



BME 332
Biomaterials and Biomechanics Lab

Lab 4
Hydrostatic Bench-III

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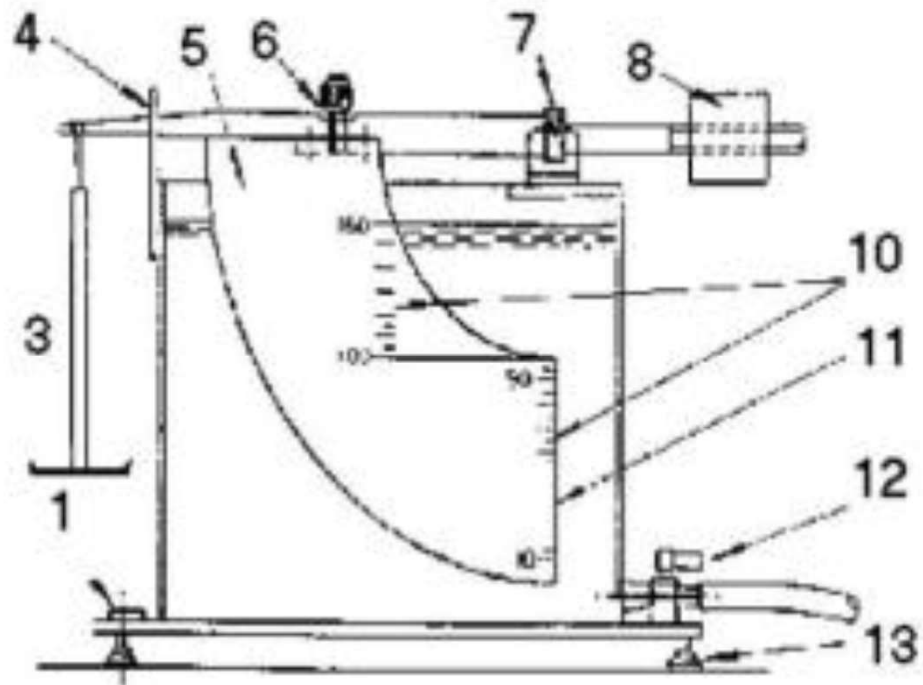
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Purpose

- The Hydrostatic Bench enables the study of the main properties and the behavior of such liquids under hydrostatic conditions, with the aid of some accessories to make the different experiments.

Experiment -2.2

- **Pressure center in a smooth surface**
- **Aim of this Experiment**
- To determine the position of the pressure center on the rectangular face
- of the float
- **Necessary devices**
- Hydrostatic Pressure device or hydrostatic device.



- 1.-Receiver
- 3.- Pan
- 4.- Balance indicator or pointer
- 5.- Quadrant
- 6.- Set screw
- 7.- Arm
- 8.- Support;
- 9.- Adjustable counterweight
- 10.-Graduated scale
- 11.-Font flat surface
- 12.-Cock
- 13.- support feet

Procedure

1. Measure and note down the dimensions designed as a , L , d , and b ; the last corresponding to the flat surface placed at the end of the quadrant.
2. With the receiver placed on the bench, place the balance arm on the support (sharp profile). Hang the pan at the end of the arm.
3. Connect a length of flexible hose to the receiver draining cock and connect the other end to drain.
4. Level the receiver by properly acting on the support feet, which is adjustable, while the "bubble level" is observed.

Procedure

5. Displace the counterweight of the arm until getting the arm to be horizontal.
6. Close the drain cock in the bottom of the receiver.
7. Introduce water in the receiver until its free surface is tangent to the lower edge of the quadrant. The fine adjustment of that level can be achieved by slightly overreaching the established filling and then slowly draining through the cock.
8. Place a calibrated weight on the balance pan and slowly add water until the balance arm recovers the horizontal position. Record the water level, indicated in the quadrant, and the value of the weight placed on the pan.

Equipment Description

- 9. Repeat the operation above several times, increasing progressively the weight in the pan until, the balance arm is at level, the level of the free water surface becomes flush with the upper edge of the flat rectangular surface that the end of the quadrant presents.
- 10. From this point on, and in the order inverse to the operation above of placing the weights on the pan, the weight increments given in each step are removed, the arm is leveled (after every removal) by using the drain cock and the weight in the pan and the water level values are recorded.

For $y < d$ (partial immersion), calculate the practical and the theoretical value of m/y^2 using the equation:

$$m/y^2 = p \cdot b / 2L (a + d - y/3).$$

The slope of this graph must be $-p \cdot b / 2L$, and its intersection with the coordinate axis $p \cdot b (a + d) / 2L$.

See the discrepancies in a reasoned way, if any, between the average values measured and the values obtained with the equations above

