

# **Emission Defence Packing EDP15 INSTRUCTION MANUAL**

- Thank you very much for adopting PILLAR GLAND PACKING.
- It is advised to fully read the instruction manual prior to use, so that the PILLAR GLAND PACKING can be used correctly and safely.
- Keep carefully this instruction manual and read repeatedly if necessary.

**NIPPON PILLAR PACKING CO., LTD.**

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## SAFETY PRECAUTIONS

Please read this instruction manual carefully to ensure safe, correct and efficient use of the product. The following lists safety notices that must be observed to ensure safe and proper use of the product and prevent personal injury and/or property damage.










In this instruction manual, safety notices are divided into "Danger", "Warning" and "Caution" according to the hazard level.

Because these safety notices contain important information, be sure to read and observe them.

 <b>DANGER</b>	Indicates a case when such impending danger as death or serious injury may be supposed to occur.
 <b>WARNING</b>	Indicates a case when a man may be supposed to die or be seriously injured.
 <b>CAUTION</b>	Indicates a case when a man may be supposed to be injured or physical damage may occur.

	<b>Indicates that the operation concerned is prohibited.</b>
	<b>Indicates that the operation concerned is demanded persistently or is instructed.</b>

## SAFETY PRECAUTIONS

 <b>WARNING</b>	<b>MAINTENANCE • INSPECTION</b>	<b>Discharge the pressure securely, which is left in the equipment to disassembling the seal part for periodical inspection.</b> Note that disassembling the seal part with pressure applied may result in personal accident or fire due to leakage.	
		<b>Remove the fluid securely, which is left in the equipment to disassembling the seal part for periodical inspection.</b>	
		<b>Do not allow the hand or face to come near the seal part in the event of leakage.</b> Since the seal part may reach high or low temperature, depending on the fluid used, allowing the hand or face to come near the seal part may result in personal accident such as burn, etc.	
	<b>RE-TIGHTENING</b>	<b>To perform tightening, wear protective wears, gloves, goggles, and others.</b> High-temperature fluid may be scattered, resulting in burns or other bodily injury unless the protective gear is used.	
		<b>Do not touch any sliding part during tightening.</b> If your cloth, glove, or other touches the rotating part or reciprocating part, it may be caught by that part, resulting in bodily injury.	
 <b>CAUTION</b>	<b>MAINTENANCE • INSPECTION</b>	<b>Ensure that valve operations for the piping system are performed properly.</b> Check that the valves specified to be open are open and that the valves specified to be closed are closed. A wrong valve operation might cause breakage or leakage of a sealed device, resulting in injury or major fire.	
		<b>Tighten each bolts/nuts securely.</b> If the bolts/nuts are not fully tightened, the seal unit may rupture due to fluid pressure, by which the fluid may be scattered in the air, probably resulting in serious fire.	
	<b>DISPOSAL</b>	<b>To dispose of the gland packing, do not incinerate it, but dispose of it as nonflammables waste.</b> If the gland packing using polytetrafluoroethylene liquid (PTFE) is incinerated, it will generate harmful gas, which may adversely affect the human body.	

◎ After reading the instruction manual, it is advised to keep it at such a place that the operator can read it any time.

## Inspection

When you receive gland packing, please confirm if it is what you ordered and also confirm next points. If you have some inconvenience, please contact with your supplier.

- (1) Item numbers of gland packing.
- (2) Dimensions and quantity of gland packing. (If you have the drawing, please confirm it by the drawing.)
- (3) The gland packing are free from any damage due to an accident or the like during transportation.

## Introduction

The gland packing used for the seal part of each apparatus must be properly handled to ensure its best performance.

This instruction manual describes the procedures for handling the gland packing so that the gland packing can be used more properly and effectively. Follow these instructions to ensure the proper handling of the gland packing:

### 1. Procedures for assembling the gland packing

#### Procedure 1) Preparations for fitting the gland packing

- I) Remove oil and dust from the gland follower using cotton waste cloth or the like.  
Check that the gland follower fits into the packing box without a hitch.
- II) Remove oil and dust from the packing box using cotton waste cloth or the like.
- III) Remove oil and dust from the stem using cotton waste cloth or the like. Check the stem for any flaw or corrosion. If the stem has any significant flaw or corrosion, replace the stem.
- IV) If a lantern ring is used, remove oil and dust from the lantern ring using cotton waste. Check that the lantern ring fits into the packing box without a hitch.
- V) Remove oil and dust from the gland bolts and nuts using cotton waste cloth or the like and then thinly apply lubricant agent.  
Attach the nuts to the gland bolts and then check that the nuts can be turned easily with fingers.

### Procedure 2) Cutting the gland packing

Check that the inner diameters of the packing box and outer diameters of stem and the dimensions of the packing are correct.

