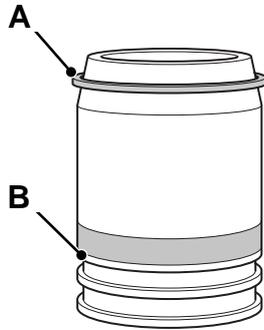


- Fit the heated slipper seal **A** (approximately 200°C) into its installation groove **B** using the insertion jig.

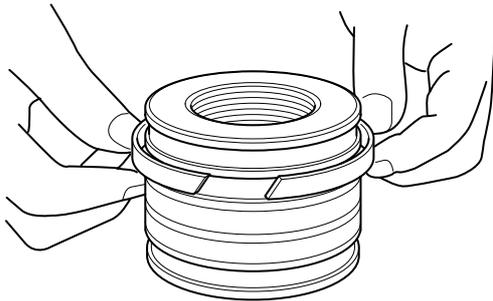
Damage to the surface of the slipper seal cap will affect its sealing performance. Be careful not to scratch the surfaces of the seal when installing.



**Fig 81.**

C030940-C1

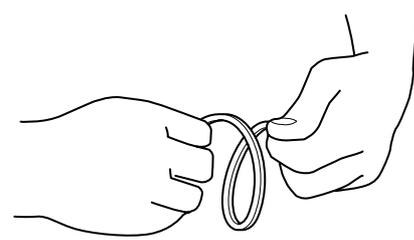
- Fit the second back up ring.
- Install the two wear rings into their installation grooves → [Fig 82.](#) ([E-197](#)).



**Fig 82.**

C030950

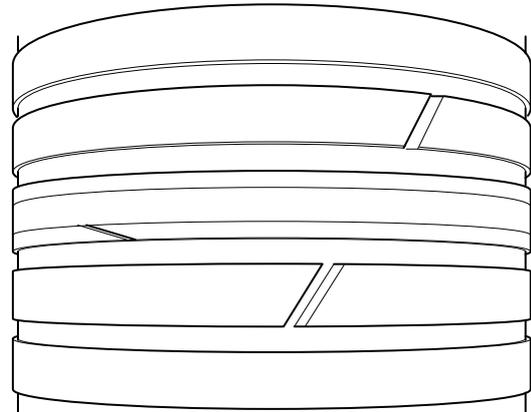
- First twist and then fit the two slide rings into their installation grooves → [Fig 83.](#) ([E-197](#)).



**Fig 83.**

C030960

**Note:** Wear and slide ring slits must not be aligned → [Fig 84.](#) ([E-197](#)).



**Fig 84.**

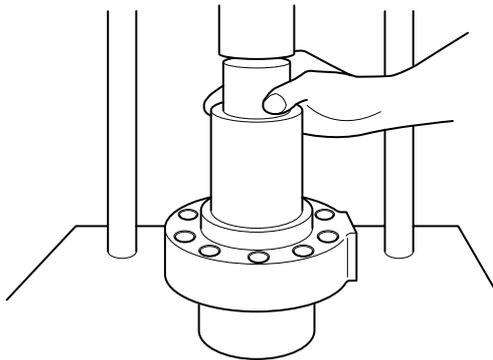
C030970

## Assembling the Cylinder Head Seals

### Before Assembly

Check that the assembly tools are free from defect. Clean tools before starting. Clean cylinder head before assembly. Check that grooves are clean and not damaged.

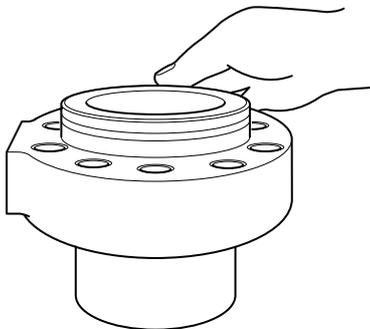
- 1 locate du-bush to cylinder and push into place using a press → [Fig 85.](#) (□ E-198). Fit the bush retaining ring.



**Fig 85.**

C030980

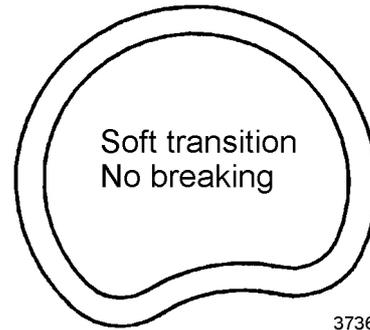
- 2 Fit the back up ring in its seat on the cylinder head → [Fig 86.](#) (□ E-198).



**Fig 86.**

C031000

- 3 Bend the buffer ring to a loose curve before fitting, → [Fig 87.](#) (□ E-198).

