

I. General

1. Pipes with UF joint

- (1) Abbreviation symbol: $\text{D} \text{---} \times$
- (2) Pipe size: 28 in. to 104 in. (In this manual, pipes size 28 in. to 40 in. and 84 in. to 104 in. are omitted.)
- (3) Nominal pipe wall thickness: Class PF
- (4) UF joint: see Figure 1

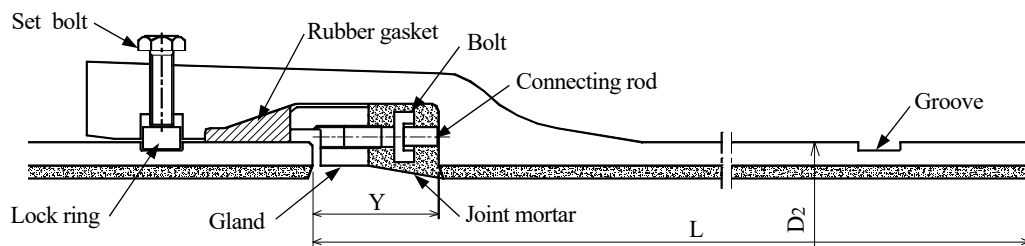


Figure 1 Pipe with UF joint

- (5) Dimensions of pipe: see Figure 1 and Table 1

Table 1 Dimensions of pipes with UF joint

Size (in.)	Outside diameter D_2 (in.)		Standard gap Y (in.)	Nominal laying length L
	Nominal	Tolerance ⁽¹⁾		
44	45.04	+0.08 -0.16	3.94	19.69' (236.22") ⁽²⁾
48	49.06			
54	55.12			
60	61.18			
64	64.96		4.33	13.12' (157.48") ⁽²⁾ and 16.40' (196.85") ⁽²⁾
66	66.97			
72	72.76			
80	81.14			

Note (1) In case that the converted circumferential diameter is not less than the minimum value in the above table, additional negative tolerance 0.04" on the outside diameter can be allowed.

Note (2) In this manual, units of feet and inches are expressed by (figure)' and (figure)" respectively.

2. Materials of accessories

- (1) Rubber gasket: SBR (NBR)
- (2) Gland: Ductile iron
- (3) Bolt: Ductile iron
- (4) Connecting rod: Ductile iron
- (5) Lock ring: Ductile iron
- (6) Set bolt: Stainless steel
- (7) Connector of gland: Polyamide (PA6)
- (8) Bolt and washer for connector of gland: Stainless steel

II. Joint Assembling Procedure

Assemble UF joint strictly in accordance with this manual. If not, the assembled joint may leak or not be restrained.

To ensure the assembled joint, it is recommended checking the joint conditions with “Joint check sheet”.

1. Laying of pipe

Check the ovality of the spigot (see Table 1). If the spigot has an excessive ovality, correct it.

Locate the manufacturer's mark ⊗ on the socket end at the top then lay the pipe slowly in the trench.

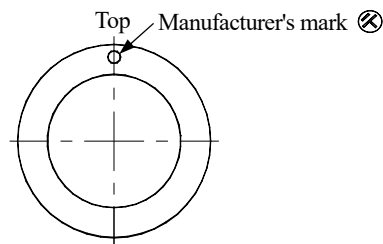


Figure 2 Position of manufacturer's mark

2. Cleaning of socket and spigot

Remove the oil, sand and other deposited foreign substances completely from the inside surface of socket and outside surface of spigot within the distance of about 8” from the spigot end.

3. Prior confirmation of lock ring

Locate the split portion of the lock ring at the top then set it in the groove of the spigot. Contract the lock ring with fastening tool such as ratchet strap or ratchet buckle to fit closely to the groove.

Measure the distance g_1 between the split ends of the lock ring (see Figure 3) and record it, then remove the fastening tool and lock ring.

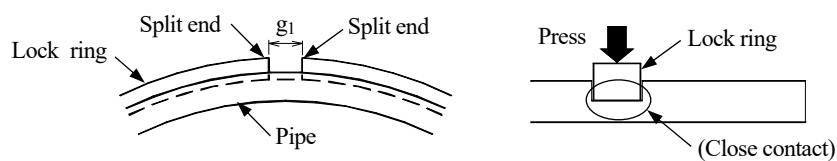


Figure 3 Prior confirmation of lock ring

4. Set of set bolt

Screw the set bolts into the tapped holes of the socket until the end reaches the bottom of the groove (see Figure 4).

