

Fitting Guide for

Supagraf® OX

Gland packing for valves in oxygen service critical applications

Issue 1

- ❗ Oxygen services are critical and potentially hazardous. Great care must be taken to ensure that no grease, or particles of other materials, are introduced during valve maintenance that could ignite when in contact with oxygen at elevated pressures and/or temperatures.

It is therefore imperative that oxygen service handling procedures are adhered to when installing this gland packing in a valve, to ensure the oxygen service rating is not invalidated. Locally approved procedures should be implemented, however if in doubt, please refer to the latest edition of US standard CGA G-4.1-2009 'Cleaning equipment for oxygen service', or contact James Walker Technical Support Team for advice.

- ❗ Read through this Fitting Guide carefully before starting work, to ensure you have all the components, tools and personal protection equipment (PPE) that meets your local Health & Safety requirements – for the correct installation of gland packing in an oxygen service valve.

- 1 The oxygen valve should be removed to a clean room facility for the installation of new gland packings.



Wear clean rubber gloves, without powder or dust, during all stages of the packing installation procedure. Do not contact the packing without these gloves.

Take special precautions to keep the gland packing clean and free of any dirt, oils, greases, oil from hands, and other foreign debris during handling and installation.

Ensure that all tools used during the gland packing installation are also clean and free of any contaminants.

- 2 Carefully remove all old packing, one ring at a time, using James Walker Packing Extractors.



- 3 Measure the valve stem and gland diameters, as well as the depth of the gland, so that the correct size of packing ring can be chosen.



The packing section (S) is calculated by;

$$S = (\text{Housing bore diameter} - \text{Valve stem diameter}) / 2$$

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Clean the valve to a suitable level for oxygen service.

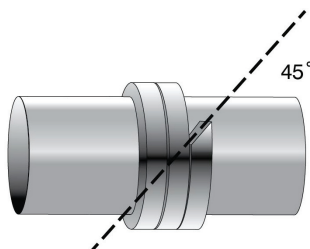
The valve stem should have a polished surface finish of $0.8\mu\text{m Ra}$ or less. The stuffing box should have a surface finish of 1.6 to $3.1\mu\text{m Ra}$.

Examine the stem, housing bore and gland follower for damage. Repair/ refurbish as required.

i Do NOT under any circumstances lubricate the gland packing or the valve stem.

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i Do not remove the gland packing from its sealed packaging until it is in a clean room facility, and you are wearing rubber gloves that are free of powder and dust.

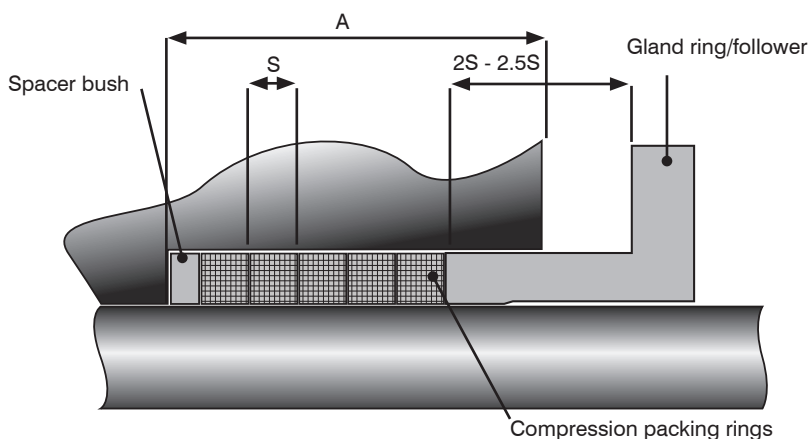


When length-form packing is used, obtain a mandrel (e.g. rod or tube) of equivalent diameter to the valve stem. Clean the mandrel to a suitable level for oxygen service, then spirally wrap the gland packing around the mandrel. Cut the packing with a sharp, clean knife at an angle of 45° to achieve maximum sealing at the packing ends. For this operation we recommend wearing cut-resistant gloves beneath rubber gloves.

