Handling procedures for VITROVEX glass sphere housings

Content:

Fourth edition, October 2013

- Point 6 closing procedure modified

Fourth edition, September 2013

- Point 6 closing procedure modified

Third edition, Januar 2013

- Changed mind. connector thread length from 30 to 35mm

Second edition, April 2011

- introduction page added
- use of Terostat 7 sealing tape will no longer be recommended due to risk of leakage

First edition, December 2009

Introduction

You have purchased a concept in deep sea instrument housings which is completely different to the common metal or synthetic materials. After a period of familiarisation, you will highly appreciate the host of advantages that glass offers for many applications.

It is necessary to emphasise the differences in handling the glass cylinders and spheres.

Glass is sensitive to impact, always handle with best possible care. Plastic protective covers should be installed.

Glass housings are only strong against pressure, not tension or shear or torsion. Do not install at instrument platforms where they are subjected to such forces. Thermal shock is to be below 100°C.

Evacuation of the housings is recommended for three reasons:

- to settle the parts firmly,
- to avoid inside condensation,
- to avoid excess inside pressure when the instrument is heated up, for instance when it is exposed to sunlight. Air would try to seep out and then cause a leak in the seal.

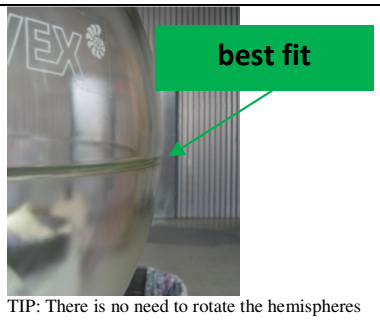
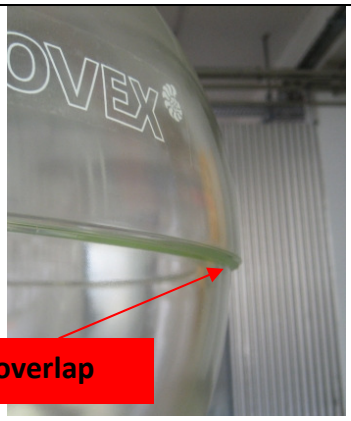
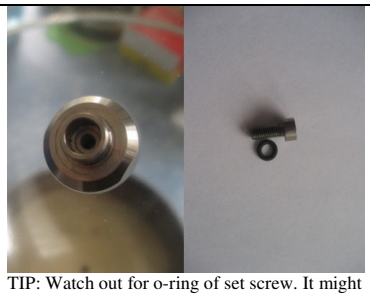
Sealing is done glass-to-glass with outside sealing band. No O-rings are used.

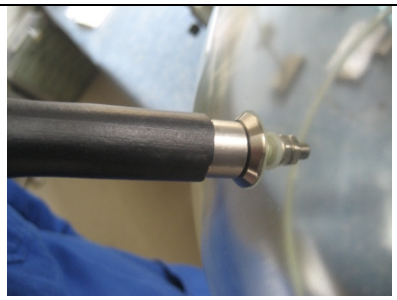
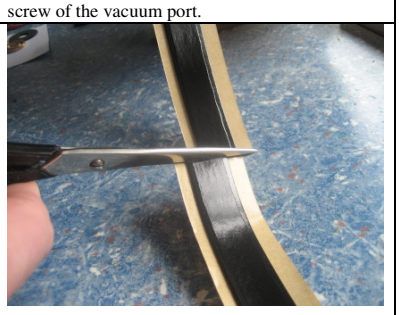
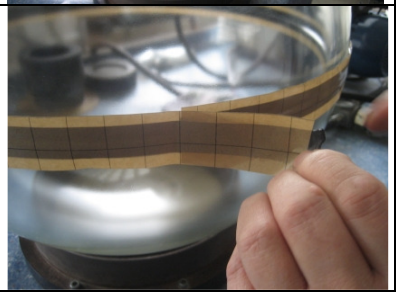
NEVER USE GREASE OR OIL AS A SEALING AID.