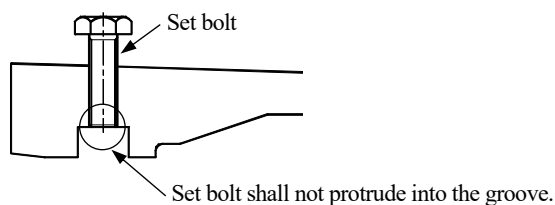
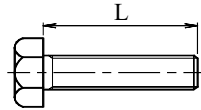


Figure 4 Screw-in of set bolt

Note. The set bolt for pipe is shorter than that for fittings as shown in Table 2.

Table 2 Length of set bolt



Size (in.)	L (in.)	
	For pipe	For fittings
44 to 60	2.36	3.74
64 to 80	2.95	4.72

5. Set of lock ring

- 1) Locate the split portion of the lock ring at the top of the pipe at where the interval of the tapped holes for set bolt on the socket is smallest. Contract the lock ring by hand then insert it into the groove of the socket (see Figure 5).

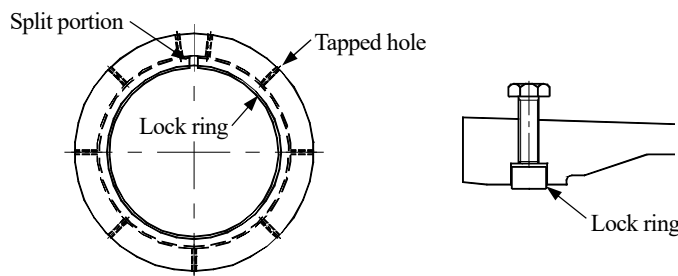


Figure 5 Set of lock ring

In case of size 54 in. and smaller pipes, use of turn buckle makes the contraction of the lock ring easy.

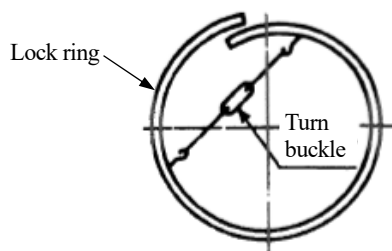


Figure 6 Contraction of lock ring (size 54 in. and smaller)

- 2) Attach the expander between the ends of the split portion of lock ring. Expand the lock ring and store the whole lock ring in the groove all around the socket.

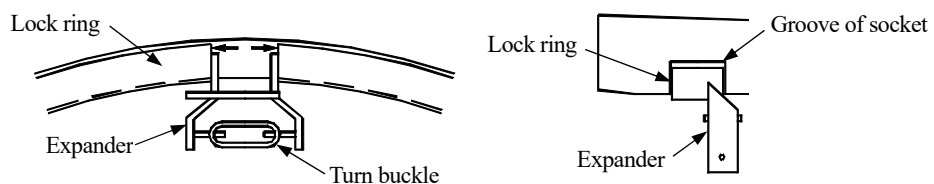


Figure 7 Expansion of lock ring with expander

6. Application of lubricant

Clean the outside of the spigot end and inside of the socket. Apply lubricant to the spigot outside and socket inside at where rubber gasket will be seated (see Figure 8).

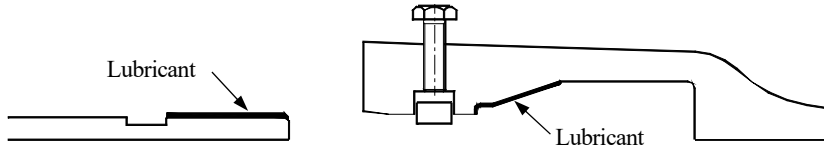


Figure 8 Application of lubricant

7. Insertion of spigot into socket

Lift the spigot pipe with crane then insert the spigot slowly into the socket. When the spigot end hits the expander, it falls. When the groove of the spigot goes under the lock ring, the lock ring holds the groove of the spigot.

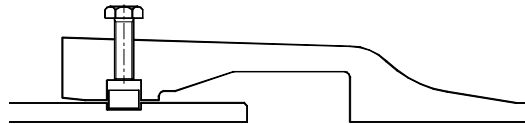


Figure 9 Lock ring in the groove of spigot

8. Pressing of lock ring

Confirm that the lock ring is in the groove of the spigot by swinging the spigot pipe to up, down, left and right directions slightly. Fasten firmly the set bolts on both sides simultaneously from the bottom to the top of the pipe. In this case, make the gap between the spigot outside and socket inside almost same all around the socket (see Figure 10).

