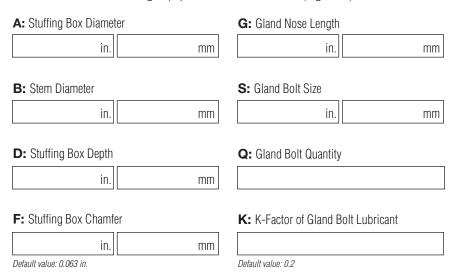# *1622*
Emissions Valve Packing

EQUIPMENT PREPARATION

PRECAUTION:
Observe all plant and equipment manufacturers depressurizing and cooling procedures before installation. Product 1622 should not be used beyond the published limitations of the material. Refer to product literature for application data. Review all instructions below before proceeding with installation.

Preparation

1. Clean the stuffing box and stem to ensure that they are completely free of wear, solids or corrosion. Ensure that gland bolts and nuts run freely on the threads. It is recommended that gland bolts and nuts are new or "like new" condition.

2. Check the gland follower nose is clean and properly fits into the stuffing box.

3. Ensure the bottom of the stuffing box is flat and perpendicular to the valve stem.

4. Check the valve stem has a surface finish of 10 to 32 RMS (7.5 to 24 Raµin / 0.2 to 0.6 Raµm) and the stuffing box has a surface finish of 64 to 125 RMS (49 to 94 Raµin / 1.2 to 2.4 Raµm) post-cleaning.
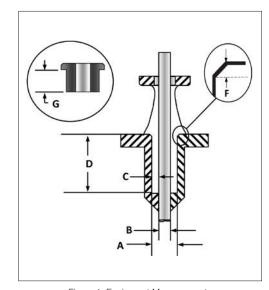
5. Obtain the following equipment measurements (Figure 1):

Figure 1: Equipment Measurements

A: Stuffing Box Diameter

in.	mm

B: Stem Diameter

in.	mm

D: Stuffing Box Depth

in.	mm

F: Stuffing Box Chamfer

in.	mm

Default value: 0.063 in.

G: Gland Nose Length

in.	mm

S: Gland Bolt Size

in.	mm

Q: Gland Bolt Quantity

K: K-Factor of Gland Bolt Lubricant

Default value: 0.2

CAUTIONS

These instructions are general in nature. It is assumed that the installer is familiar with mechanical packing and with the plant requirements for the successful use of mechanical packing. If in doubt, get assistance from someone in the plant that is familiar with the product, or delay the installation until a packing representative is available. All necessary auxiliary arrangements for successful operation (heating, cooling, flushing) as well as safety devices must be employed. These decisions are to be made by the user. The decision to use this or any other Chesterton product in a particular service is the customer's responsibility.

Packing Set Calculations

6. Determine **Packing Cross Section** = $\frac{[A - B]}{2}$
   Record value in box **C**.

7. Determine **Number of Packing Rings** = $\frac{[D - F]}{[C \times 1.1]}$

   a. If this value is 3.74 or less, contact Chesterton Mechanical Packing Application Engineering.

   b. If this value is between 3.75 and 4.75, record value "**4**" in box **N**; proceed to step 8.

   c. If this value is greater than 4.76, record value "**5**" in box **N**; proceed to step 8.

8. Calculate **Packing Set Height = [C] x [1.1] x [N].**
   Record value in box **H**.

Gland Movement and Bushing Height Calculations

NOTE:
If [G] from step 5 is less than 2.5 x [C] a longer gland nose may be required to avoid bottoming out.

9. Calculate the packing **Compression Value = [H] x [0.3]**.
   Record value in box **P**.

10. Calculate **Gland Nose Movement = D – H + P**.
    Record value in box **M**.

11. Compare "**M**" (from step 10) and "**G**" (from step 5):

    a. If (G x 0.7) is greater than **M**, no bushing is required. Proceed to step 13.

    b. If (G x 0.7) is less than **M**, continue.

