

GROUP 9 BOOM, ARM AND BUCKET CYLINDERS

1. REMOVAL AND INSTALL

1) BUCKET CYLINDER

(1) Removal

- ※ Expand the arm and bucket fully, lower the work equipment to the ground and stop the engine.
- ※ Operate the control levers and pedals several times to release the remaining pressure in the hydraulic piping.

▲ Loosen the breather slowly to release the pressure inside the hydraulic tank. Escaping fluid under pressure can penetrate the skin causing serious injury.

- ※ Fit blind plugs in the hoses after disconnecting them, to prevent dirt or dust from entering.

① Set block between bucket cylinder and arm.

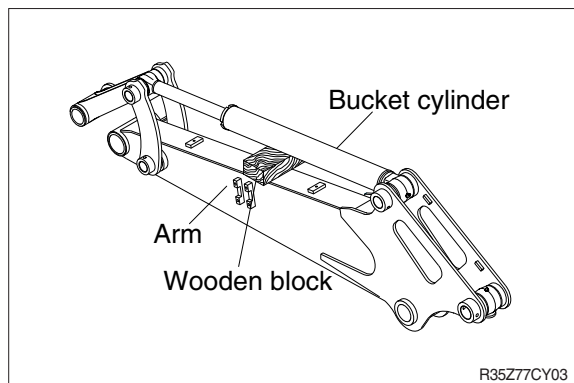
② Remove bolt (2), nut (3) and pull out pin (1).

- ※ Tie the rod with wire to prevent it from coming out.

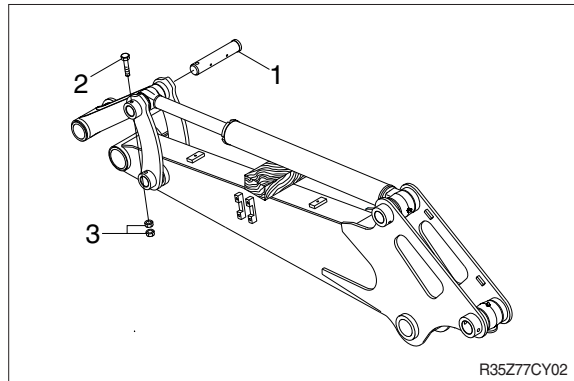
③ Disconnect bucket cylinder hoses (4) and put plugs (5) on cylinder pipe.



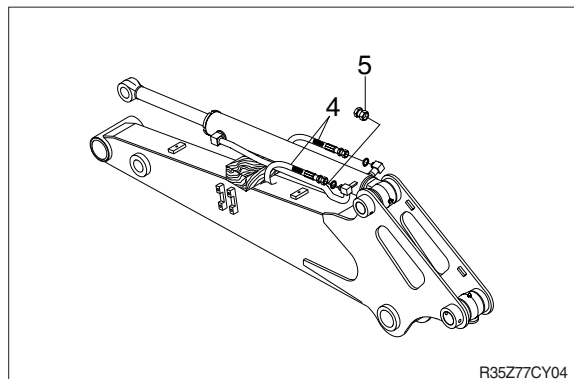
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R35Z77CY03

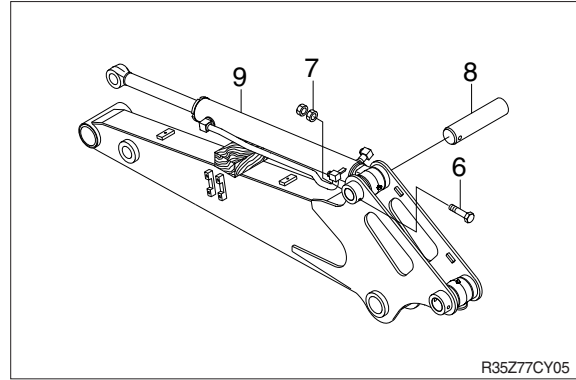


R35Z77CY02



R35Z77CY04

- ④ Sling bucket cylinder assembly (9) and remove bolt (6) and nut (7) then pull out pin (8).
- ⑤ Remove bucket cylinder assembly (9).
 - Weight : 18 kg (40 lb)



(2) Install

- ① Carry out installation in the reverse order to removal.
- ▲ When aligning the mounting position of the pin, do not insert your fingers in the pin hole.**
- ※ Bleed the air from the bucket cylinder.
 - ※ Confirm the hydraulic oil level and check the hydraulic oil leak or not.

2) ARM CYLINDER

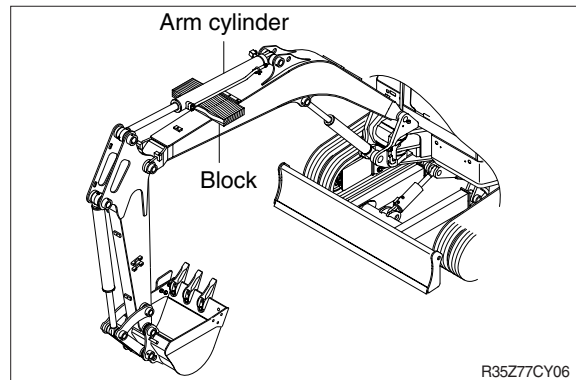
(1) Removal

- ※ Expand the arm and bucket fully, lower the work equipment to the ground and stop the engine.
- ※ Operate the control levers and pedals several times to release the remaining pressure in the hydraulic piping.

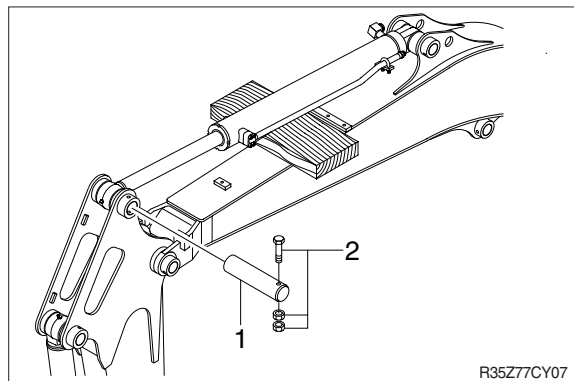
▲ Loosen the breather slowly to release the pressure inside the hydraulic tank.