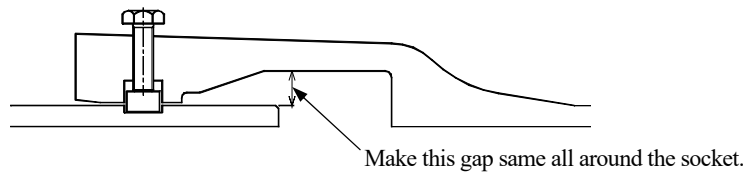


Figure 10 Pressing of lock ring

9. Check of pressed lock ring

Measure the distance g_2 between the split ends of the lock ring from pipe outside (see Figure 11). If the measured value g_2 is not more than the value g_1 obtained at prior confirmation in Clause 3, the lock ring is in the groove correctly. If not, reset the lock ring again.

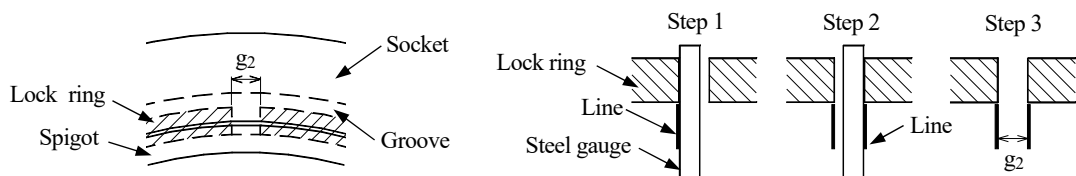


Figure 11 Check of fastened lock ring

10. Set of rubber gasket

Confirm the indication mark of the joint type “UF” on the backside of the rubber gasket.

Apply lubricant to the inside and outside of the rubber gasket then set it on the spigot end. In this case, face the heel portion of the rubber gasket to the spigot end. Push the rubber gasket by hand into the clearance between the spigot outside and socket inside as far as possible.

11. Set of gland

The gland consists of four segments, namely one piece 1, two piece 2s and one piece 3. Screw all bolts fully into the tapped holes on each segment. At first place the piece 1 on the socket bottom. Secondly place the piece 2 on the each end of the piece I simultaneously. Finally connect the piece 3 to the piece 2 with connector and bolts (see Figure 12).

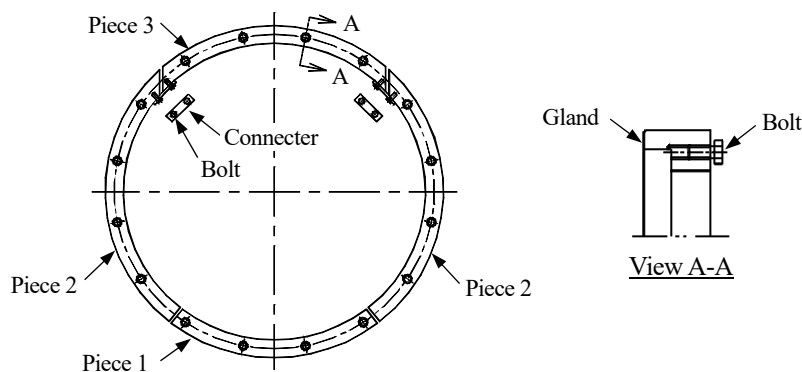


Figure 12 Assembled gland

Then push the gland toward the rubber gasket by hand (see Figure 13).

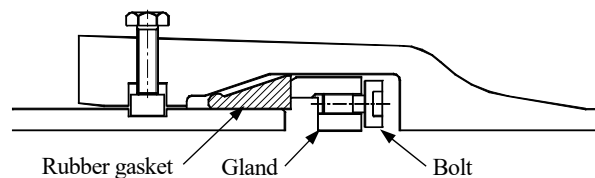


Figure 13 Set of gland

12. Fastening of bolts

1) Push the rubber gasket with gland by screwing out the bolt with spanner to 1.2” to 1.4” from the gland every three bolts (see Figure 14).

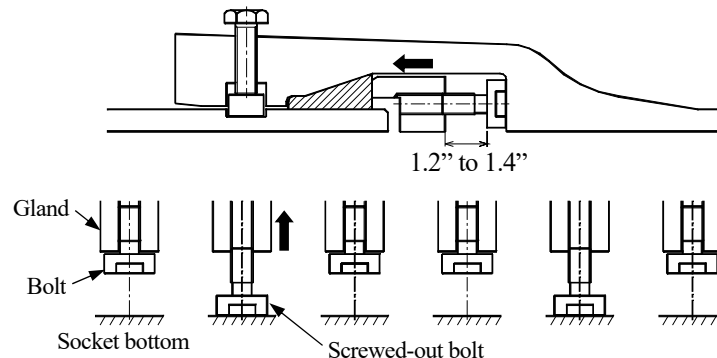


Figure 14 Screwed-out bolt

2) Insert the connecting rod between the bolt and socket bottom end. Then screw out the bolt until the connecting rod touches the socket bottom end.