12. Calculate the **Bushing Height = D – H – F**.

    a. If this value is greater than [1.5] x [C], record value in box **BH**. A bushing is required.

    b. If this value is less than [1.5] x [C], do not use a bushing. Record N/A in box **BH**. Add one additional packing ring to the set. Increase the value in Box **N** by 1. Using this new value for **N**, recalculate the packing set height in step 8, and replace this value in box **H**.

Packing Set Preparation

13. Wrap Packing around a mandrel (the same diameter as the valve stem) and mark one ring (Figure 2a).

14. Skive cut an individual packing ring at 45° on the mandrel with a clean, sharp blade to ensure a high-quality cut (Figure 2b).

15. Check the packing ring for fit around the mandrel and cut remaining rings; check each ring for fit around the mandrel.

C: Packing Cross Section

in.	mm

N: Number of Packing Rings

H: Packing Set Height

in.	mm

P: Compression Value

in.	mm

M: Gland Nose Movement

in.	mm

BH: Bushing Height

in.	mm

Figure 2a: Mark ring to be cut

Figure 2b: Skive cut the ring

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Bolt Torque Calculations

16. Calculate Imperial Units: **Compression Load = [A^2 – B^2] x [0.785] x [8575]** or Calculate Metric Units: **Compression Load = [A^2 – B^2] x [0.785] x [59.12]**. Record value in box **L**.

17. Calculate Imperial Units: **Bolt Factor = [K] x $\frac{S}{12}$**

    or Calculate Metric Units: **Bolt Factor = [K] x $\frac{S}{1000}$** Record value in box **BF**.

18. Calculate (per bolt) **Bolt Torque = $\frac{[L \times BF]}{Q}$** Record value in box **T**.

NOTE:
Ensure the torque value does not exceed the yield strength of the gland or gland bolt material being utilized. Typically, B7 bolts are used for valve applications.

L: Compression Load

lbs.	N

BF: Bolt Factor

ft.	m

T: Bolt Torque

ft.-lb.	Nm

INSTALLATION

19. Install bushing in bottom of stuffing box. If no bushing is required proceed to step 20.

20. Insert the first ring of packing into the stuffing box and use a tamping tool to firmly seat the packing against the bottom of the box (or bushing). **NOTE: Packing rings are specifically designed to fit snugly in order to obtain optimum sealing for lowest possible emission rates.**

21. Insert the next ring of packing into the stuffing box and use a tamping tool to firmly seat this ring of packing against the previously inserted ring, staggering ring joints 90°. Repeat this procedure for all the packing rings that are to be installed (Figure 3). **NOTE: The packing set may need to be pre-compressed in order for the final packing ring to be installed. Be sure the top packing ring sits below the stuffing box chamfer prior to applying load.**

22. Apply lubricant to gland stud threads, nuts and hardened washers. Install the gland nose, gland, gland bolts and hardened washers. Finger tighten gland nuts. **NOTE: Where possible, hardened washers should be utilized under the gland nuts (reference ASTM-F-36). The gland nuts should only operate on a machined surface in order to attain accurate bolt torque values.**

23. Use a torque wrench to alternately tighten the gland nuts until the torque calculated in step 18 is achieved.

24. Fully stroke the valve 10 times. Re-apply the torque.

25. Repeat step 23 until the gland nuts rotate less than 1 flat when original torque value is applied.

26. Ready for start-up (Figure 4).

Equipment Start-up and Maintenance

27. Observe all plant and equipment manufacturer's safety procedures to return valve to service.

28. If unacceptable leakage is detected during normal emission monitoring, per operation procedures, reapply torque as necessary.
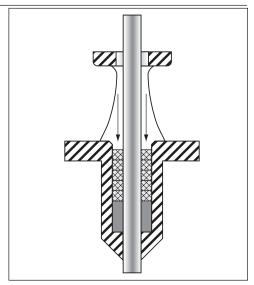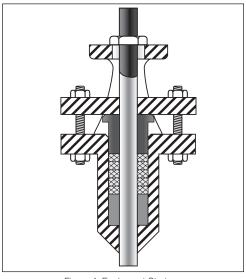

Figure 3: Install Bushing and Packing Rings

Figure 4: Equipment Start-up

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