▲ Escaping fluid under pressure can penetrate the skin causing serious injury.

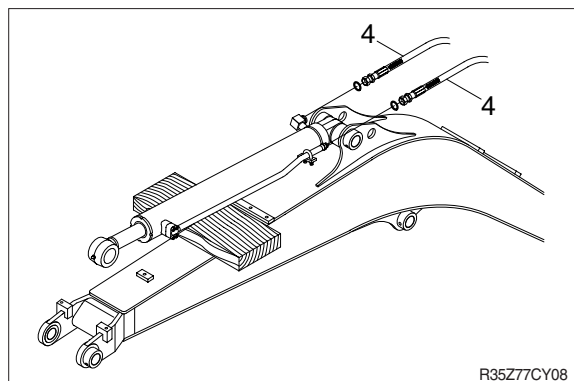
- ※ Fit blind plugs in the hoses after disconnecting them, to prevent dirt or dust from entering.
- ① Set block between arm cylinder and boom.



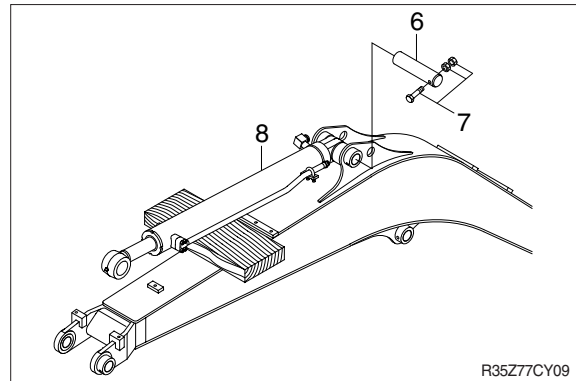
- ② Remove bolt and nut (2) and pull out pin (1).
- ※ Tie the rod with wire to prevent it from coming out.



- ③ Disconnect arm cylinder hoses (4) and put plugs on cylinder pipe.



- ⑤ Sling arm assembly (8) and remove bolt and nut (7) then pull out pin (6).
- ⑥ Remove arm cylinder assembly (8).
 - Weight : 25 kg (55 lb)



(2) Install

- ① Carry out installation in the reverse order to removal.
- ▲ When aligning the mounting position of the pin, do not insert your fingers in the pin hole.**
- ※ Bleed the air from the arm cylinder.
 - ※ Confirm the hydraulic oil level and check the hydraulic oil leak or not.

3) BOOM CYLINDER

(1) Removal

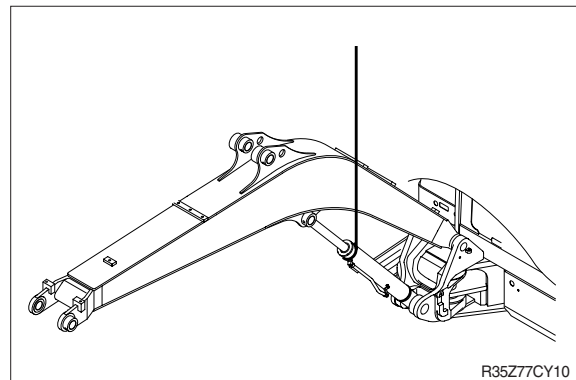
- ※ Expand the arm and bucket fully, lower the work equipment to the ground and stop the engine.
- ※ Operate the control levers and pedals several times to release the remaining pressure in the hydraulic piping.

▲ Loosen the breather slowly to release the pressure inside the hydraulic tank.

▲ Escaping fluid under pressure can penetrate the skin causing serious injury.

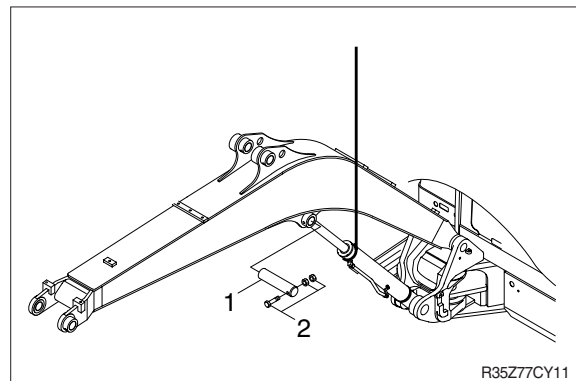
- ※ Fit blind plugs in the hoses after disconnecting them, to prevent dirt or dust from entering.

① Sling boom cylinder assembly.

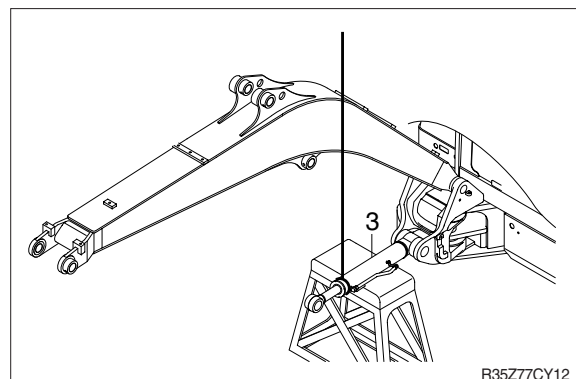


③ Remove bolt and nut (2) and pull out pin (1).

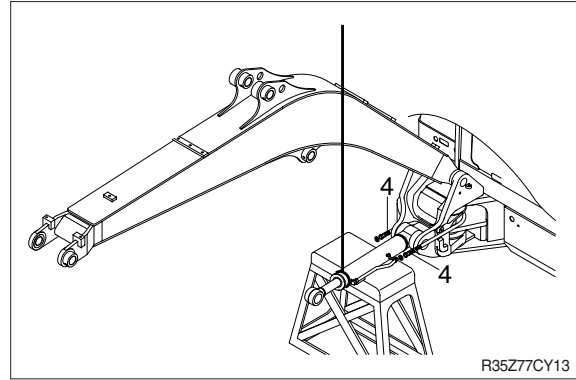
- ※ Tie the rod with wire to prevent it from coming out.



