BURSTING STRENGTH

Measurement of Fabric Bursting Strength:

- In this test a 25mm diameter steel ball is pushed through the stretched fabric and the force required to do so is recorded.
- The advantage of the test is that it can be carried out on a standard universal strength tester with a suitable attachment.
- There is also no limit to the amount a sample can be extended as there is with the diaphragm test.

(a) Diaphragm bursting test:

- In this test the fabric sample is clamped over a rubber diaphragm by means of an annular clamping ring.
- An increasing fluid pressure is applied to the underside of the diaphragm until the specimen bursts.
- The operating fluid may be a liquid or a gas.

Sample:

- Specimens of two sizes are used; 30mm and 113mm.
- The specimen with the larger diameter fails at lower pressure (approximately 1/5 of the 30mm diameter value).
- The standard requires 10 specimens to be tested.

Procedure:

- The fabric sample is clamped over the rubber diaphragm.
- The pressure in the fluid increases at such a rate that the specimen bursts within 20 ± 3 sec. (P_1).
- The height (extension) of the diaphragm is noted
- Another test is carried out without a specimen.
- The pressure to do this is noted and then deducted from the earlier reading.
- (P_1 - P_2) is the actual bursting strength of the specimen.

Mean bursting strength "kN/m^2"

Mean bursting distance "mm"

Click on Image to run the animation

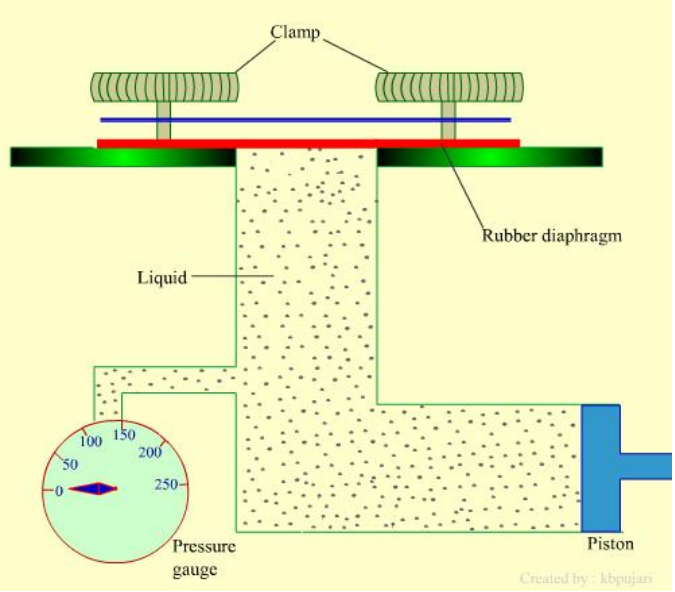

Figure: A diaphragm bursting strength tester.

Disadvantages:

- Fabrics with very high extensibility (knitted fabrics) creates problem because the rubber diaphragm has to stretch to the same amount.
- Blank test is required, which needs accuracy, or pressure – distance calibration chart is required.
- Spilling of liquid may occur or chances of leakage.
- Diameter of the specimen may be varied.

It is good to have a test length greater than the fibre length. A diameter of say 1.2'', which is recommended by

- some standard, is little on the smaller side for woven cotton cloth.
- For knotted fabrics the length of yarn (a 1.2'' circular fabric) is much longer due to looped structure.
- Crimp percentage in warp and weft plays an important role. For similar yarn, the direction with lower crimp percentage will break.

(b) Ball bursting strength:

The US standard **ASTM D 3787** specifies a 1.0000 inch diameter ball (25.4mm) with a clamp diameter of 1.75 inch (44.45mm) and a speed of 12 inch/min (305mm/min).

The British Standard for coated fabrics **BS 3424** specifies a very similar dimension with a ball diameter of 25.2mm, a clamp diameter of 45mm and a testing speed of 5mm/s. an example of a compression fixture to carry out this test is shown.

- Diaphragm bursting test is not suitable for highly stretchable fabrics.
- Errors due to diaphragm expansion.
- This test can be performed using an attachment on a standard tensile testing m/c.
- 25mm diameter ball is pushed through the stretched fabric and force required is recorded.
- In diaphragm pressure is measured, but here force is measured.
- No limit to the amount that a sample can be extended.
- The load cell operates in compression mode.

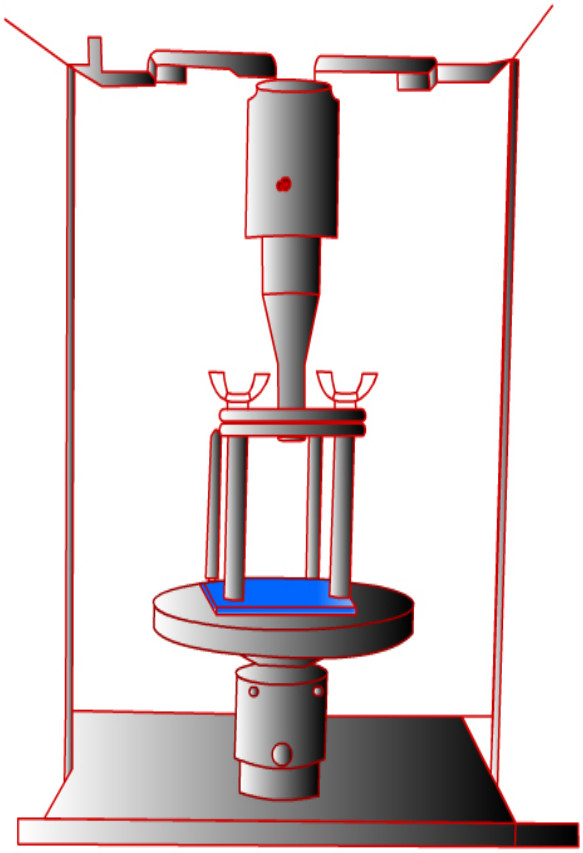

Figure: A ball bursting strength attachment.