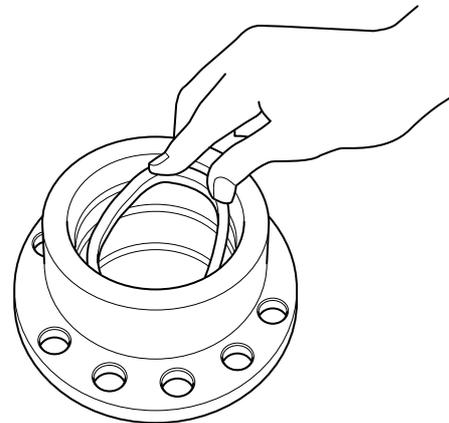


373600-V1

373600-V1

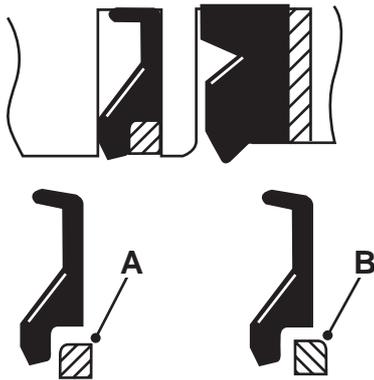
**Fig 87.**

- 4 Fit the buffer ring into its seat in the cylinder head → [Fig 88.](#) (□ E-198). Fit back up ring after putting the buffer ring in place ensuring correct orientation. **A** is correct **B** is incorrect. → [Fig 89.](#) (□ E-199).



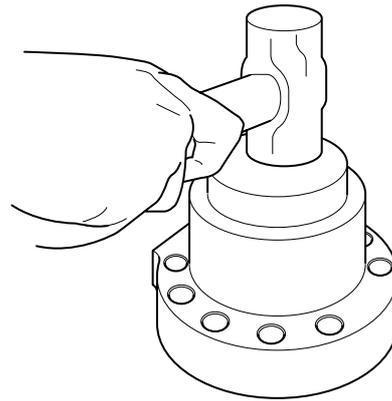
**Fig 88.**

C031020



**Fig 89.**

C031040-C1

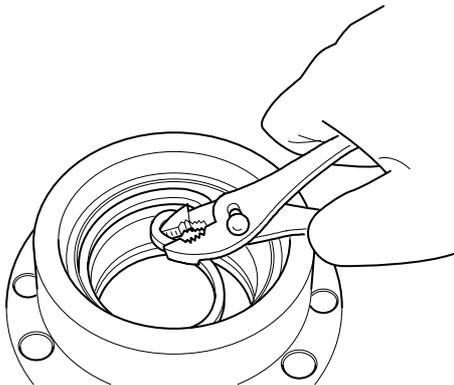


**Fig 91.**

C031060

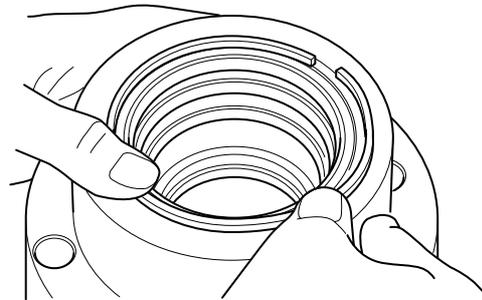
- 5 Deform the u-packing ring into a loose curve with the u-packing holder and insert it into its fitting groove → [Fig 90.](#) ([□ E-199](#)). Fit the back up ring after fitting the u-packing ring.

- 7 Install the retaining ring into its groove → [Fig 92.](#) ([□ E-199](#)).



**Fig 90.**

C031050



**Fig 92.**

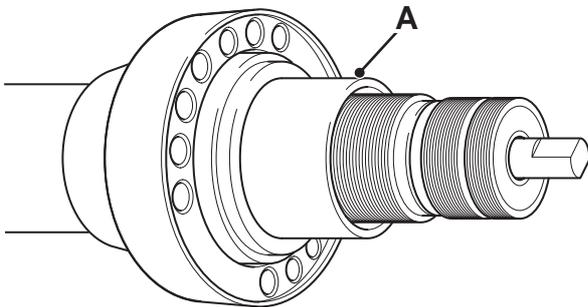
C031070

- 6 Place the Wiper ring into the cylinder head horizontally. Using the insertion tool, carefully press the wiper into position making sure not to deform the wiper lip → [Fig 91.](#) ([□ E-199](#)).

### Assembly of the Piston Rod

The cylinder components must be cleaned before assembly. The piston and cylinder head must be cleaned before seal assembly and be kept clean up until this stage. Do not clean piston or cylinder head with seals fitted.

