# EX550-5, EX600H-5 Workshop Manual

# SECTION 1
# GENERAL INFORMATION

## —CONTENTS—

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## PRECAUTIONS FOR DISASSEMBLING AND ASSEMBLING

### Precautions for Disassembling and Assembling

- Clean the Machine

  Thoroughly wash the machine before bringing it into the shop. Bringing a dirty machine into the shop may cause machine components to be contaminated during disassembling/assembling, resulting in damage to machine components, as well as decreased efficiency in service work.

- Inspect the Machine

  Be sure to thoroughly understand all disassembling/assembling procedures beforehand, to help avoid incorrect disassembling of components as well as purchasing unnecessary parts.
  Check and record the items listed below to prevent problems from occurring in the future.

  - The machine model, machine serial number, and hour meter reading.
  - Reason for disassembly (symptoms, failed parts,
  - and causes).
  - Contamination or clogging of filters and oil, water or air leaks, if any.
  - Capacities and condition of lubricants.
  - Loose or damaged parts.

- Prepare and Clean Tools and Disassembly Area

  Prepare the necessary tools to be used and the area for disassembling work or storing disassembled parts.

- Precautions for Disassembling

  - To prevent dirt contamination, cap or plug all removed pipes.
  - Before disassembling, clean the exterior of the components and place on a work bench.
  - Before disassembling, drain gear oil from the reduction gear.
  - Be sure to provide appropriate containers for draining fluids.
  - Use matching marks for easier reassembling.
  - Be sure to use the specified special tools, when instructed.
  - If a part or component cannot be removed after removing its securing nuts and bolts, do not attempt to remove it forcibly. Find the cause(s), then take the appropriate measures to remove it.
  - Orderly arrange disassembled parts. Mark and tag them as necessary.
  - Store common parts, such as bolts and nuts with reference to where they are to be used and in a manner that will prevent loss.
  - Inspect the contact or sliding surfaces of disassembled parts for abnormal wear, sticking, or other damage.
  - Measure and record the degree of wear and clearances.

- Precautions for Assembling

  - Be sure to clean all parts and inspect them for any damage. If any damage is found, repair or replace it.
  - Dirt or debris on the contact or sliding surfaces may shorten the service life of the machine.
  - Take care not to contaminate any contact or sliding surfaces.
  - Be sure to replace O-rings, backup rings, and oil seals with new ones once they are disassembled. Apply a film of grease before installing.
  - Be sure that liquid-gasket-applied surfaces are clean and dry.
  - If an anti-corrosive agent has been used on a new part, be sure to thoroughly clean the part to remove the agent.
  - Utilize matching marks when assembling.
  - Be sure to use the designated tools to assemble bearings, bushings and oil seals.
  - Keep a record of the number of tools used for disassembly/assembly. After assembling is complete, count the number of tools, so as to make sure that no tools are missing.

**Bleeding Air from Hydraulic System**

When hydraulic oil is drained, the suction filter or the suction lines are replaced, or the removal and installation of the pump, swing motor, travel motor or cylinder is done, bleed air from the hydraulic system in the following procedures:

- Bleeding Air from Hydraulic Pump

**IMPORTANT: If the engine is started with air trapped in the hydraulic pump housing, damage to the pump may result. Be sure to bleed air before starting the engine.**

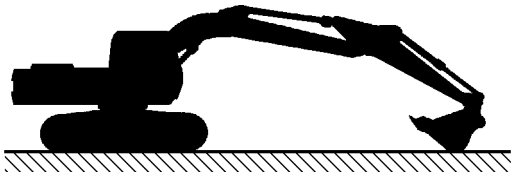
- Remove the air bleeding plug from the top of the pump and fill the pump housing with hydraulic oil.
- After the pump housing is filled with hydraulic oil, temporarily tighten the plug. Then, start the engine and run at slow idle speed.
- Slightly loosen the plug to bleed air from the pump housing until hydraulic oil oozes out.
- After bleeding all the air, securely tighten the plug.

- Bleeding Air from Travel Motor / Swing Motor

- With the drain plug (upper side) / hose on travel motor / swing motor removed, fill the motor case with hydraulic oil.

