° FLARED AND 45° INVERTED FLARE FITTINGS

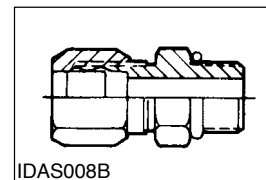


| 45° FLARED AND 45° INVERTED FLARE FITTINGS | | | | |
|--|------|---------------------|-----------------|-----------|
| NOMINAL TUBE O.D. | | THREAD SIZE inch | STANDARD TORQUE | |
| METRIC | INCH | | (N • m) | (lb • ft) |
| 3.18 | .125 | 5/16 | 5.0 ± 1.5 | 4 ± 1 |
| 4.76 | .188 | 3/8 | 8.0 ± 1.5 | 6 ± 1 |
| 6.35 | .250 | 7/16 | 11 ± 2 | 8 ± 1 |
| 7.94 | .312 | 1/2 | 17 ± 3 | 13 ± 2 |
| 9.52 | .375 | 5/8 | 30 ± 3 | 22 ± 2 |
| 11.11 | .438 | 11/16 | 30 ± 3 | 22 ± 2 |
| 12.70 | .500 | 3/4 | 38 ± 4 | 28 ± 3 |
| 15.88 | .625 | 7/8 | 50 ± 5 | 37 ± 4 |
| 19.05 | .750 | 1-1/16 | 90 ± 8 | 65 ± 6 |
| 22.22 | .875 | 1-1/4 | 100 ± 10 | 75 ± 7 |

TIGHTENING OTHER FITTINGS

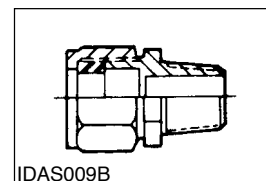
Ermeto Tube Fittings

Put nut and sleeve over the tube with head or shoulder end of sleeve next to nut. Push tube into counterbore of fitting body as far as possible. Turn nut clockwise until sleeve holds tube and prevents movement. Tighten the nut 1-1/4 turns more to seat sleeve and give a locking action. When necessary to assemble again, put sleeve over tube and tighten nut until a sudden increase in torque is felt. Then tighten 1/6 to 1/3 turn more to seat the sleeve.

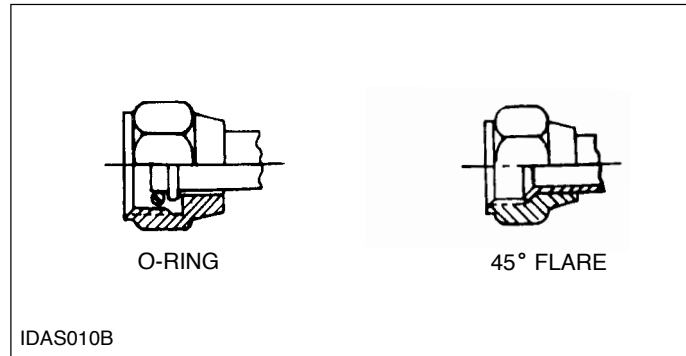


Flex Fittings

Put nut and sleeve over the tubing and push tube in to counterbore of fitting body as far as possible. Tighten the nut until it is against the hex part of the fitting body.



AIR CONDITIONING AND TAPERED PIPE THREAD FITTINGS



| AIR CONDITIONING FITTINGS | | | | | | |
|---------------------------|-----------------|-----------|-----------------------|-----------|-----------------|-----------|
| O-RING FITTING END | | | 45° FLARE FITTING END | | | |
| THREAD SIZE inch | STANDARD TORQUE | | STEEL TUBES | | ALUMINUM TUBES | |
| | | | STANDARD TORQUE | | STANDARD TORQUE | |
| | N • m | (lb • ft) | N • m | (lb • ft) | N • m | (lb • ft) |
| 5/8-18 | 18 ± 4 | 13 ± 3 | 30 ± 3 | 22 ± 2 | 23 ± 3 | 17 ± 2 |
| 3/4-16 | 37 ± 4 | 27 ± 3 | 52 ± 5 | 38 ± 4 | 33 ± 4 | 24 ± 3 |
| 7/8-14 | 40 ± 4 | 30 ± 3 | 60 ± 7 | 44 ± 5 | 38 ± 4 | 28 ± 3 |
| 1 1/16-14 | 45 ± 5 | 33 ± 4 | 75 ± 8 | 55 ± 6 | 50 ± 5 | 37 ± 4 |

| TAPERED PIPE THREAD FITTINGS | | | | |
|------------------------------|------------------------------|-----------|-------------------------|-----------|
| PIPE THREAD SIZE inch | STANDARD TORQUE | | | |
| | THREADS WITH 1E2200E SEALANT | | THREADS WITHOUT SEALANT | |
| | N • m | (lb • ft) | N • m | (lb • ft) |
| 1/16-27 | 15 | 11 | 20 | 15 |
| 1/8-27 | 20 | 15 | 25 | 18 |
| 1/4-18 | 25 | 18 | 35 | 26 |
| 3/8-18 | 35 | 26 | 45 | 33 |
| 1/2-14 | 45 | 33 | 60 | 45 |
| 3/4-14 | 60 | 45 | 75 | 55 |
| 1-11 1/2 | 75 | 55 | 90 | 65 |
| 1 1/4-11 1/2 | 95 | 70 | 110 | 80 |
| 1 1/2-11 1/2 | 110 | 80 | 130 | 95 |
| 2-11 1/2 | 130 | 95 | 160 | 120 |