GDS INSTRUMENTS LIMITED

World Leaders in Computer Controlled Testing Systems for Geotechnical Engineers and Geologists

005 GDS Helpsheet

Hardware

Bishop & Wesley Cell

Lower Chamber Saturation

1. Introduction

When your triaxial cell is delivered to you from GDS, the lower chamber is generally already saturated with deaerated water. Provided you make a properly deaired connection to your lower chamber digital controller it is unlikely you will disturb the set-up until you need to reconfigure the system for some reason. From time to time however you may wish to recharge the lower chamber with deaerated water and check that air has been excluded as far as possible. This may be carried out as described in the step-by-step procedure given below. If your triaxial cell is not delivered already saturated with deaerated then you will have to carry out the procedure below before using your triaxial cell:

2. Lower Chamber Saturation Procedure

The upper cell and lower chamber are sealed with identical Bellofram Rolling Diaphragms (BRDs). The low friction action of these BRDs is the result of pressure differential maintaining a convolute in the diaphragm between the piston and cylinder walls.

This convolute must be maintained by pressure differential at all times. Failure to actuate the piston by pressure differential (eg moving the piston by hand) will damage the BRD and lead to rupture!

1. With the help of a colleague lay the fully assembled cell on its back on a rubber mat on a bench top. Make sure the cross-arms are not obstructed and are free to move and that the lower chamber valve is pointing vertically upwards. Angle the cell so that the pedestal end is at the edge of the bench and pointing towards you. Check that the cell is inclined slightly so that any air pockets in the lower chamber will float to just below the lower chamber valve.

2. Connect a 2m length of nylon tubing to the lower chamber valve and let it hang over the front of the bench and down into a beaker of deaerated water on the floor. Fill the cell with water. Connect a 2m length of nylon tubing to the upper cell valve and let it hang over the front of the bench and down into a beaker of deaerated water on the floor.

3. Open the valve to the lower chamber. Open the valve to the upper cell. Raise the beaker of water connected to the upper cell. In this way you are applying a small pressure differential. At this time you will see the pedestal moving away from you. If this procedure does not work as described, there may be an air lock so go to step # 7 below and then repeat this step # 3. Alternatively, the combined friction of the Rotolin bearing and Bellofram Rolling Diaphrams (BRDs) may be just a bit too much to be overcome by 1-2m of water pressure so you may need to raise the beaker even higher or use a GDS pressure controller to increase cell pressure.

4. When the piston attached to the pedestal reaches the end of its stroke, water will cease flowing out of the tube connected to the lower chamber valve and the cross-arm will be at the bottom of the cross-arm slot. If air was present in the lower chamber you will see air bubbles in the nylon tube.

5. Turn off the valve to the lower chamber. Empty the beaker of water and refill with freshly deaerated water. Keep the outlet of the nylon tube dipped below the surface.

6. If the nylon tube contains any air bubbles, disconnect it from the lower chamber valve, siphon water through the tube from the beaker until all bubbles are purged and remake the deaired connection to the lower chamber valve.

7. Raise the beaker to about 0.5m above the bench top. Open the lower chamber valve. Lower the cell beaker to the floor. Open the cell valve. The pedestal will now move towards you until it reaches the end stop. If this procedure does not work as described, there may be an air lock so go to step # 6 above and repeat. Alternatively, the combined friction of the Rotolin bearing and Bellofram Rolling Diaphrams (BRDs) may be just a bit too much to be overcome by 1-2m of water pressure so you may need to raise the beaker to a higher elevation or use a GDS pressure controller.

8. Go back to step # 2 and repeat the steps to step # 7 until you no longer observe air bubbles coming out of the lower chamber.

9. Repeat step # 7 to set the triaxial cell piston to its maximum upward stroke. Reconnect to the lower chamber controller (see GDS Helpsheet # 4, "Setting up the triaxial cell").

If you have any problem or any further questions please do not hesitate to contact the GDS support team by visiting the support section on our website: http://gdsinstruments.helpserve.com/