- Bleeding Air from Hydraulic Circuit

- After refilling hydraulic oil, start the engine. While operating each cylinder, swing motor and travel motor evenly, operate the machine under light loads for 10 to 15 minutes. Slowly start each operation (never fully stroke the cylinders during initial operation stage). As the pilot oil circuit has an air bleed device, air trapped in the pilot oil circuit will be bled while performing the above operation for approx. 5 minutes.
- Reposition the front attachment to check hydraulic oil level.
- Stop the engine. Recheck hydraulic oil level. Replenish oil as necessary.



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**Precautions for Handling Floating Seal**

1. In general, replace the floating seal with a new one after disassembling.
   If the floating is to be reused, follow these procedures:

   (1) Keep seal rings together as a matched set with seal ring faces together. Insert a piece of card-board to protect surfaces.

   (2) Check slide surface (C) on seal ring (A) for scuffing, scoring, corrosion, deformation or uneven wear.

   (3) Check O-ring (B) for tears, breaks, deformation or hardening.

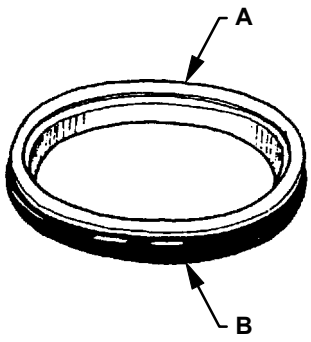
2. If incorrectly assembled, oil leaks or damage will occur. Be sure to do the following, to prevent trouble.

   (1) Clean the floating seal and seal mounting bores with cleaning solvent.
   Use a wire brush to remove mud, rust or dirt.
   After cleaning, thoroughly dry parts with compressed air.

   (2) Clean the floating seal and seal mounting bores. Check the bore surface for scuffing or scoring by touching the surface with finger.

   (3) Check that the O-ring is not twisted, and that it is installed correctly on the seal ring.

   (4) After installing the floating seal, check that seal surface (C) is parallel with idler face (D) by measuring the distances (a) and (b) as illustrated. If these distances differ, correct the O-ring seating.

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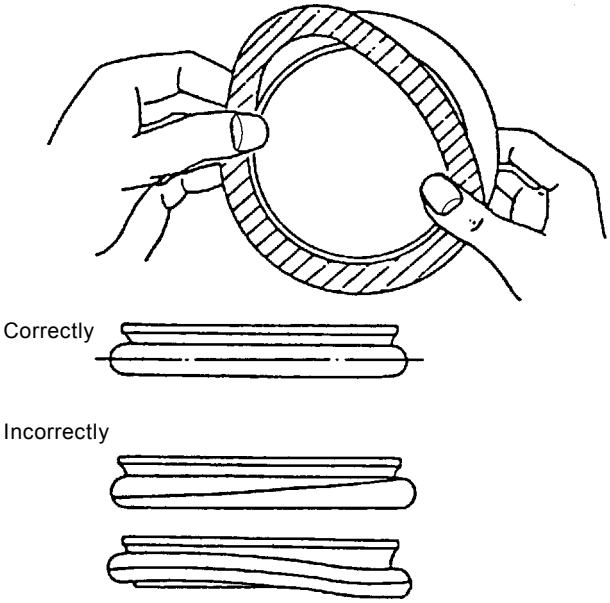


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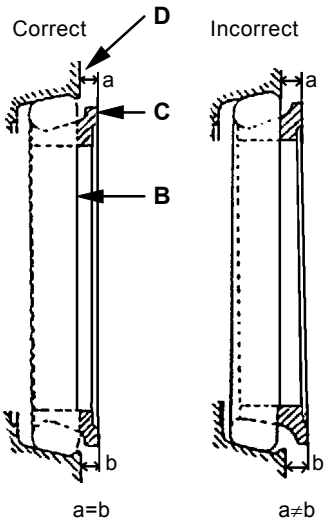


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## MAINTENANCE STANDARD TERMINOLOGY

**“Standard”**

1. Dimension for parts on a new machine.

2. Dimension of components or assemblies adjusted to specification.

Both dimensions are shown with tolerances as necessary.

