

Johnston Invar Coupling

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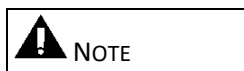
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I. STRUCTURE OF THE MANUAL / CLARIFICATION

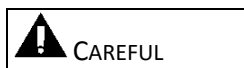
The various aspects of this manual are clearly listed here. Points of attention are marked throughout the entire manual in the following way (the interpretation is also given):



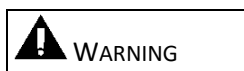
Offers suggestions/advice to the operator in order to perform certain tasks more easily.



Points out possible problems to the operator.



Indicates damage to the system or directly linked equipment when the operator does not carefully adhere to the procedures.



Warns the operator of possible injuries if the procedures are not adhered to properly.



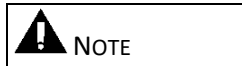
The life of the operator is directly threatened.

**Demaco Holland bv considers the operator to be:
the one who operates the machine or equipment supplied by Demaco Holland bv.**



The operator is responsible for the safety of any assisting employee. The operator must ensure, before starting the machine or application, that no dangerous situation can occur for the assisting employee.

II. SAFETY AND HEALTH CONCERNS



This user manual must be read by the operator as soon as possible in order for him to become familiar with the operation of this equipment.

From the point of view of injuries to the operator, specific attention is given to the dangers that can occur when using liquid nitrogen. On Demaco Holland bv equipment, where the operator may come into contact with liquid nitrogen, you can find the label as shown below. It warns the operator of the presence of coldness and it is indicated that safety glasses and gloves with wrist protection should be worn.



figure 1; *Safety label*

This user manual should at least be available for consultation at the head of the department. We recommend that a copy be made of this manual inserted in plastic folders, or bound, and put on view at location with the control cabinet.

We also recommend to carefully read the Demaco safety instruction "Safety guidelines for working with cold media". Extensive information is provided in this manual about working with cryogenic media. A copy of the "safety instruction" is shipped with this delivery. Should you require more copies of this instruction in order to create a safe working environment for your operator(s), additional copies can be requested from Demaco Holland bv. Contact our sales department.

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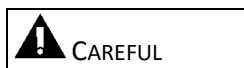
1 GENERAL REMARK

Assembly instructions for vacuum insulated pipes, which are connected by means of a male-female (Johnston) coupling. Before you begin assembly, first read these instructions and refer to the enclosed drawing number 09408.C.2.

2 ASSEMBLY INSTRUCTIONS

Check the pipe sections by means of the isometric drawing. On each section next to the pump valve there is an order number engraved by Demaco Holland bv. There is also a section number which corresponds to the sections numbers on the isometric drawing. For checking the sections do not remove the packing, as this might cause dirt to enter the pipe, resulting in the possible contamination of the pipe assembly. In case of multiple lines, sort out the sections per line number.

Decide at which point you like to start the assembly. This does not have to be at section number one. Mount two sections on their supports in such a way that both ends of the inner tube are separated with an inter space of about 600 mm.



The male Johnston coupling is provided with a protective cover on the metal seal. This protective cover will protect the metal seal on the front of the coupling. Remove this cover just before you connect the male to the female connector. This to prevent damage to the metal seal. Damaging the metal seal may result in malfunction of the Johnston coupling.

Remove the packing from the male and female coupling. Watch out for pollution on, and damage to the ends. In a heavily polluted work area use, for example, a tent to screen the area. Normally the male part of the coupling is by horizontal lines in the flow direction. In vertical lines the male is above the female, irrespective of the flow direction.

Check the flanges and sealing area. Clean the couplings, especially the O-ring groove, and the metal seal area, with a dry and clean cloth.

Grease the O-rings lightly with a vacuum lubricants with silicone.

For lines suitable for oxygen, use only O-rings and lubricants which is appropriate for this application, by example Klüberalfa YV 93-1202 lubricants. For this, the list of suitable materials for liquid oxygen from the German institute BAM can be accessed.

Place both O-rings (See drawing 09408.C.2.)The small O-ring has to be placed in the second groove from the metal seal ring.

For oxygen service the small O-ring is rejected.

Insert the male into the female. The first part runs smoothly into the female, up until the metal seal of the male reaches the sealing bush of the female. Check the position of the O-ring in the flange of the male and push the two parts, for the last 20 mm together. Considerable force may be required to move the male into the female. Mount, when the flanges are together, the KF50 clamp or bolts, rings and nuts. In case you use lubricants on the nuts make sure it is the correct type of lubricants in the case of an O₂ line. The maximum tightening moment of the KF50 clamp is 2,8 Nm.

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Install the remaining VIP-line spools. When you are convinced that the line is installed correctly, you may pressurise the line with gas on room temperature.



Make sure that a safety-relief valve is installed between two shut-off valves.

Check the coupling with liquid leak detector spray. Bubble forming on the flanges shows a gas leak. If there is one at the coupling, tighten the clamp or the bolts and nuts. Be careful not to exceed the maximum torque on the clamp. Check the coupling again on leakage after a tightening action.

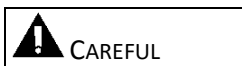
If the leak is still there, release the pressure of the VIP-line and open the coupling. Check and clean the O-ring and groove. If necessary use a new O-ring. It is important to apply lubricants to the O-ring. For lines suitable for oxygen, use only O-rings and lubricants which is appropriate for this application, by example Klüberalfa YV 93-1202 lubricants.

Note:

Within 24 hours after the first cool down with cryogenic liquid all bolts must be retightened. After longer operation the bolts must not be retightened in cold conditions.

Note:

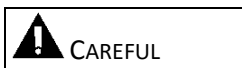
Re-tightening of the clamp or bolts is for pipes with oxygen service allowed only directly after the first cooling down of the system within 24 hours (risk of fire and / or explosion hazard). If in doubt contact Demaco.



Each section is pre-vacuumed at our factory. Welding at the outer pipe of the section (jacket) will result in the loss of the vacuum. This due to the fact that the hot metal will be sucked into the vacuum space.

3 STORAGE OF THE VACUUM INSULATED PIPES

Store the pipes dry and packed. Prevent water and other pollutants from entering the pipes. Minimum storage temperature is 18°C.



Be careful that the protection cover, on the end of the male Johnston Coupling, remains undamaged during handling and storage.

4 MAINTENANCE

The maintenance of the vacuum-insulated pipes requires only a periodical visual control. Ice build-up on the outer pipe and/or flanges of the coupling may be the result of the following matters:

- Within 24 hours after the first cool down with cryogenic liquid all bolts must be retightened. After longer operation the bolts must not be retightened in cold conditions.
- Re-tightening of the clamp or bolts is for pipes with oxygen service allowed only directly after the first cooling down of the system within 24 hours (risk of fire and / or explosion hazard). If in doubt contact Demaco.
- The vacuum level in the vacuum space is reduced. This normally occurs within a time span of several years. Consequently, the insulation value is also reduced. By simply re-vacuuming the vacuum space, the correct insulation capacity can be re-obtained. Before you pump the pipes to a correct vacuum level, the pipes must be warmed up to at least the surrounding temperature. Preferably up to a higher temperature.
- The O-ring of the coupling is damaged. We advise you to replace the O-ring when any damage to the O-ring can be seen. Remove the damaged O-ring and clean the O-ring grooves.
- You always have to warm up the couplings after ice building to ensure an adequate sealing of the O-ring.

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5 DRAWING