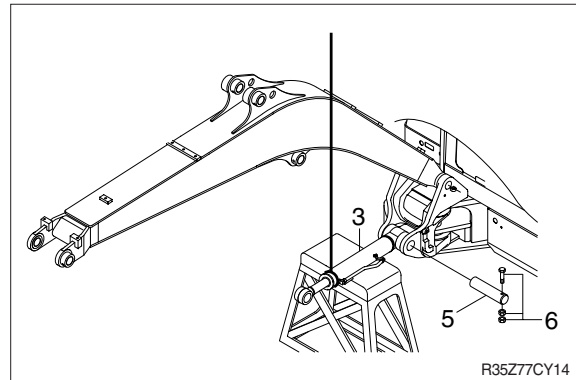
④ Lower the boom cylinder assembly (3) on a stand.



- ⑤ Disconnect boom cylinder hoses(4) and put plugs on cylinder pipe.



- ⑥ Remove bolt (6) and pull out pin (5).
⑦ Remove boom cylinder assembly (3).
· Weight : 31 kg (68 lb)



(2) Install

- ① Carry out installation in the reverse order to removal.

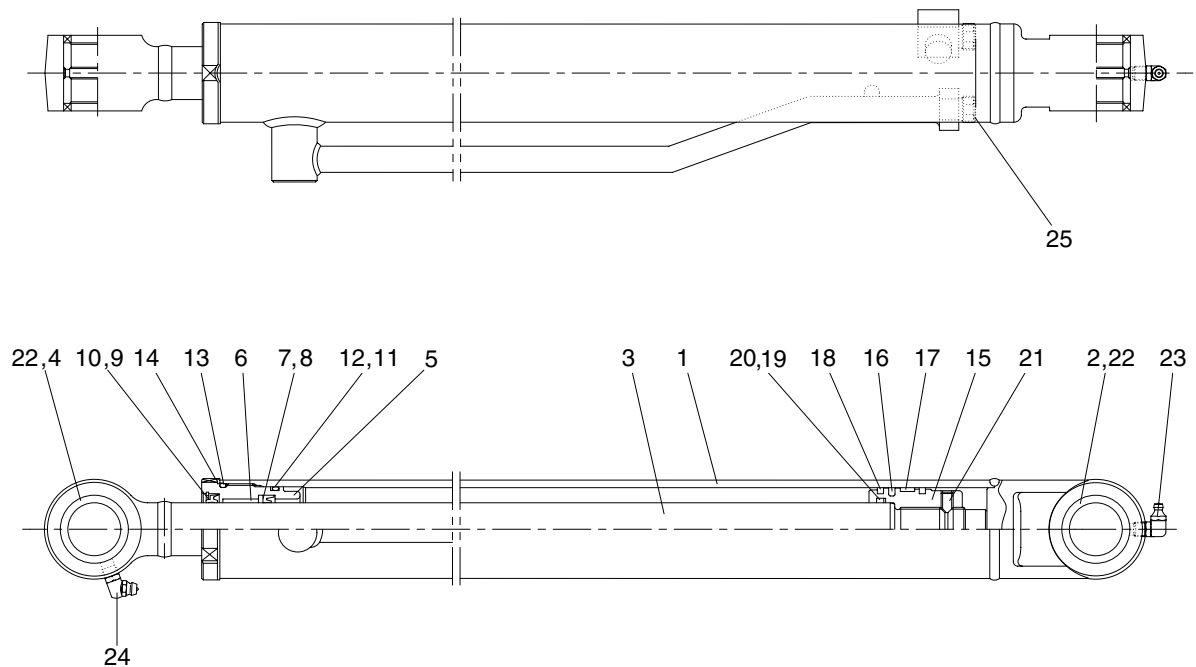
▲ When aligning the mounting position of the pin, do not insert your fingers in the pin hole.

- ※ Bleed the air from the boom cylinder.
- ※ Confirmed the hydraulic oil level and check the hydraulic oil leak or not.

2. DISASSEMBLY AND ASSEMBLY

1) STRUCTURE

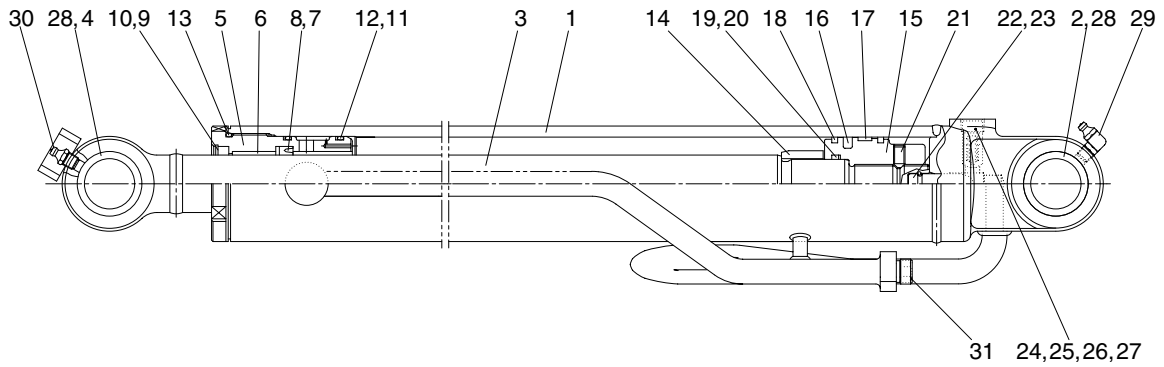
(1) Bucket cylinder



R27Z97CY15

1	Tube assembly	10	Retaining ring	19	O-ring
2	Pin bushing	11	O-ring	20	Back up ring
3	Rod assembly	12	Back-up ring	21	Set screw
4	Pin bushing	13	O-ring	22	Pin wiper
5	Rod cover	14	Washer	23	Grease nipple
6	Rod bushing	15	Piston	24	Grease nipple
7	U-packing	16	Piston seal	25	O-ring
8	Back-up ring	17	Wear ring		
9	Dust wiper	18	Dust ring		

