

SUPERPRESSURE PRODUCTS

REACTION VESSELS

2-9/16" O.D. Micro Series

4-3/8" O.D. Series

6-7/8" O.D. Series

FLAT & DELTA GASKETS INSTRUCTIONS

This Manual is for:

Vessel Part No.:

Sales Order No.:

Max. Working Pressure @ 100° F:

Test Pressure:

Material:

Serial No.:

Date Manufactured:

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A. Access

Access to the reaction vessel is gained in either of two ways: removal from the heating jacket and disassembly of the vessel, or disassembly of the vessel while installed in the heating jacket. For the two methods, see assembly drawing and proceed as follows:

1. Removal from the heating jacket:
 - a. Unscrew gland nut and remove tubing from head.
 - b. Unscrew tailbolt (end of vessel opposite tubing connection). If instrument is Aminco pencil type, remove thermocouple by unscrewing gland nut, and remove leads from the binding posts on heating jacket.
 - c. Slide vessel from heating jacket-grasp eyebolts and pull.
 - d. Grip vessel body across flats in a Superpressure's vise (Cat. No. 48-11340) and loosen cap screws on vessel cap. Unscrew cap, and lift off. If cap resists unscrewing, a prybar can be used to loosen the cap. Insert bar in the 3/8" diameter holes in cap periphery.
 - e. Lift off thrust ring, head and thermowell or liner, from body. When using flat gasket, gasket will come off with head.
 - f. If vessel has a delta gasket instead of flat gasket, gasket will be a separate piece and is lifted off after the head, with thermowell, is removed.

NOTE

The flat gasket is expanded into a machined recess in the underside of the head. Stainless-steel vessels have stainless-steel gaskets, and in some instances the operator may not realize the gasket is a separate piece from the head. When copper gaskets are used, the difference in color between gasket and head makes it apparent that the two are separate pieces (see page 2 for gasket maintenance).

B. Disassembly

Disassembly in heating jacket:

1. Unscrew gland nut and remove tubing from head.
2. Loosen cap screws and unscrew cap from vessel. Remove thermocouple by unscrewing gland nut, if instrument is Aminco pencil type; remove leads from binding posts on the heating jacket.
3. Remove thrust ring and head (with thermowell and flat gasket, if used) from vessel.
4. Remove delta gasket, if used.

NOTE

The thermowell need only be removed (by unscrewing) for replacement or when using special Pyrex liners (not supplied with the thermowell), in which case the thermowell opening must be compatible.

C. Assembly

1. Place the sample in the vessel and assemble in the reverse order of disassembly. If the vessel uses the delta gasket, see page 3 for installation of the delta gasket. When reassembling (if the reaction vessel has been removed from the heating jacket), slide the vessel into the jacket and turn it until the locating pins engage the corresponding holes in the bottom of the reaction vessel. Put thread lubricant on the tailbolt (which holds the vessel in the heating jacket). Tighten the tailbolt hand-tight. Be certain the word TOP, stamped on the vessel head, is in the proper position, so that when the vessel and heating jacket are installed in the shaking mechanism the thermowell will be in contact with the reactants.
2. Before replacing cap, apply thread lubricant to vessel body threads and cap screw threads. When installing cap over head and thrust ring, proceed as follows:
 - a. Unscrew all cap screws until they do not protrude beyond inner face of cap.
 - b. Place flat gasket groove. No additional gasket is needed. Center the head and slip on thrust ring. See page 3, for delta gasket installation.
 - c. Screw cap on until it just seats on thrust ring. Screw on hand-tight only.
 - d. Screw in each cap screw finger-tight.
 - e. With torque wrench, sequentially tighten opposing cap screws 1/16 turn.
 - f. After once tightening all screws, repeat step (e) above.

NOTE

Proper torque is needed to seal the vessel. This information is marked on the tag attached to all vessels. Record this data in the instruction manual for future reference.