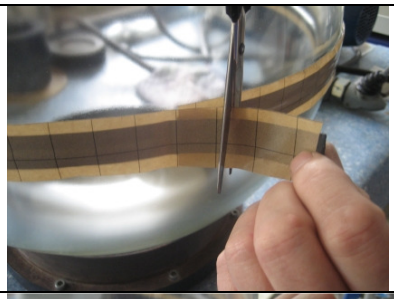
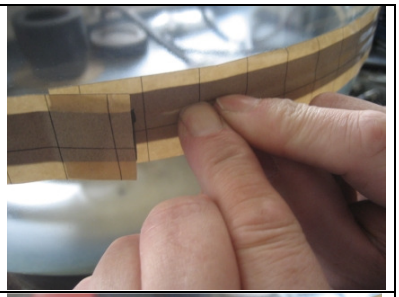
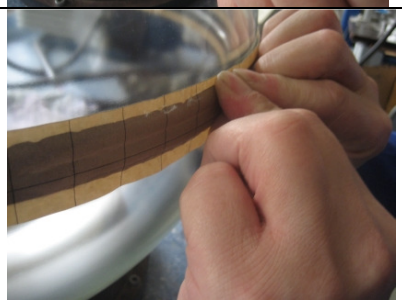
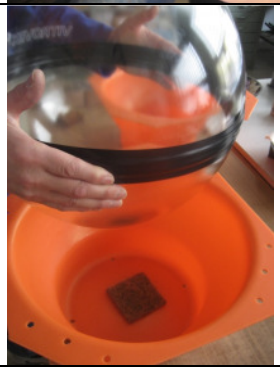
Surfaces must be meticulously clean. Wipe with residual free solvent (e.g. Toluene) and do not touch again before closing.

For installing and fixing instruments inside, it is suggested that glass glues are used. Such glue is commercially available; and it bonds metal or synthetics reliably to glass.

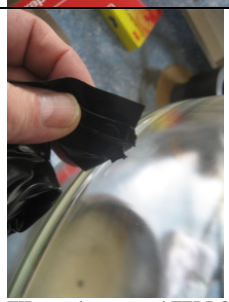
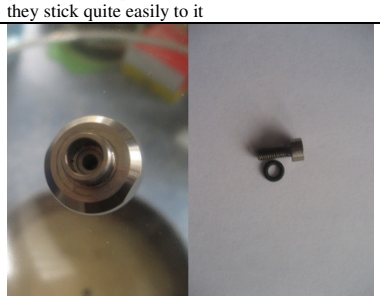
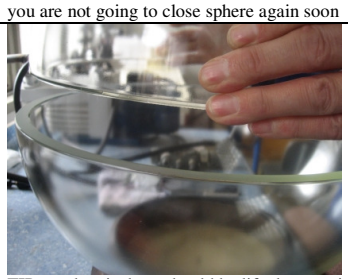
Closing procedure of a VITROVEX glass sphere

1.	Clean surface of cutting area on both hemispheres by means of a chemical volatile cleaner such as Acetone or just common glass cleaner in combination with a cleaning rag.		 TIP: Spray onto rag rather than onto glass
2.	Put top and bottom hemisphere exactly on top of each other.	 TIP: Don't look for any corresponding markers on top and bottom hemispheres. VITROVEX hemispheres can be placed on top of each other at any position due to high quality grinded cutting areas.	 TIP: There is no need to rotate the hemispheres just align along the edges by gently pressing against the top hemisphere
3.	Check for best fit of top and bottom hemispheres (no overlap)		
4.	Open vacuum port by screwing out set screw		 TIP: Watch out for o-ring of set screw. It might get stuck in the vacuum port.