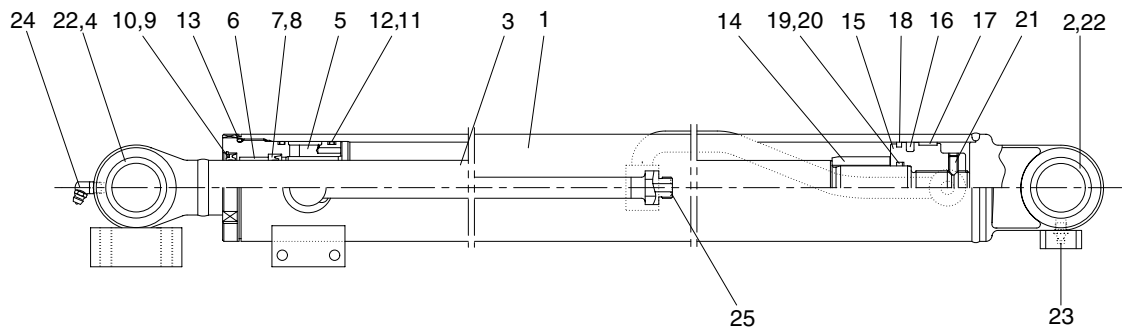
(2) Arm cylinder



R27Z97CY16

- | | | | | | |
|----|----------------|----|-----------------|----|---------------------|
| 1 | Tube assembly | 12 | Back-up ring | 23 | Stop ring |
| 2 | Pin bushing | 13 | O-ring | 24 | Check valve |
| 3 | Rod assembly | 14 | Cushion ring | 25 | Spring |
| 4 | Pin bushing | 15 | Piston | 26 | Spring support |
| 5 | Rod cover | 16 | Piston seal | 27 | Hexagon socket plug |
| 6 | Rod bushing | 17 | Wear ring | 28 | Pin wiper |
| 7 | U-packing | 18 | Dust ring | 29 | Grease nipple |
| 8 | Back-up ring | 19 | O-ring | 30 | Grease nipple |
| 9 | Dust wiper | 20 | Back up ring | 31 | O-ring |
| 10 | Retaining ring | 21 | Set screw | | |
| 11 | O-ring | 22 | Cushion plunger | | |

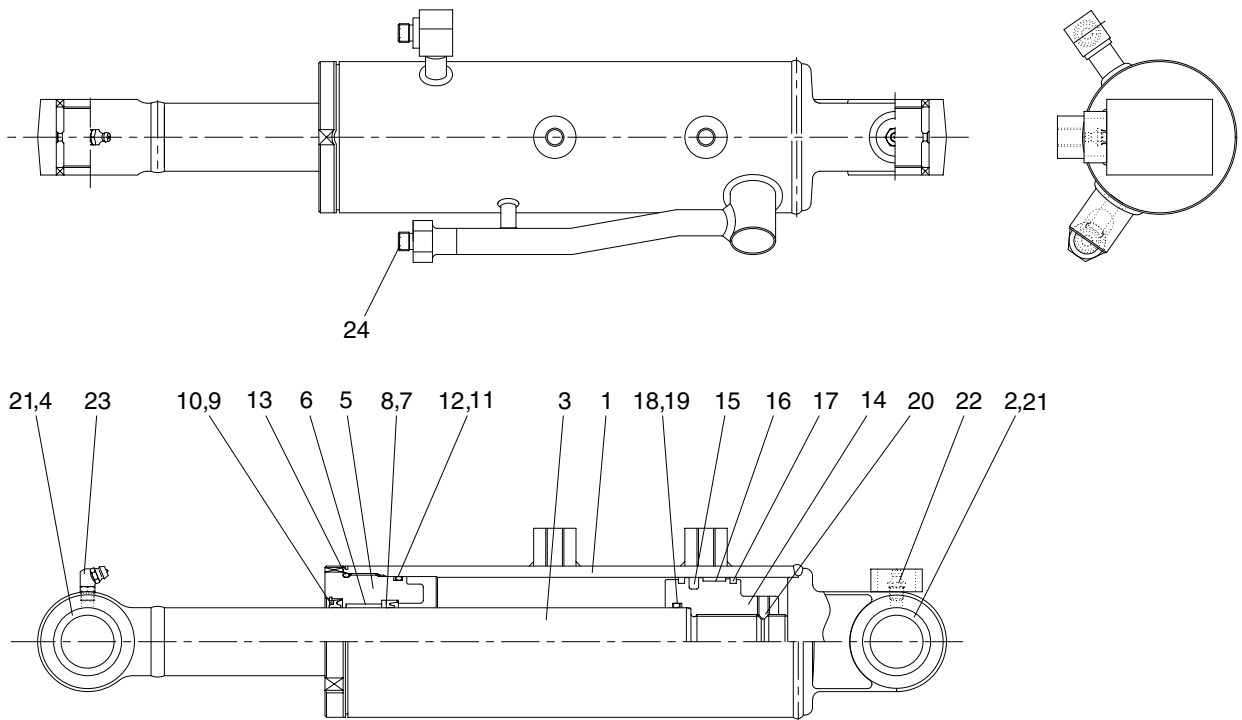
(3) Boom cylinder



R27Z97CY17

- | | | | | | |
|---|---------------|----|----------------|----|---------------|
| 1 | Tube assembly | 10 | Retaining ring | 19 | O-ring |
| 2 | Pin bushing | 11 | O-ring | 20 | Back up ring |
| 3 | Rod assembly | 12 | Back-up ring | 21 | Set screw |
| 4 | Pin bushing | 13 | O-ring | 22 | Pin wiper |
| 5 | Rod cover | 14 | Cushion ring | 23 | Grease nipple |
| 6 | Rod bushing | 15 | Piston | 24 | Grease nipple |
| 7 | U-packing | 16 | Piston seal | 25 | O-ring |
| 8 | Back-up ring | 17 | Wear ring | | |
| 9 | Dust wiper | 18 | Dust ring | | |