MAINTENANCE

Whenever a gasket becomes nicked or work-hardened, replacement is recommended. To replace flat gasket:

1. Spring the gasket from the groove by striking it sharply several times with a cape chisel around the inner and outer circumferences. Do not chisel down the face of the gasket, or damage to the head will result.
2. Place a new gasket into the groove in the head. There will be a slight amount of clearance between the gasket and the groove. After several installations and removals of the cap, the gasket will be expanded into the recess. At the same time a ridge will appear in the face of the gasket, caused by its being forced into the groove; on the vessel body.
3. When ordering replacement flat gaskets, the inside and outside diameters of the vessel body and the desired metal must be specified. Stainless-steel and copper gaskets are standard; other metals are available from Newport Scientific, Inc. on special order.

DELTA GASKETS

DESCRIPTION

- A. Reaction vessels incorporating a delta gasket are shipped with the gasket in the groove of the vessel body and the head and cap installed. A slight torque is exerted on the trust bolts to hold the closure firm during shipment.
- B. The vessel and gasket have been hydrostatically tested at a pressure equal to 1.5 times the working pressure of the vessel. After the test vessel is dismantled and cleaned. Some oil film remains and the vessel and parts in contact with the reactants should be cleaned, as required by the chemical process anticipation of the service for which the reaction vessel will be used.

INSTALLATION

When reassembling the vessel the following steps are recommended to effect an efficient seal with the least difficulty:

1. Examine the groove surfaces in the head and body and the delta gasket itself. If the gasket has corrosion pit marks, or is in any way scored or shows sign of galling, it should be replaced. In some cases the gasket surface can be machined, but this must be done very carefully so that the dimensions and radii at the contact points are held to tolerances. Dimensions for the gasket supplied can be obtained from Newport Scientific, Inc., Jessup, Maryland. Please include the serial number of the reaction vessel when ordering gaskets.
2. Any dirt particles in the grooves of the body and head must be removed. It is especially important that any viscous or tar-like products are removed from the grooves after a reaction has been completed, and the vessel is being assembled for another experiment. If the gasket grooves in the head and body are pitted or galled, the surfaces may require machining. It is suggested that Superpressure be contacted regarding machine of the grooves. Slight scoring can be made smooth with abrasive paper. Care must be exercised to keep dimensional tolerances.
3. With smooth surfaces on the gasket and the grooves in the body and head, the gasket is carefully placed in the body groove. The diameter of the gasket at the contact radius is slightly larger than the diameter of the groove into which the gasket fits. This is to insure that the gasket makes contact with the groove on the 47° angle surface of the groove rather than the back-side of the groove. This is true for both the groove in the body and the head. The gasket can be rocked slightly in the groove. It should be aligned as level as possible.
4. Place the head over the gasket, being careful not to have the gasket go askew. The vessel should be on a flat surface during this operation.

5. Place the thrust ring on the head.
6. Screw the cap on the body. The thrust bolts should be backed off at this time.
7. With the cap and body threads fully engaged, the thrust bolts are then made finger-tight. Tighten the bolts in a diametrically opposite sequence to provide an even force on the gasket.
8. The delta gasket can now be initially sealed by applying a torque to the thrust bolts. It is important that the torque be applied to all bolts in small increments of 2 ft-lbs or less. The final torque required is dependent on the size (diameter) of the gasket. Do not exceed a final torque of _____ foot-pounds at any time.

CAUTION

BE CERTAIN THAT THE THE BOLTS ARE TIGHTENED IN A DIAMETRICALLY OPPOSITE SEQUENCE SO THAT THE GASKET IS SEALED ON A LINE CONTACT OVER THE ENTIRE SEALING CIRCUMFERENCE.

A very narrow line contact is the objective of the initial seal.

9. Connect tubing connections and pressurize vessel as required by the experiment being performed.
10. The delta gasket, if it has good line contact during initial seal, will prove very effective. The delta gasket moves outward in the groove and the sealing area increases from a line contact to an annular area contact as pressure is developed in the vessel. The result is a seal which becomes more effective as the pressure increases.
11. Delta gaskets "flow" during their service under pressure. After a number of operations the gasket may take a permanent set and requiring replacing. The number of service cycles varies. An indication that the gasket should be replaced is given when the surface which is subject to the pressure develops a curve or radius.

NOTE

Vessel Serial No. _____ has been effectively sealed with _____ foot-pounds torque on each cap screw and with a hydrostatic test pressure of _____ psi in the vessel. The torque is applied in small increments of 2 foot-pounds, applied to the screws in a diametrically opposite sequence.