Verify the fit of the first packing ring. Once verified, cut the correct number of rings to suit the valve cavity (generally 5-6 rings is advised)

i A James Walker Compression Packing Cutter will simplify the production of perfectly matching 45° scarf joints.

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Measure the depth of stuffing box (A). Typically a set of 5-6 Supagraf® OX rings is advised.

If the stuffing box is too deep for 5-6 rings, excess depth can be taken up by the use of a spacer or bush; made of a suitable material for oxygen service.

Ensure that the gland follower spigot length is at least 2 – 2.5 times the packing section in length

i If in doubt about bush/spacer rings, please contact James Walker Technical Support Team for advice.

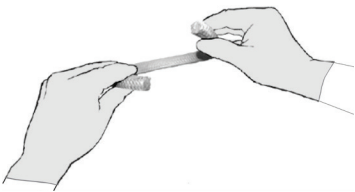
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Wearing clean rubber gloves, place first ring around the valve stem. Do this by opening the ring axially to form a helix. This will allow the ring to slip over the stem without overstressing the ring material.

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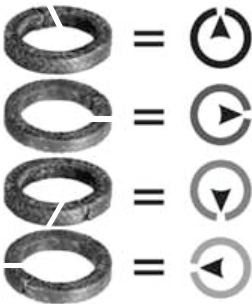


Partially enter both ends of the first ring together into the stuffing box. Using the gland follower, push the ring firmly to the bottom of the stuffing box. If necessary, use a spacer or bush beneath the gland follower for additional length when pushing the ring to the bottom.

i

Make sure that the cut packing ring is clean and has not picked up any dirt during handling.

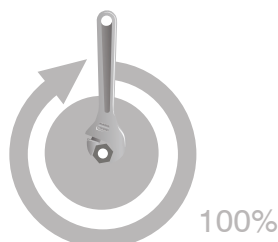
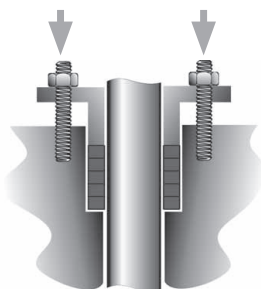
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Insert the remaining rings, one by one, in the same way. Ensure that the joints are staggered by 90° to 180° from the previous ring, and that each ring is pushed firmly down into the stuffing box.

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Compress the packing set with 100% of the predetermined torque.



Fit gland follower and finger tighten the gland nuts. Ensure that the gland follower is level.

Tighten gland nuts evenly to give recommended minimum installation stress of 55MPa, and a preferred stress level between 70MPa and 77MPa. Torque calculation provided later in document.

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Do NOT use an impact wrench to tighten bolts/studs. This could result in over-torque of the bolts/studs and over-stress of the packing gland, resulting in mechanical component failure.

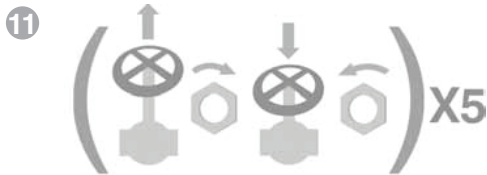
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① Assess thread engagement and nut travel and refurbish where necessary.



Open and close the valve between 5 and 10 cycles and reapply the recommended torque value. If required the torque can be applied at both the fully open and fully closed cycle to ensure full packing consolidation. The valve may now be re-installed and system pressure applied.

① In oxygen service conditions, ensure all appropriate safety precautions are taken before re-installing valve and applying system pressure.

Check the gland adjustment during the first few hours of service. Take up any slack that may have occurred during initial settling in.

Bolt/stud load calculations for 70MPa stress

The following formula can be used to calculate the bolt/stud torque to achieve a 70MPa stress:

$$T = \frac{0.011 (B^2 - C^2) \times D}{N}$$

Where: **T** is the required torque (Nm). **B** is housing bore diameter (mm). **C** is valve stem diameter (mm). **D** is bolt/stud diameter (mm). **N** is the number of bolts/studs. (Note that 1.356Nm = 1 lb.ft.)

Safety Data Sheets are available on request

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