- 1 Secure the piston rod pack on the bench, brace the piston rod head.
- 2 Carefully fit the cylinder head onto the piston rod ensuring that the threads are not damaged.
- 3 Fit the cushion ring **A**



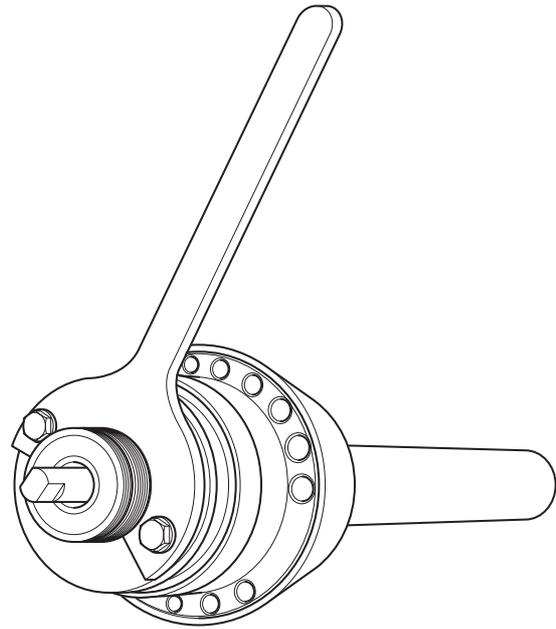
**Fig 93.**

C030730-C1

- 4 Assemble the piston head onto the piston rod. Fit the Jig to piston and torque tighten the piston to stated torque value. [⇒ Table 1.](#) ([□ E-200](#)).

**Table 1.**

Ram	Piston
Boom	981 Nm +/- 98 Nm (723 lbf ft +/- 72 lbf ft) (100 kgf m +/- 10 kgf m)
Bucket	981 Nm +/- 98 Nm (723 lbf ft +/- 72 lbf ft) (100 kgf m +/- 10 kgf m)
Dipper	981 Nm +/- 98 Nm (723 lbf ft +/- 72 lbf ft) (100 kgf m +/- 10 kgf m)



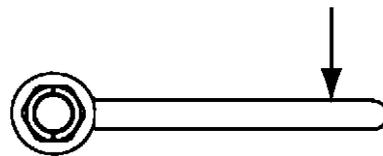
**Fig 94.**

C030720

- 5 Assemble the nut onto the piston rod and torque tighten to stated torque value. [⇒ Table 2.](#) ([□ E-200](#)).

**Table 2.**

Ram	Piston Rod Nut
Boom	1860 Nm +/- 186 Nm (1374 lbf ft +/- 137 lbf ft) (190 kgf m +/- 19 kgf m)
Bucket	1860 Nm +/- 186 Nm (1374 lbf ft +/- 137 lbf ft) (190 kgf m +/- 19 kgf m)
Dipper	1860 Nm +/- 186 Nm (1374 lbf ft +/- 137 lbf ft) (190 kgf m +/- 19 kgf m)



**Fig 95.**

373460B-V2

- 6 Locate and fasten the stop screw **X** and torque tighten to stated torque value. [⇒ Table 3.](#) ([□ E-201](#)).

### Assembly of Piston Rod in Cylinder Tube

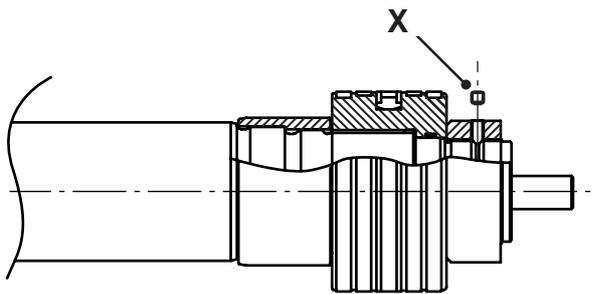


Fig 96.

C030710-C1

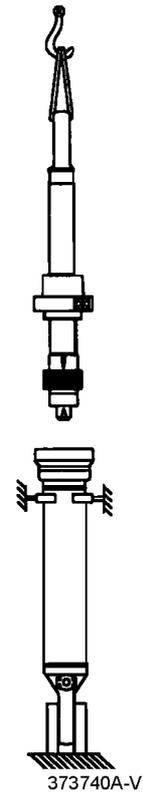
Table 3.

Ram	Stop Screw <sup>(1)</sup>
Boom	15 Nm (11 lbf ft) (1.5 kgf m)
Bucket	15 Nm (11 lbf ft) (1.5 kgf m)
Dipper	15 Nm (11 lbf ft) (1.5 kgf m)

(1) Apply Loctite #242 on the threaded portion (caulking after tightening).

- 1 Make sure that assembly tools and cylinder tube are clean before assembly. The piston rod pack must be protected from dirt up until this stage. Assembly should be made vertically.