**“Allowable Limit”**

1. Normal machine performance cannot be accomplished after exceeding this limit.

2. Repair or replacement is required before reaching this limit.

Machine performance will decrease, and maintenance and down time expense will increase as machine operating hours accumulate. It is recommended that parts are repaired or replaced before reaching the **“Allowable Limit”**.

## TIGHTENING TORQUE SPECIFICATIONS

Bolt and Nut on Base Machine Standard Torques

Torque Specifications

| No. | Descriptions | | | Bolt Dia mm | Q'ty | Wrench Size mm | Torque | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | N·m | kgf·m | lbf·ft |
| 1 | Engine cushion rubber mounting bolt | Front | Engine cushion rubber | 16 | 2 | 24 | 205 | 21 | 152 |
| | | | Cushion rubber-machine | 16 | 2 | 24 | 205 | 21 | 152 |
| | | Rear | Engine cushion rubber | 22 | 2 | 32 | 540 | 55 | 400 |
| | | | Cushion rubber-machine | 16 | 4 | 24 | 205 | 21 | 152 |
| 2 | Radiator mounting bolt | | | 16 | 4 | 24 | 205 | 21 | 152 |
| 3 | Hydraulic oil tank mounting bolt | | | 16 | 8 | 24 | 205 | 21 | 152 |
| 4 | Fuel tank mounting bolt | | | 16 | 8 | 24 | 205 | 21 | 152 |
| 5 | ORS fittings for hydraulic hoses and piping | | | 1-3/16-12UNF | | 36 | 175 | 18 | 130 |
| | | | | 1-7/16-12UNF | | 41 | 205 | 21 | 152 |
| 6 | Pump transmission mounting bolt | | | 7/16-14UNF | 14 | 16 | 69 | 7 | 51 |
| 7 | Pump device mounting bolt | | | 20 | 8 | 30 | 390 | 40 | 290 |
| 8 | Control valve mounting bolt | | | 20 | 4 | 30 | 390 | 40 | 290 |
| 9 | Swing device mounting bolt | | | 22 | 26 | 32 | 740 | 75 | 540 |
| | Ring gear housing mounting bolt (hexagonal wrench) | | | 18 | 24 | 14 | 295 | 30 | 215 |
| 10 | Swing motor mounting bolt (hexagonal wrench) | | | 12 | 16 | 10 | 88 | 9 | 65 |
| 11 | Battery mounting nut | | | 12 | 2 | 19 | 34 | 3.5 | 25.5 |
| 12 | Cab mounting bolt | | STD, LC | 16 | 4 | 24 | 205 | 21 | 152 |
| | | | H, LCH | 16 | 6 | 24 | 205 | 21 | 152 |
| 13 | Swing bearing mounting bolt to upperstructure | | | 30 | 36 | 46 | 1910 | 195 | 1410 |
| | Swing bearing mounting bolt to undercarriage | | | 30 | 36 | 46 | 1720 | 175 | 1270 |

Continued on next page

Torque Specifications (continued)

| No. | Descriptions | | Bolt Dia mm | Q'ty | Wrench Size mm | Torque | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | N·m | kgf·m | lbf·ft |
| 14 | Travel device mounting bolt | | 22 | 40 | 32 | 740 | 75 | 540 |
| | Travel motor mounting bolt | | 18 | 8 | 27 | 295 | 30 | 215 |
| | Sprocket mounting bolt | | 22 | 48 | 32 | 32 | 75 | 540 |
| 15 | Upper roller mounting | | 20 | 24 | 30 | 540 | 55 | 400 |
| 16 | Lower roller mounting bolt | STD, H | 24 | 64 | 36 | 930 | 95 | 690 |
| | | LC, LCH | 24 | 72 | 36 | 930 | 95 | 690 |
| 17 | Track shoe bolt | STD, H | 24 | 392 | 32 | 1370 | 140 | 1010 |
| | | LC, LCH | 24 | 416 | 32 | 1370 | 140 | 1010 |
| 18 | Track guard mounting bolt | STD, H | 24 | 16 | 36 | 930 | 95 | 690 |
| | | LC, LCH | 24 | 24 | 36 | 930 | 95 | 690 |
| 19 | Track frame mounting bolt | | 33 | 36 | 50 | 2160 | 225 | 1590 |
| 20 | Coupling and clamp of low pressure piping | Coupling | 8 | | 13 | 10.5 to 12.5 | 10.5 to 1.26 | 7.6 to 9.1 |
| | | Clamp | 1/4-28UNF | | 11 | 5.9 | 0.6 | 4.3 |
| 21 | Counterweight mounting bolt | | 45 | 2 | 65 | 2750 | 280 | 2030 |
| | Counterweight retaining bolt | | 24 | 4 | 36 | 440 | 45 | 330 |
| 22 | Front pin-retaining bolt | | 20 | | 30 | 390 | 40 | 290 |
| | Front pin-retaining nut | | 20 | | 30 | 390 | 40 | 290 |