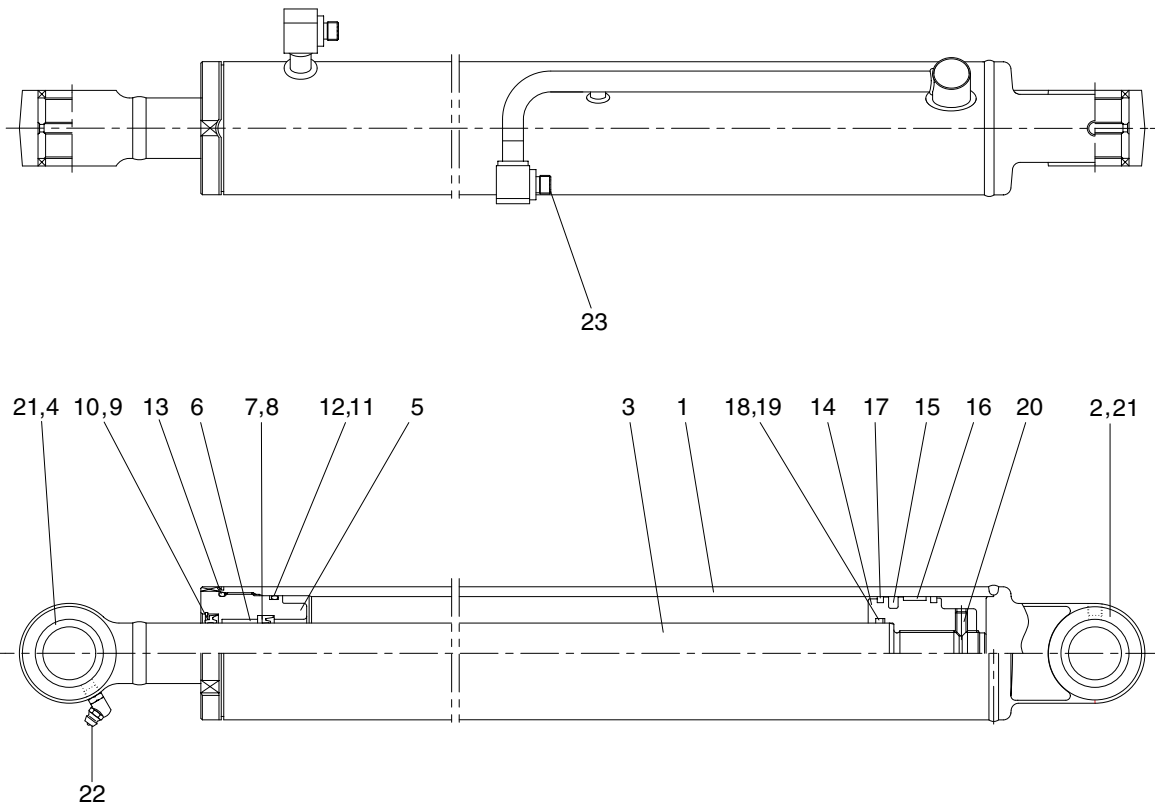
(4) Dozer cylinder



R27Z97CY18

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|---|---------------|----|----------------|----|---------------|
| 1 | Tube assembly | 9 | Dust wiper | 17 | Dust ring |
| 2 | Pin bushing | 10 | Retaining ring | 18 | O-ring |
| 3 | Rod assembly | 11 | O-ring | 19 | Back up ring |
| 4 | Pin bushing | 12 | Back-up ring | 20 | Set screw |
| 5 | Rod cover | 13 | O-ring | 21 | Pin wiper |
| 6 | Rod bushing | 14 | Piston | 22 | Grease nipple |
| 7 | U-packing | 15 | Piston seal | 23 | Grease nipple |
| 8 | Back-up ring | 16 | Wear ring | 24 | O-ring |

(5) Boom swing cylinder

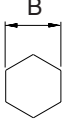


R27Z97CY19

- | | | | | | |
|---|---------------|----|----------------|----|---------------|
| 1 | Tube assembly | 9 | Dust wiper | 17 | Dust ring |
| 2 | Pin bushing | 10 | Retaining ring | 18 | O-ring |
| 3 | Rod assembly | 11 | O-ring | 19 | Back up ring |
| 4 | Pin bushing | 12 | Back-up ring | 20 | Set screw |
| 5 | Rod cover | 13 | O-ring | 21 | Pin wiper |
| 6 | Rod bushing | 14 | Piston | 22 | Grease nipple |
| 7 | U-packing | 15 | Piston seal | 23 | O-ring |
| 8 | Back-up ring | 16 | Wear ring | | |

2) TOOLS AND TIGHTENING TORQUE

(1) Tools

Tool name	Remark	
Allen wrench	8	
	3	
Spanner	M22	
Hook spanner	Suitable size (80~120 mm)	
(-) Driver	Small and large sizes	
Torque wrench	Capable of tightening with the specified torques	

(2) Tightening torque

Part name	Item	Size	Torque		
			kgf · m	lbf · ft	
Gland	Boom cylinder	5	M80	70 ± 7.0	506 ± 50.6
	Arm cylinder	5	M70	50 ± 5.0	362 ± 36.2
	Bucket cylinder	5	M65	50 ± 5.0	362 ± 36.2
	Dozer cylinder	5	M90	70 ± 7.0	506 ± 50.6
	Boom swing cylinder	5	M80	70 ± 7.0	506 ± 50.6
Piston	Boom cylinder	15	M30	75 ± 7.5	542 ± 54.2
	Arm cylinder	15	M27	50 ± 5.0	362 ± 36.2
	Bucket cylinder	15	M27	50 ± 5.0	362 ± 36.2
	Dozer cylinder	14	M36	75 ± 7.5	542 ± 54.2
	Boom swing cylinder	14	M32	75 ± 7.5	542 ± 54.2

3) DISASSEMBLY

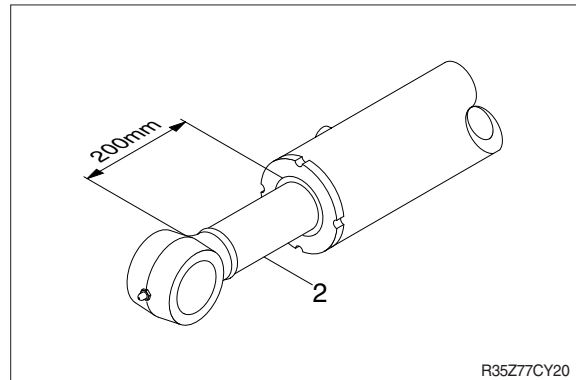
※ Procedures are based on the boom cylinder.

(1) Remove cylinder head and piston rod

① Hold the clevis section of the tube in a vise.