To cut the gland packing, wind the gland packing around the stem as illustrated in Fig. 1-1 and then cut the gland packing slightly longer than the closing part. The inner and outer circumferences of the rolled gland packing form a sliding surface with the stem.

The width (a) of the gland packing is slightly smaller than the width (W) of the packing box. However, if it is larger than the box width (W) due to deformation of the packing, correct the width (a) so as to be shorter than the width (W).

The cut length of the packing can also be obtained using the equation (1):

$$L = \pi \times \left( d + \frac{4}{3} W \right) + \frac{1}{4} W \cdots \cdots (1)$$

Marks in the formula above show the meaning below.

$L$ : Cut length of the gland packing [mm]

$d$ : Outer diameter of Stem [mm]

$W$ : Packing box width [mm]

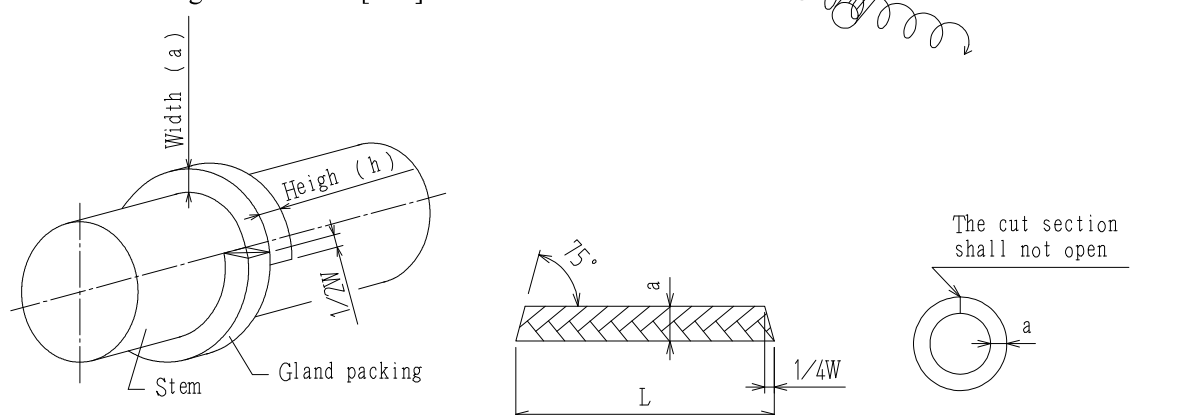


Fig. 1-1: Cutting the gland packing & revise dimensions of gland packing

If the corded packing is deformed into a ring, it shows a behavior of becoming slightly shorter. For this reason, after cutting the corded packing into one ring, temporarily insert it into the packing box to see that the cut length is correct.

Once the cut length is found to be correct, proceed to cutting the corded packing into the second and subsequent rings.

SAFETY PRECAUTIONS		
 CAUTION	Please treat gland packing carefully not to be damaged, bended, wetted and attached impurities like trash whenever handling, because the surface of gland packing is the most important to assure sealing performance.	!
	<b>Make sure that there is not any scar or deflection on the packing box surface.</b> When such scar or deflection is found on the surface, repair such defects, as it is unable to prevent leakage. When the foreign matters such as rust, dust, oil, etc. are adhered, remove them, using a cotton waste cloth, etc., as it is unable to prevent leakage.	!

### Procedure 3) Assembling the gland packing

#### I) Number of packing rings

Table 1-1 shows the number of packings :

**Table 1-1: Number of packings**

Pressure Class	Standard Number of Packings	Minimum Number of Packings
150Lb	6	5
300Lb		
600Lb	7	6
900Lb		

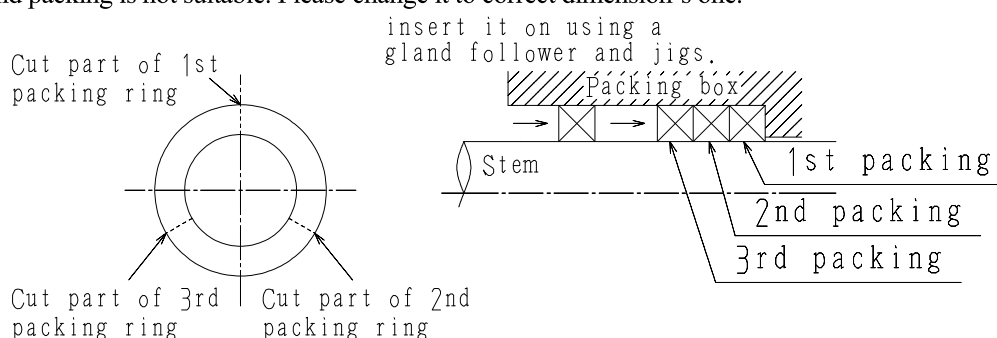
Since the compression ratio of EDP15 is high, if no margin left for tightening, please put another 1 ring and re-tight. The re-tightening margin of the packing after tightening would be height of 1 packing ring or more.