Screw the screwed-out bolt into the gland then insert the connecting rod between the bolt and socket bottom end. Confirm that each bolt is equipped with the connecting rod.

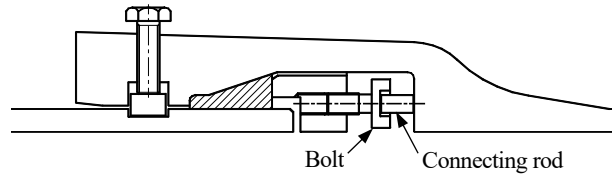
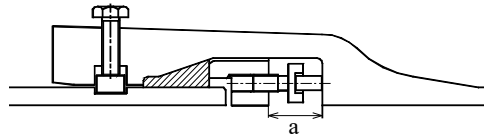


Figure 15 Inserted connecting rod

3) Screw out the all bolts until the distance between the gland and socket bottom end comes to the value shown in Table 3 all around the socket.

Table 3 Distance between the gland and socket bottom end



Size (in.)	Distance a (in.)
44 to 60	2.24 – 2.36
64 to 80	2.64 – 2.76

When it is difficult to screw out the bolt to achieve the value in Table 3, check the bolting torque. If the bolting torque reaches the specified value in Table 4, it is no need to fasten the bolts any more.

Table 4 Bolting torque

Size (in.)	Bolting torque (ft-lb)
44 to 60	163
64 to 80	190

III. Filling of Joint Mortar

After assembled the joints, fill the cement mortar (i.e., joint mortar) in the room between the gland and socket bottom end as below.

- 1) Prepare the cement mortar paste (water/cement = 0.35 to 0.4, cement/sand $\geq 2/1$ by mass) then apply the cement mortar paste with brush or by hand to the room between the gland and socket bottom end (see Figure 16).

In this case, apply the cement mortar paste only to the area at where the applied paste has not dried up when apply the joint mortar on it.

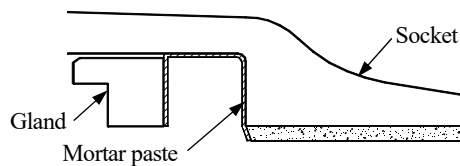


Figure 16 Room coated with cement mortar paste

- 2) Prepare cement mortar (water/cement = 0.2, cement/sand = 1/1 by mass) which can be formed into a lump when grasped firmly by hand. Apply the balled mortar by pressing with hand to the room, where cement mortar paste has not dried up, from the pipe bottom to upward. If the applied cement mortar paste dried up, apply the cement mortar paste again.

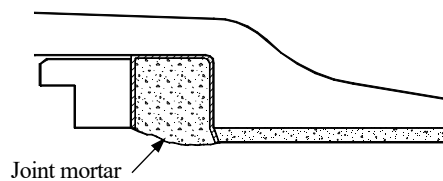


Figure 17 Filled joint mortar

- 3) Tamp the filled joint mortar with hammer and make it dense. Tamping makes the joint mortar at the backside of the bolts dense.

- 4) Finish the surface of the joint mortar to smooth with spatula (see Figure 18).

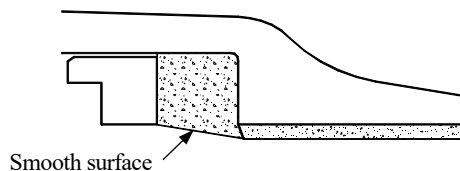


Figure 18 Finished joint mortar

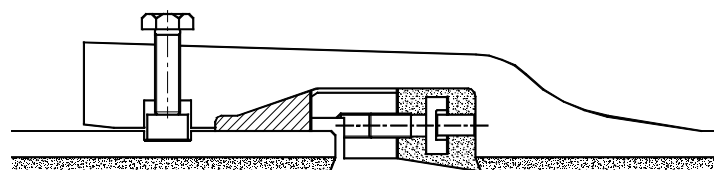


Figure 19 Completed joint mortar

IV. Preparation of Cut Pipe Spigot

1. Effective length of cut pipe

The nominal length of cut pipe shall be as shown in Figure 20.

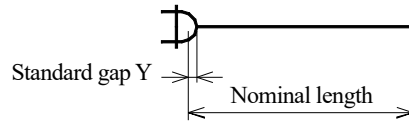


Figure 20 Effective length of cut pipe

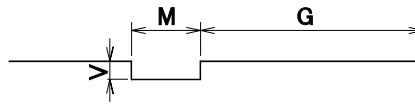
2. Pipe for cutting

Cut only the gauged pipe. The gauge pipe, which outside diameter is suitable to joint along the pipe axis, can be identified by a white line marked around the socket neck.