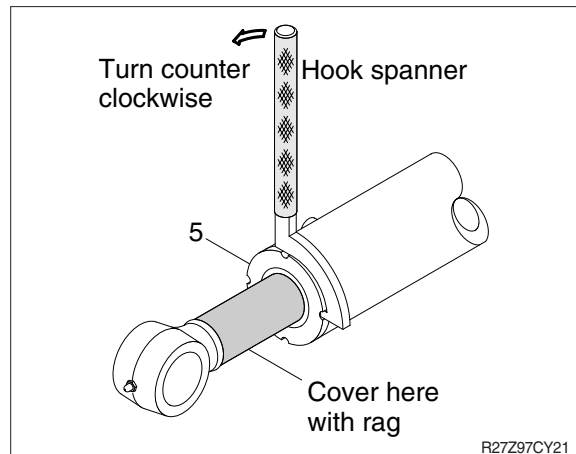
※ Use mouth pieces so as not to damage the machined surface of the cylinder tube. Do not make use of the outside piping as a locking means.

② Pull out rod assembly (3) about 200 mm (7.1 in). Because the rod assembly is rather heavy, finish extending it with air pressure after the oil draining operation.



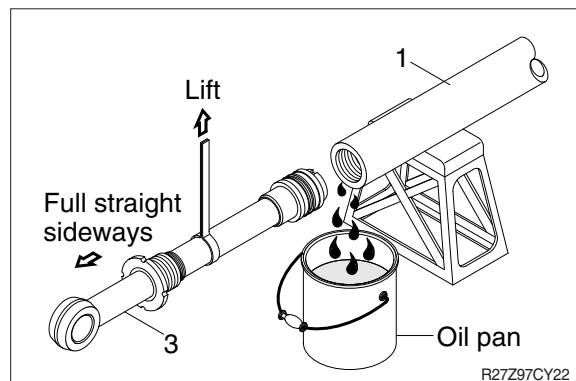
③ Loosen and remove the gland (5) by hook spanner.

※ Cover the extracted rod assembly (3) with rag to prevent it from being accidentally damaged during operation.



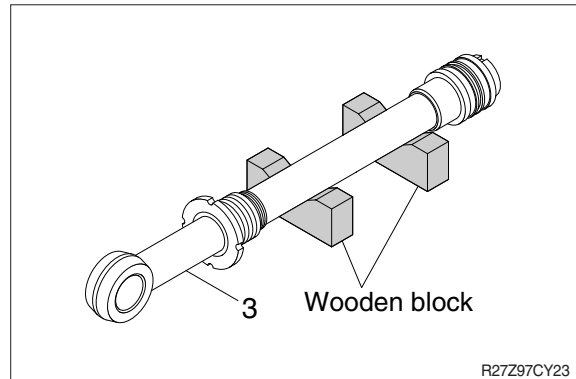
④ Draw out cylinder head and rod assembly together from tube assembly (1).

※ Since the rod assembly is heavy in this case, lift the tip of the rod assembly (3) with a crane or some means and draw it out. However, when rod assembly (3) has been drawn out to approximately two thirds of its length, lift it in its center to draw it completely.



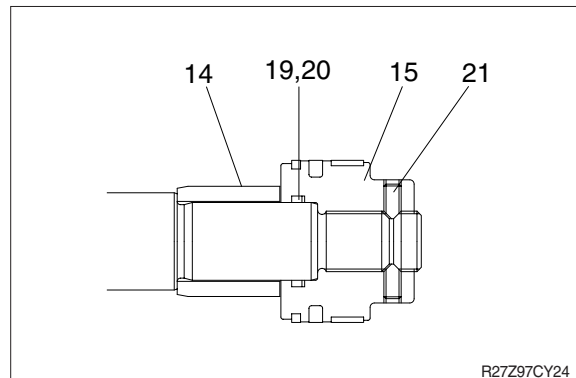
Note that the plated surface of rod assembly(3) is to be lifted. For this reason, do not use a wire sling and others that may damage it, but use a strong cloth belt or a rope.

- ⑤ Place the removed rod assembly on a wooden V-block that is set level.
- ※ Cover a V-block with soft rag.

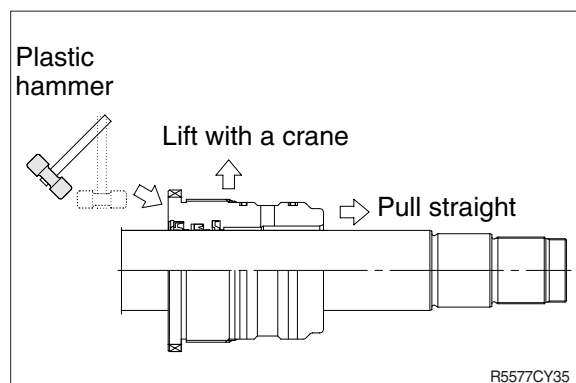


(2) Remove piston and gland

- ① Remove set screw (21).
- ② Remove piston assembly (15), back up ring (20), O-ring (19) and cushion ring (14).

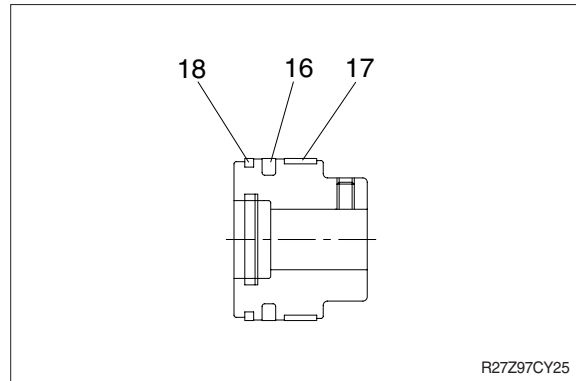


- ④ Remove the gland assembly from rod assembly (3).
 - ※ If it is too heavy to move, move it by striking the flanged part of gland with a plastic hammer.
 - ※ Pull it straight with gland assembly lifted with a crane.
- Exercise care so as not to damage the lip of DU bushing (6) and packing (7, 8, 9, 10, 11, 12) by the threads of rod assembly (3).