#### II) Assembling the packing

In assembling the packing, pay attention to the following points:

- Check that the inner and outer diameters of the packing box and the dimensions of the packing are correct.
- Carefully fit each packing ring and then check the number of packing rings that you have finally fit.
- Clockwise position the cut parts of the packings at 90 or 120 degrees (Fig. 1-2).

In case the stem moves when you move the stem in right and left after installing the gland packing, the dimension of gland packing is not suitable. Please change it to correct dimension's one.



**Fig. 1-2: Inserting the packings**

#### III) Attaching the gland follower

Attaching the gland follower.

#### IV) Attaching the gland nuts

Attach the gland nuts to the bolts and then uniformly and lightly tighten them with a spanner or the like.

## 2. Tightening of gland packing

### 1) Tightening stress

Appropriate tightening stress must be given to the gland packing because it greatly affects the characteristics of the gland packing.

The tightening stress required for sealing is affected by the type, usage, and others of the apparatus involved. Therefore, these factors must also be taken into consideration when the apparatus is used.

The minimum tightening stress at the pressure classes of each gland packing are shown in Table 2-1.

Please tighten the packing more than minimum tightening stress by using a torque wrench etc.

Please tighten it equally so that grand packing does not uneven tightening.

We recommend the tightening way shown in Fig. 2-1 to seal leaky fluid like gas or satisfy leak regulation like API622 2<sup>nd</sup>.

<Tightening way shown in Fig. 2-1>

- 1) Tighten by the max. tightening stress  $60\text{N/mm}^2$
- 2) Reciprocate the stem about 3 times
- 3) Release tightening stress to “0 (zero)”
- 4) Tighten by  $40\text{N/mm}^2$

Table 2-1: Minimum tightening stress

Pressure class [Lb]	150	300	600	900
Min. tightening stress [N/mm <sup>2</sup> ]	19.6	19.6	24.5	29.4

Remarks:

1. When a water-resistant pressure test is performed, either the tightening stress shown in Table 2-1 or a minimum of 1.5 times the water-resistant pressure, whichever larger, must be applied.

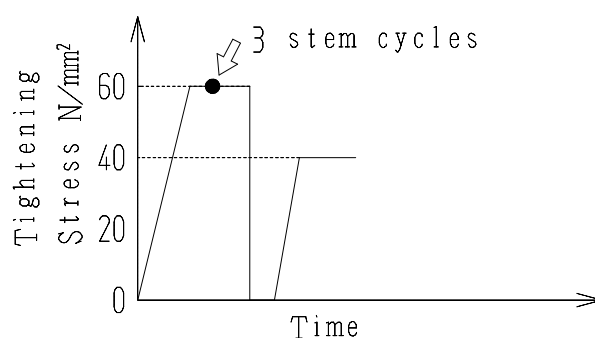


Fig. 2-1: Tightening Method (example)



## II) Tightening torque

The tightening torque for the gland bolt, nut which is required to clamp the gland packing, can be calculated using equation (2).

Torque coefficient  $k$  is assumed as 0.2 given that the bolt thread surface and the nut seating face are lubricated.

$$T = k \times \frac{\pi \times (D^2 - d^2) \times P_g}{4 \times n} \times B \times 10^{-3} \quad \dots\dots (2)$$

Marks in the formula above show the meaning below.

$T$  : Tightening torque per gland bolt, nut [N·m]

$k$  : Torque coefficient  $k=0.2$

$D$  : Inner diameter of packing box [mm]

$d$  : Outer diameter of stem [mm]

$P_g$  : Packing tightening stress [N/mm<sup>2</sup>]

$n$  : Number of bolts

$B$  : Nominal diameter of bolt [mm]

## III) Checks after tightening

After tightening the gland packing, Pay attention to the following points. :

- The gland packing does not overhang from the box.
- The inner circumference of the gland follower does not make contact with the stem.
- The gland packing has tightening allowance equivalent to height of 1 to 1.5 ring.