*NOTE: 1. When tightening bolts and nuts, apply a lubricant to threads to reduce friction. (i.e.: white zinc B dissolved into spindle oil)*

*2. Remove rust, soil, and dust before tightening.*

*3. Use LOCTITE to the engine cushion rubber mounting nuts and the lower roller mounting bolts.*

## TORQUE CHART

**CAUTION: Use tools appropriate for the work to be done. Makeshift tools and parts create safety hazards. If an incorrect tool is used, the tool may slip or come off or break, resulting in personal injury.**

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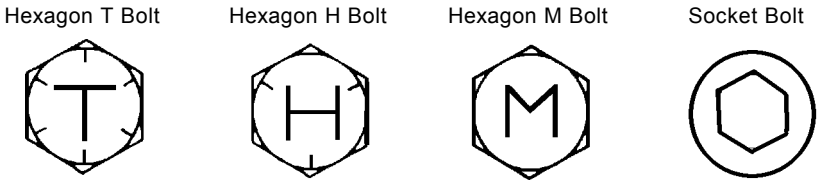
**Bolt Types**

When tightening bolts and nuts, use the specified torque. Bolts are classified according to materials and applications. Be sure to use the correct bolts and nuts, and tighten them to specification.

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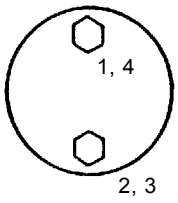
**Specified Tightening Torque Chart**

| Bolt Dia. | Wrench Size | Hexagon Wrench Size | T Bolt, Socket bolt | | | H Bolt | | | M Bolt | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | N·m | kgf·m | lbf·ft | N·m | kgf·m | lbf·ft | N·m | kgf·m | lbf·ft |
| M 8 | 13 | 6 | 29.5 | 3 | 22 | 19.5 | 2 | 14.5 | 9.8 | 1 | 7.2 |
| M 10 | 17 | 8 | 64 | 6.5 | 47 | 49 | 5 | 36 | 19.5 | 2 | 14.5 |
| M 12 | 19 | 10 | 108 | 11 | 80 | 88 | 9 | 65 | 34 | 3.5 | 25.5 |
| M 14 | 22 | 12 | 175 | 18 | 130 | 137 | 14 | 101 | 54 | 5.5 | 40 |
| M 16 | 24 | 14 | 265 | 27 | 195 | 205 | 21 | 152 | 78 | 8 | 58 |
| M 18 | 27 | 14 | 390 | 40 | 290 | 295 | 30 | 220 | 118 | 12 | 87 |
| M 20 | 30 | 17 | 540 | 55 | 400 | 390 | 40 | 290 | 167 | 17 | 123 |
| M 22 | 32 | 17 | 740 | 75 | 540 | 540 | 55 | 400 | 215 | 22 | 159 |
| M 24 | 36 | 19 | 930 | 95 | 690 | 690 | 70 | 505 | 275 | 28 | 205 |
| M 27 | 41 | 19 | 1370 | 140 | 1010 | 1030 | 105 | 760 | 390 | 40 | 290 |
| M 30 | 46 | 22 | 1910 | 195 | 1410 | 1420 | 145 | 1050 | 540 | 55 | 400 |
| M 33 | 50 | 24 | 2550 | 260 | 1880 | 1910 | 195 | 1410 | 740 | 75 | 540 |
| M 36 | 55 | 27 | 3140 | 320 | 2310 | 2400 | 245 | 1770 | 930 | 95 | 690 |