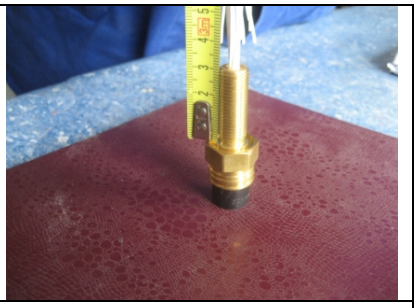
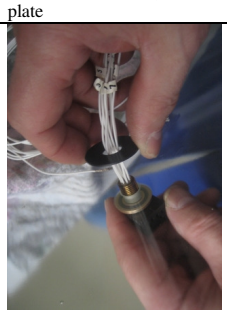
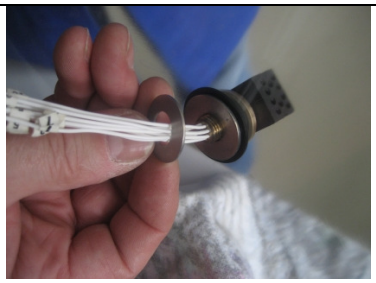
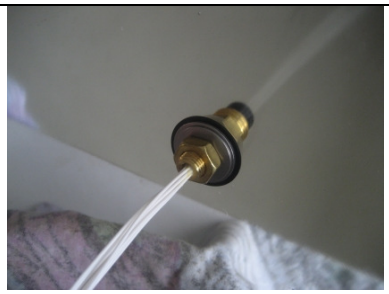
5.	Put a matching hose from a vacuum pump over the open vacuum port		
6.	Evacuate the sphere to 0.75 to 0.85 bar below atmospheric pressure (0,15 to 0.25 bar absolute), take off air hose and close vacuum port immediately		 TIP: A slightly higher depression than 0.8 bar gives you a little bit more time to screw in the set screw of the vacuum port.
7.	Cut off an appropriate length of TEROSTAT 81 sealing tape (approx. 1400mm for 17” glass sphere)		
8.	Align glass sphere horizontally and clean the area along the equator similar to step #1		
9.	Centre TERROSTAT between the two semi spheres and attach it to the glass sphere all around		

10.	Cut off surplus TERROSTAT but maintain approx. 30 mm overlap and press TERROSTAT firmly into the bevel along the two hemispheres		
11.	Apply TERROSTAT entirely onto the glass sphere, remove the protection sheet and push the overlapping tail on top of the beginning		
12.	Centre SCOTCHRAP between the two semi spheres on top of the TERROSTAT		 TIP: Start point of SCOTCHRAP should be somewhat away from the junction of the TERROSTAT
13.	Attach SCOTCHRAP 3 times all around the glass sphere or TERROSTAT respectively and finally clean and push it to the sphere at the same time		
14.	The glass sphere is sealed, protected and can now moved into its protective cover		

Opening procedure of a VITROVEX glass sphere

1.	Open plastic protective cover and put glass sphere to a suitable stand		
2.	Remove SCOTCHRAP and underlying TERROSTAT sealant tape		
3.	Remove any small leftovers outside the glass sphere		 TIP: put the removed TERROSTAT tape onte the small particles to simply remove any remaining leftovers as they stick quite easily to it
4.	Open vacuum port by screwing out set screw	 TIP: tighten set screw after vacuum is released in case you are not going to close sphere again soon	 TIP: Watch out for o-ring of set screw. It might get stuck in the vacuum port.
5.	After vacuum escaped, lift up top hemisphere, turn it around and place it onto a suitable stand (next to the remaining semi hemisphere if there is a connection between them). Remove carefully any remaining TERROSTAT sealant tape from the cutting area of the two hemispheres.	 TIP: top hemisphere should be lifted up vertically in order to avoid any damadges around the edges of the hemispheres	

Installation of a bulkhead/connector

1.	Make sure you have all parts for the bulkhead assembly at your disposal (bulkhead, adapter plate with o-ring, plastic shaped washer, washer, disc spring, nut). Make sure that the tread of the bulkhead is at least 35 mm.		
2.	Clean all parts of connector and glass sphere thoroughly. Pay special attention to the surface around the boreholes as it must be free of any scratches		
3.	Put the adapter plate over the bulkhead and fit everything into the borehole whereas the side with the o-ring of the adapter plate points towards inside the glass sphere.	 TIP: Use silicon to grease the o-ring of the adapter plate	
4.	Put the shaped washer followed by the washer over the bulkhead and make sure that the bulge of the shaped washer points towards the glass sphere. Put the disc spring followed by the nut over the bulkhead and make sure that the bulge of the disc spring points towards the nut.		
5.	Tighten the nut by hand to take up any slack. The o-rings should be compressed, then, using a torque, tighten nut until disc spring is compressed and the connector is fixed. We recommend using a force of 6 to 8 Nm (7/16” standard thread) for clean and free of grease threads.	 TIP: you may use a low strength threadlocker (e.g. loctite 222) for the nut