3. Grooving of spigot

1) Cut the pipe into the required length with cutting machine then groove the spigot with grooving machine. The position and dimensions of the groove are shown in Table 5.

Table 5 Position and dimensions of groove



Size (in.)	V (in.)		M (in.)		G (in.)	
44, 48	0.20	+0.04	1.26	+0.06	3.31	+0
54		-0.02				
60	0.24	+0.06	1.46	-0.02	3.70	-0.08
64 to 72		-0.02				
80	0.28	-0.02	1.65			

2) Bevel the corner of the groove and the cut end of pipe with file or grinder.

3) Apply suitable coating to the exposed iron at the groove and cut end of the pipe. If cement mortar lining is damaged at the cut end, repair the damaged lining.

V. Disassembling of Joints

- 1) Break the joint mortar between the gland and socket bottom by hammering with chisel or with air-hammer.
- 2) Screw-in the bolts into the gland then take out the connecting rods.
- 3) Disassemble the gland in the opposite order of the assembling then take it out from the spigot.
- 4) Take out the rubber gasket from the spigot with flat-blade screwdriver.
- 5) Loosen and remove the set bolts except the one at the pipe bottom.
- 6) Remove the foreign materials from the grooves of socket and spigot by jet water introduced from the tapped hole on the socket.
- 7) Hammer the dismantling wedge from the outside of socket into the clearance between the split ends of the lock ring and expand the lock ring.

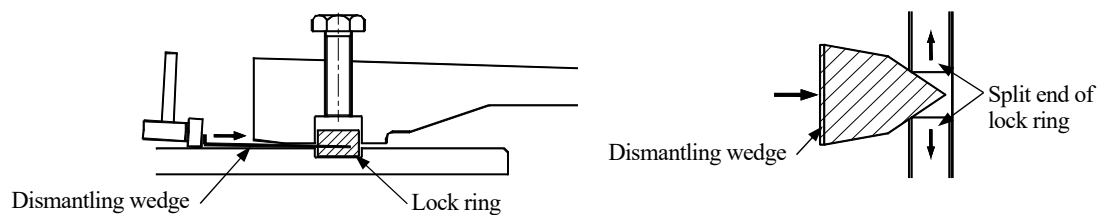


Figure 21 Expansion of lock ring

- 8) Insert the wedge plates from the pipe outside beyond the groove at just beside the dismantling wedge then move them to the downward. Repeat this work until 6 to 8 wedge plates are evenly distributed around the pipe.

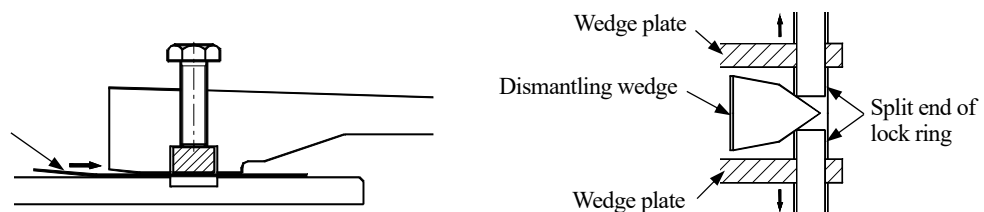


Figure 22 Wedge plate

- 9) Screw-out the set bolt at the pipe bottom. Align the jointed pipes with crane. Pull out the lifted pipe slowly from the socket by swinging it.

Annex

Special Tools for UF Joint Assembling/Disassembling and Pipe Cutting

Description		Quantity	Remark
1. Joint assembling			
(1)	Ratchet strap or ratchet buckle	1	(by contractor)
(2)	Lock ring expander	1	
(3)	Turn buckle (in case of pipe size ≤ 54 in.)	1	(by contractor)
(4)	Torque wrench	1	163 ft-lb (M22)/190 ft-lb (M24), spanner type
(5)	Lubricant	-	(by contractor with brush)
(6)	Spatula for joint mortar	1	(by contractor)
2. Spigot projection formation of cut pipe			
(1)	Pipe cutting & grooving machine	1	(Power source by contractor)
(2)	Grinder or file	1	(by contractor)
(3)	Paint for cut pipe	1	(Brush by contractor)
3. Joint disassembling			
(1)	Dismantling wedge	1	
(2)	Wedge plate	6 to 8	
(3)	Chisel or air hammer with air-compressor	1	(by contractor)