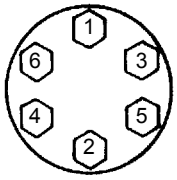
**IMPORTANT:**
**(1) Apply lubricant (i.e. white zinc B dissolved into spindle oil) to nuts and bolts to reduce friction.**
**(2) Torque tolerance should be ±10 %.**
**(3) Be sure to use bolts of correct length. Bolts that are too long cannot be tightened, as the bolt tip comes into contact with the bottom of the bolt hole. Bolts that are too short cannot develop sufficient tightening force.**
**(4) The torques given in the chart are for general use only.**
**Torque as specified.**
**(5) Make sure that the nut and bolt threads are clean before installing.**
**Remove dirt or corrosion, if any.**

**Bolt Tightening Order**
When tightening two or more bolts, tighten them alternately, as shown, to ensure even tightening.

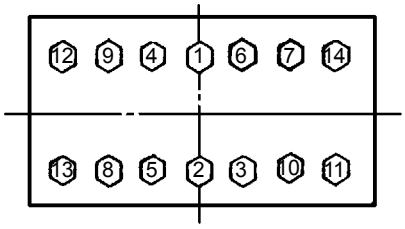
Equally tighten upper and lower alternately




Tighten diagonally




Tighten from center and diagonally

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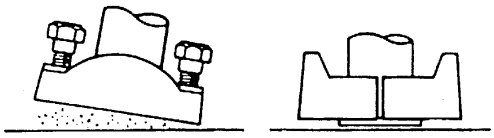
**Service Recommendations for Split Flange**

**IMPORTANT:**
**(1) Be sure to clean and inspect sealing surfaces. Scratches / roughness cruse leaks and seal wear. Unevenness causes seal extrusion. If defects cannot be polished out, replace the component.**
**(2) Be sure to use only specified O-rings. Inspect O-rings for any damage. Take care not to file O-ring contact surfaces. When installing an O-ring into a groove, use grease to hold it in place.**
**(3) Loosely assemble split flange halves. Make sure that the split is centrally located and perpendicular to the port. Hand-tighten the bolts to hold the parts in place. Take care not to pinch the O-ring.**
**(4) Tighten bolts alternately and diagonally, as shown, to ensure even tightening.**
**(5) Do not use air wrenches. Using an air wrench often causes tightening of one bolt fully before tighten the others, resulting in damage to O-rings or uneven tightening of bolts.**



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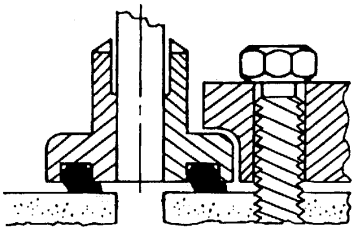
**WRONG**



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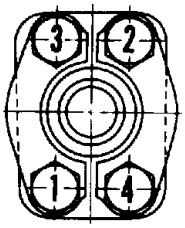


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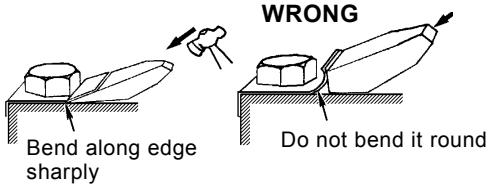
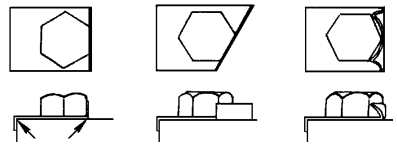
**RIGHT** **WRONG**




**RIGHT** **RIGHT** **WRONG**

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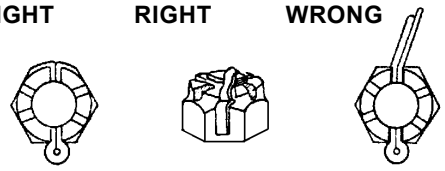
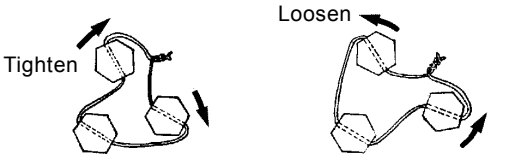
**RIGHT** **RIGHT** **WRONG**