Secure the cylinder tube [⇒ Fig 97. \(□ E-201\)](#) and bring the end of the piston rod to the cylinder tube opening.



373740A-V1

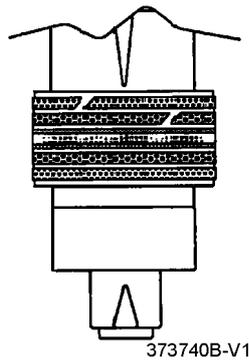
Fig 97.

373740A-V1

Release the end-flange cover on the cylinder tube in order to let air out from the tube during assembly.

Make sure the piston rod head is turned in the right position in relation to the bottom of the cylinder.

- 2 Before assembly, make sure that guiding slits on the piston are not aligned [⇒ Fig 98. \(□ E-202\)](#).



**Fig 98.**

373740b-V1

- Put the piston rod pack into the cylinder tube. Make sure that the piston guiding ring does not get jammed during assembly.

Clean hydraulic oil will help, but do not use a brush as hairs may come off.

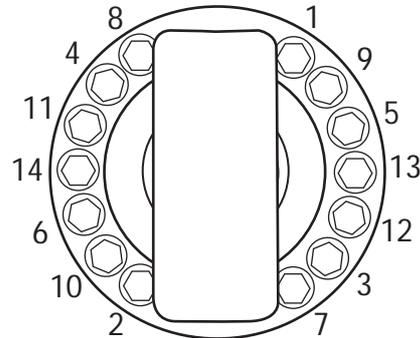
When running the piston rod in, turn the cylinder head into the right position. Finish doing this before the cylinder head O-ring has reached the cylinder tube [⇒ Fig 99. \(□ E-202\)](#). Do not use assembly grease.

Fasten the cover.

Fasten cylinder head screws and torque tighten to stated torque valve. [⇒ Table 4. \(□ E-202\)](#)

- Tighten in order according to [⇒ Fig 100. \(□ E-202\)](#).

**Note:** Be careful not to damage the piston rod!



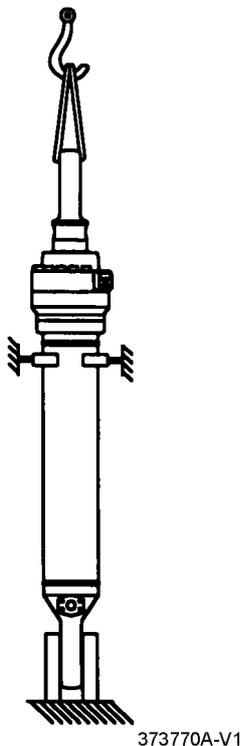
**Fig 100.**

C031080

**Table 4.**

Ram	Gland Housing <sup>(1)</sup>
Boom	383~412 Nm (282~304 lbf ft) (39~42 kgf.m)
Bucket	383~412 Nm (282~304 lbf ft) (39~42 kgf.m)
Dipper	628~687 Nm (463~507 lbf ft) (64~70 kgf.m)

(1) Apply Loctite #242 on the threaded portion.



**Fig 99.**

373770A-V1



**Maintenance Specifications**

In order to ensure long life of the hydraulic ram, carry out inspection and maintenance regularly. If an abnormal point is found, repair as soon as possible referring to the troubleshooting chart.

**Table 5.**

Inspection, Maintenance Point	Inspection, Maintenance Contents	Daily	Monthly	Annually	Note
Appearance	Is the ram kept clean (especially the rod sliding part)?	○			
	Is there oil leakage from piping installation and fixing points?		○		
	Is there any peeling paint, separation or rust?	○			
Operation	Are the movements smooth and are there any abnormal sounds?	○			
	Is the response good?	○			
	Is there oil leakage from the sliding parts?	○			
	Is there internal leakage?			○	
	Is the working pressure normal?		○		
	Is the set pressure for the overload relief valve normal?		○		
Hydraulic Oil	Is the hydraulic oil dirty or deteriorated?		○		
	Is the hydraulic oil replaced periodically?			○	
	Are the filters inspected periodically?		○		
Installation with Main Body	Is the pin greasing sufficient?		○		
	Is the pin greasing sufficient?	○			
	Is there backlash or wear in the pins?	○			
	Is the pin seal normal?		○		
	Are the installation screws loose or missing?	○			
	Tightening of the installation screws?			○	
Piston Rod	Are the sliding parts worn?			○	When the rod sliding part is exposed for a long period of time apply anti-rust oil to the rod.
	Are there scratches or dents on the sliding parts?	○			
	Is there coating separation on the sliding parts?	○			
	Are the sliding parts bent?		○		
	Are there cracks in the welding or other damage?	○			