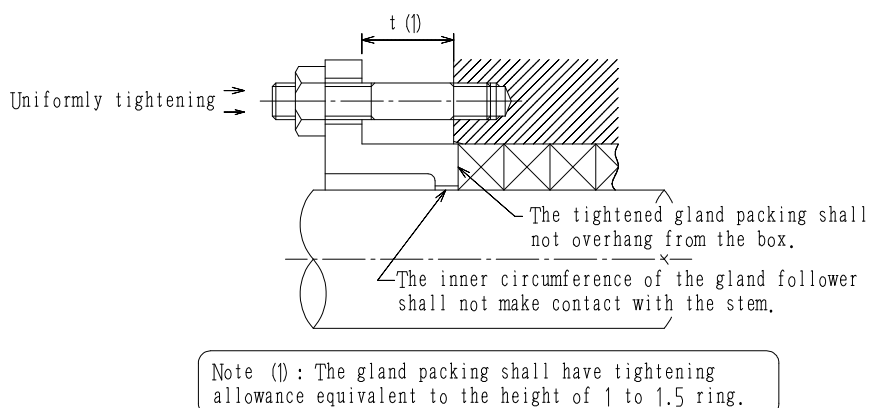






Fig. 2-2: Checks after tightening the gland packing

SAFETY PRECAUTIONS		
 <b>CAUTION</b>	Check that the bolts and nuts rotate without hitch. If any bolt or nut gets stuck or its thread is deformed, the necessary tightening stress may not be achieved. In this case, rectify that bolt or nut by tapping or die cutting.	
	Excessive tightening of the gland packing can cause malfunction or the like. The gland packing must be tightened with the appropriate tightening stress.	
	Uneven tightening of the gland packing can cause leakage. Therefore, uniformly tighten the relevant bolts and nuts. Ensure that the inner circumference of the gland follower does come into contact with the stem.	

### 3. Maintenance

#### 1) Re-tightening

Table 3-1 shows the recommended time of re-tightening.




EDP15 requires no frequent re-tightening like an asbestos packing. Considering the thermal effects including the elongation of the bolt, however, it is recommended that re-tightening be performed when temperature and pressure has increased.

In principle, use re-tightening stress equivalent to 80-100% of the final tightening stress.

Table 3-1 Recommended time of re-tightening

Step		Description	Time of tightening
1	Initial	When the packing has been assembled	○
2	Valve opening/closing	After the cycle of fully opening and closing the valve has been repeated as many as two times	—
3	24 hours later	After 24 hours minimum have elapsed; Before ventilation for steam piping or the like	—
4	After water pressure test	After depressurization following the end of water pressure test	—
5	After temperature and pressure increase	3 hours after temperature increase	—
6	After temperature and pressure increase	5 hours after the final temperature and pressure have been reached	○
7	During stop	At any time when operation is stopped after startup test	—
8	During operation	At periodical maintenance during operation	—

#### SAFETY PRECAUTIONS

 <b>CAUTION</b>	Uneven tightening of the gland packing cause leakage. Therefore, uniformly tighten the relevant bolts and nuts. Ensure that the inner circumference of the gland follower does not come into contact with the stem.	
	Check that the bolts and nuts rotate without hitch. If any bolts or nuts gets stuck or its thread is deformed, the necessary tightening pressure may not be achieved. In this case, rectify that bolts or nuts by tapping or die cutting.	

#### 4.Replacement of gland packing

Replace the packing when:

- The valve is disassembled for periodical inspection or the like;
- The tightening allowance of the gland follower is lost due to use; or
- When quantity of leak does not decrease after re-tightening.

The service life of the packing varies depending on the storage condition and the use conditions and the operation frequency. In addition, the packing can not be reused. It is therefore recommended that a spare be held in stock.

To replace the packing, use a packing tool or a similar removing tool to remove each packing ring. At this time, take care not to damage the inner circumference of the packing box and the stem surface.

Remove old packing from the packing box, completely remove foreign matter on the stem surface and the inside of the packing box.

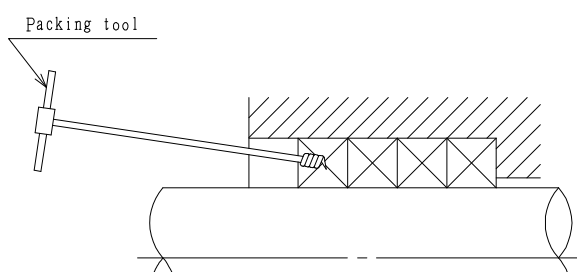




Fig. 4-1: Method of removing the packing

SAFETY PRECAUTIONS		
 <b>CAUTION</b>	<b>To replace the packing, completely remove foreign matter on the stem surface and the inside of the packing box.</b> If there is such foreign matter, the necessary tightening pressure cannot be achieved to assemble and clamp the new packing. This may adversely affect the sealing property.	
	<b>To dispose of the gland packing, do not incinerate it, but dispose of it as nonflammables waste.</b> If the gland packing using polytetrafluoroethylene (PTFE) is incinerated, it will generate harmful gas, which may adversely affect the human body.	