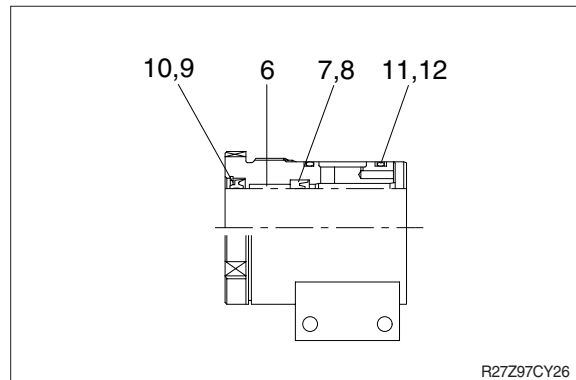
(3) Disassemble the piston assembly

- ① Remove wear ring (17).
 - ② Remove dust ring (18) and piston seal (16).
- ※ Exercise care in this operation not to damage the grooves.



(4) Disassemble gland assembly

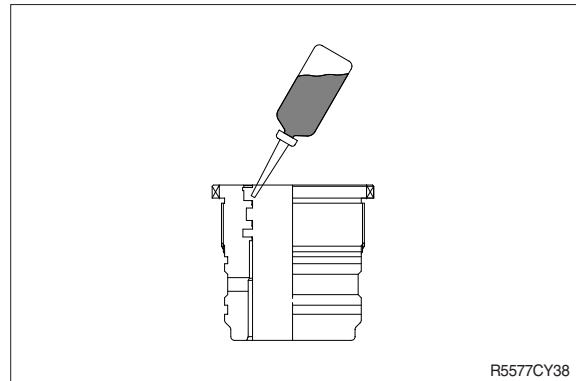
- ① Remove back up ring (12) and O-ring (11).
 - ② Remove snap ring (10), dust wiper (9).
 - ③ Remove back up ring (8), U-packing (7).
 - ④ Remove the rod bushing (6).
- ※ Exercise care in this operation not to damage the grooves.
- ※ Do not remove seal and ring, if does not damaged.



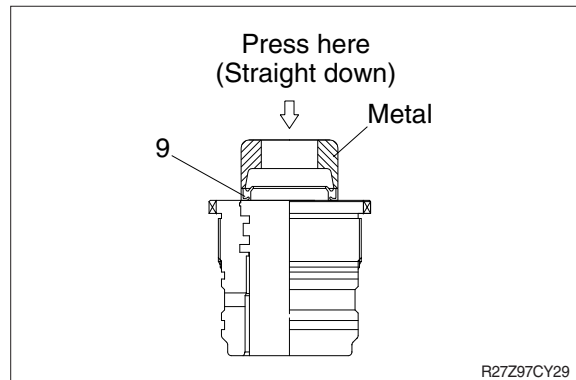
4) ASSEMBLY

(1) Assemble cylinder head assembly

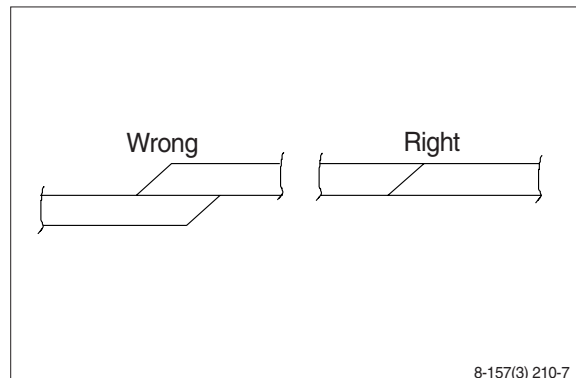
- ※ Check for scratches or rough surfaces if found smooth with an oil stone.
- ① Coat the inner face of gland (5) with hydraulic oil.



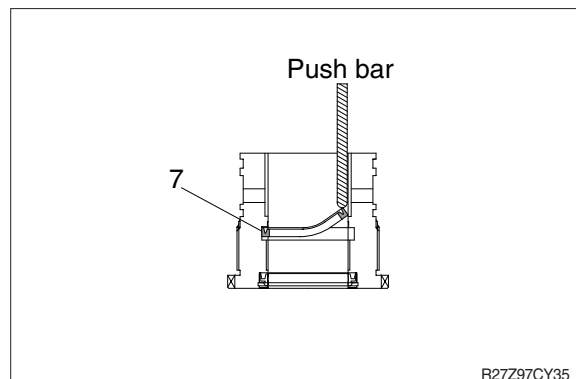
- ② Coat dust wiper (9) with grease and fit dust wiper (9) to the bottom of the hole of dust seal.
At this time, press a pad metal to the metal ring of dust seal.
- ③ Fit retain ring (10) to the stop face.



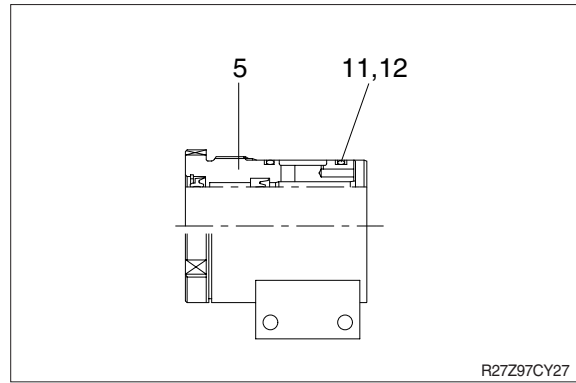
- ④ Fit back up ring (7), rod seal (6) to corresponding grooves, in that order.
 - ※ Coat each packing with hydraulic oil before fitting it.
 - ※ Insert the backup ring until one side of it is inserted into groove.



- ※ U-packing (7) has its own fitting direction. Therefore, confirm it before fitting them.
- ※ Fitting U-packing (7) upside down may damage its lip. Therefore check the correct direction that is shown in fig.

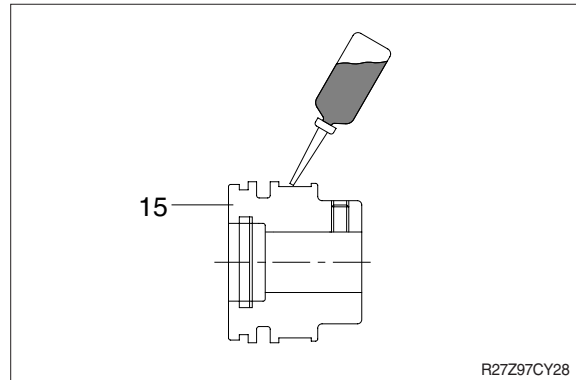


- ⑤ Fit back up ring (12) to gland (5).
- ※ Put the backup ring in the warm water of 30~50°C .
- ⑥ Fit O-ring (11) to gland (5).