**RIGHT** **WRONG**

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**Nut and Bolt Lockings**

• Lock Plate

**IMPORTANT: Do not reuse lock plates. Do not try to bend the same point twice.**

• Cotter Pin

**IMPORTANT: Do not reuse cotter pins. Match the holes in the bolt and nut while tightening, not while loosening.**

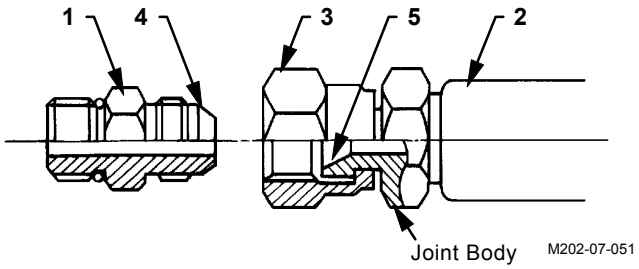
• Lock Wire

**IMPORTANT: Apply wire to bolts in the bolt-tightening direction, not in the bolt-loosening direction.**

## PIPING JOINT

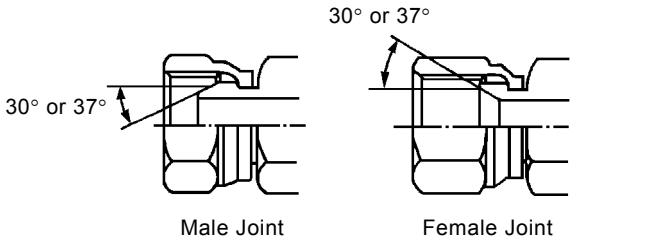
**Pipe Thread Connection / Union Joint Tightening Torque Specifications**

**Union Joint**
Metal sealing faces (4) of adapter (1) and (5) of hose (2) fit together to seal pressure oil. Union joints are used to join small-diameter lines.




**IMPORTANT: (1) Do not over-tighten nut (3). If excessive force is applied to metal sealing faces (4) and (5), adaptor (1) will be cracked. Always tighten nut (3) to specifications.**

**(2) Scratches or other damage to sealing faces (4) or (5) will cause oil to leak at the joint. Take care not to damage the sealing faces when connecting or disconnecting the union joint.**




| Union Joint | Wrench Size (mm) | | Tightening Torque | |
|---|---|---|---|---|
| | Union Nut | Joint Body | N·m (kgf·m) | lbf·ft |
| 30° Male | 19 | 19 | 59 (6) | 43 |
| | 22 | 22 | 98 (10) | 72 |
| | 27 | 27 | 118 (12) | 87 |
| | 36 | 36 | 235 (24) | 134 |
| | 41 | 41 | 295 (30) | 215 |
| | 50 | 50 | 490 (50) | 360 |
| | 60 | 60 | 670 (68) | 490 |
| | 70 | 70 | 980 (100) | 720 |
| 37° Female | 19 | 17 | 44 (4.5) | 32.5 |
| | 22 | 19 | 59 (6) | 43 |
| | 27 | 22 | 118 (12) | 87 |
| | 36 | 30, 32 | 235 (24) | 134 |
| | 41 | 36 | 295 (30) | 125 |
| | 50 | 46 | 490 (50) | 360 |

*NOTE: 37° male union joint tightening torque values are equal to those for 37° female union joint.*

**O-ring Seal Joint**

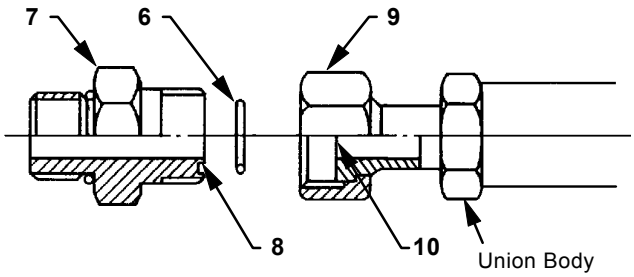
O-ring (6) is located on the end face of adapter (7) to seal pressure oil at the joint.