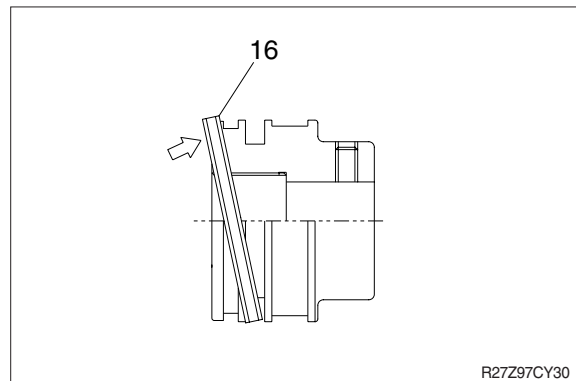


(2) Assemble piston assembly

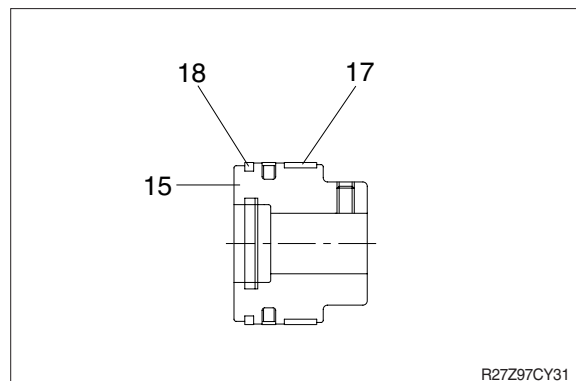
- ※ Check for scratches or rough surfaces.
If found smooth with an oil stone.
- ① Coat the outer face of piston (15) with hydraulic oil.



- ② Fit piston seal (16) to piston.
- ※ Put the piston seal in the warm water of 60~100°C for more than 5 minutes.
- ※ After assembling the piston seal, press its outer diameter to fit in.

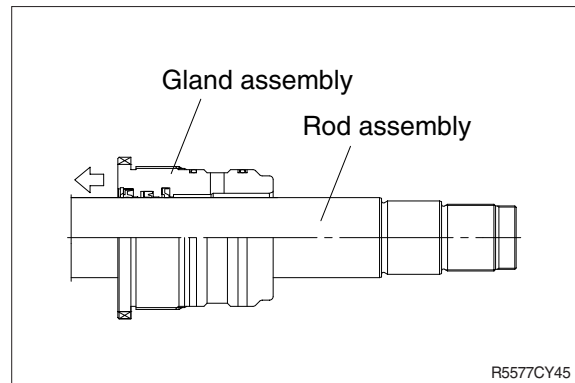


- ③ Fit wear ring (17) and dust ring (18) to piston (15).

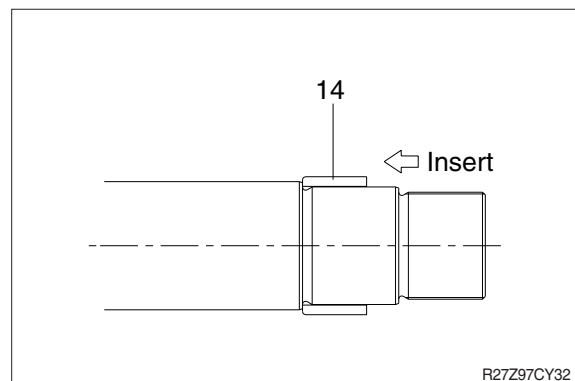


(3) Install piston and cylinder head

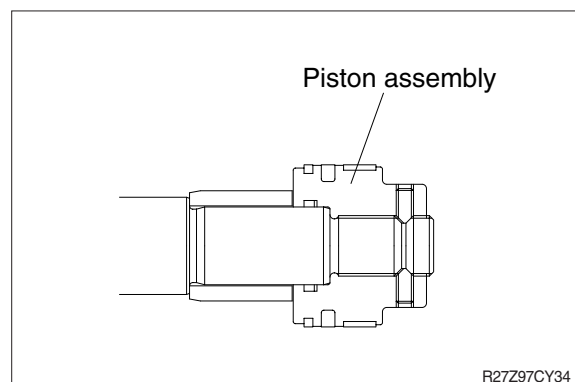
- ① Fix the rod assembly to the work bench.
- ② Apply hydraulic oil to the outer surface of rod assembly (3), the inner surface of piston and gland.
- ③ Insert gland assembly to rod assembly.



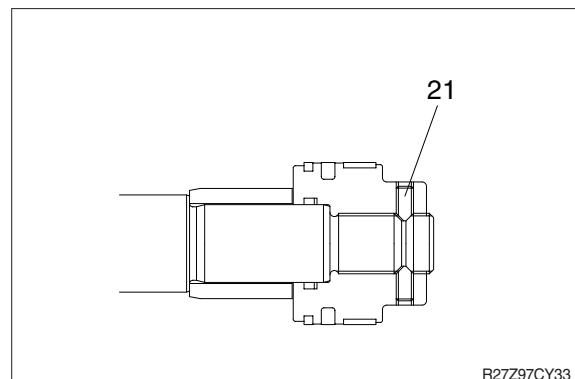
- ④ Insert cushion ring (14) to rod assembly.
* Note that cushion ring (14) has a direction in which it should be fitted.



- ⑤ Fit piston assembly to rod assembly.



- ⑥ Fit set screw (21).
· Tightening torque :
1.5 kgf · m (10.8 lbf · ft)



(3) Overall assemble

- ① Place a V-block on a rigid work bench.
Mount the tube assembly (1) on it and fix the assembly by passing a bar through the clevis pin hole to lock the assembly.
- ② Insert the rod assembly in to the tube assembly, while lifting and moving the rod assembly with a crane.
 - ※ Be careful not to damage piston seal by thread of tube assembly.
- ③ Match the bolt holes in the cylinder head flange to the tapped holes in the tube assembly and tighten socket bolts to a specified torque.
 - ※ Refer to the table of tightening torque.