**IMPORTANT: (1) Be sure to replace O-ring (6) with new one when reconnecting.**

**(2) Check that O-ring (6) is Correctly seated in O-ring groove (8) before tightening union nut (9). If union nut (6) is tightened with O-ring (6) displaced from the groove, O-ring (6) will be damaged, causing oil leaks.**

**(3) Take care not to damage O-ring groove (8) on adapter (7) and sealing face (10) of the hose end. Damaged O-ring (6) will cause oil leaks.**

**(4) If oil leaks due to looseness of union nut (9), always replace O-ring (6) with new one and check that the O-ring is correctly seated in O-ring groove (8) before re-tightening union nut (9).**

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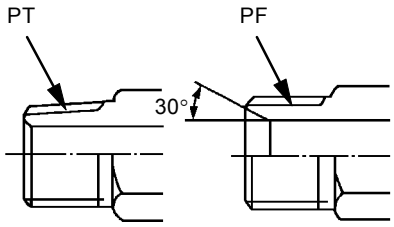
| Wrench Size | | Tightening Torque | |
|---|---|---|---|
| Union Nut | Union Body | N·m (kgf·m) | lbf·ft |
| 19 | 17 | 59 (6) | 43 |
| 22 | 19 | 98 (10) | 72 |
| 27 | 22 | 118 (12) | 87 |
| 36 | 30, 32 | 235 (24) | 134 |
| 41 | 36 | 295 (30) | 215 |
| 50 | 46 | 490 (50) | 360 |

**Screwed-In Connector**

**IMPORTANT: Many types of screwed-in connectors are used for hose or pipe connections.**
**Be sure to confirm that the thread pitch and thread type (tapered or straight) correctly match before connection.**

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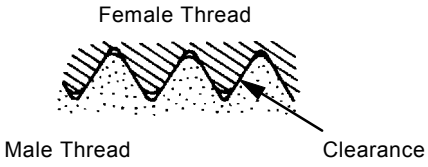
| Male Tapered Thread | | |
|---|---|---|
| Wrench | Tightening Torque | |
| Joint Body | N·m (kgf·m) | lbf·ft |
| 17, 19 | 59 (6) | 43 |
| 19, 22 | 98 (10) | 72 |
| 27, 22 | 118 (12) | 87 |
| 36, 32 | 235 (24) | 134 |
| 41 | 295 (30) | 215 |
| 50 | 490 (50) | 360 |
| 61 | 670 (68) | 190 |
| 70 | 980 (100) | 720 |

**Seal Tape Application**
Seal tape is used to seal clearances between male and female threads, so as to prevent any leaks between threads.
Be sure to apply just enough seal tape to fill up the thread clearances. Wrapping too much tape has no effect.

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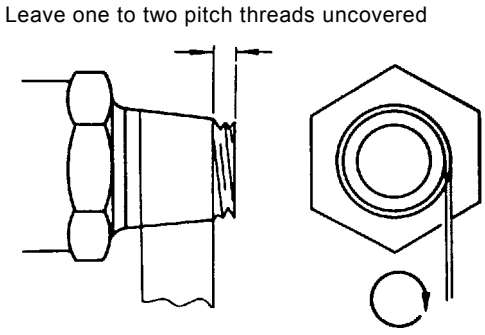
- Application Procedure

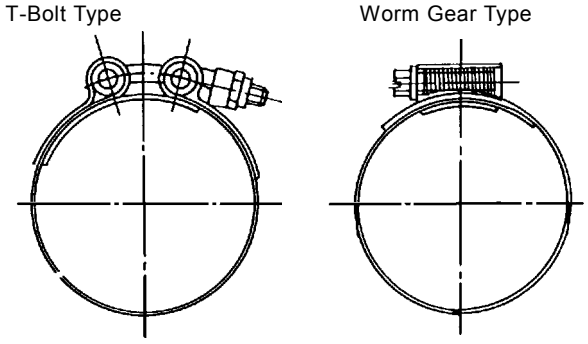
Confirm that the thread surface is clean, free of dirt or damage.
Apply seal tape around threads as shown. Wrap seal tape in the same direction as the threads.




M114-07-041

**Low-Pressure-Hose Clamp Tightening Torque**
Low-pressure-hose clamp tightening torque differs depending on the type of clamp.
See below for correct tightening torque of each type of low-pressure-hose clamp.

T-Bolt Type Band Clamp:
4.4 N·m (0.45 kgf·m, 3.25 lbf·ft)
Worm Gear Type Band Clamp:
5.9 to 6.9 N·m (0.6 to 0.7 kgf·m, 4.3 to 5.1 lbf·ft)




M114-07-042

M114-07-043

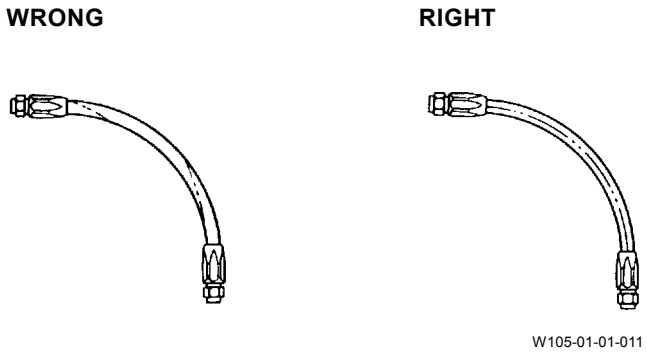
**Connecting Hose**

**CAUTION:**

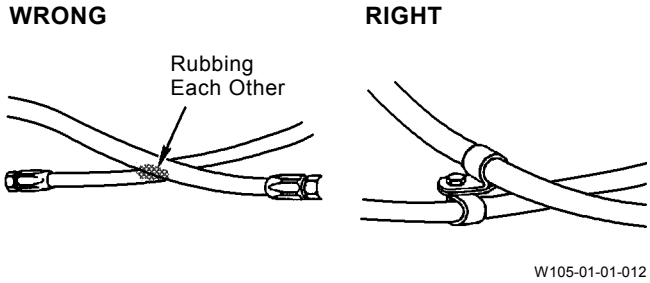
**(1) When replacing hoses, be sure to use only genuine Hitachi service parts. Using hoses other than genuine Hitachi hoses may cause oil leaks, hose rupture or separation of fitting, possibly resulting in a fire on the machine.**

**(2) Do not install hoses kinked. Application of high oil pressure, vibration, or an impact to a kinked hose may result in oil leakage, hose rupture or separation of fitting. Utilize print marks on hoses when installing hoses to check if hoses are installed properly.**

**(3) If hoses contact each other, wear on the hoses will result, leading to hose rupture. Take necessary measures to protect hoses from contacting each other.**
**Take care that hoses do not come into contact with moving parts or sharp objects.**




W105-01-01-011

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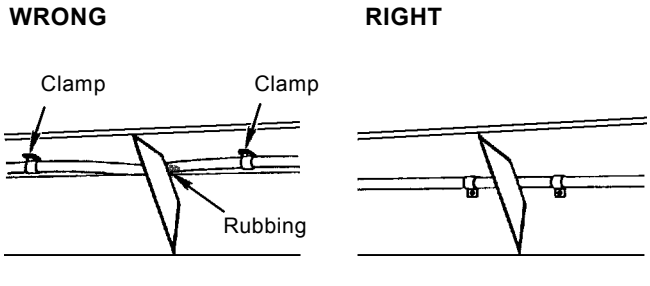


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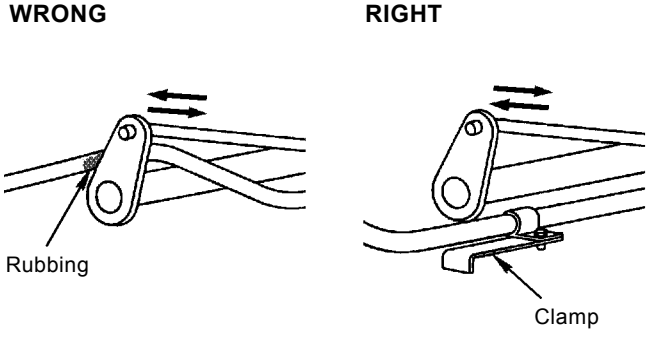


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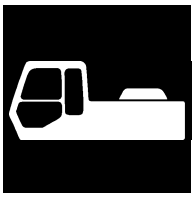
# SECTION 2
# UPPERSTRUCTURE



## —CONTENTS—

## Group 6 Pilot Valve



## Group 7 Pilot Shut-Off Valve



## Group 8 Shockless Valve



## Group 9 Solenoid Valve