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Standard Method for Testing COATED FABRICS—HYDROGEN PERMEABILITY¹

This standard is issued under the fixed designation D 815; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This method covers the measurement of the permeability of hydrogen through fabrics coated with rubber or synthetic elastomers.

2. Applicable Document

2.1 *ASTM Standard:*

D 3040-81 Practice for Preparing Statements for Standards Relating to Rubber and Rubber Testing²

3. Significance and Use

3.1 This method is intended for quality control of rubberized fabric that is used to manufacture articles that contain helium. There is a direct relation between the permeability of hydrogen and helium, with that of hydrogen being approximately twice that of helium.

3.2 It may also be used for development and research purposes.

4. Apparatus

4.1 The apparatus shall consist of the Cambridge fabric permeameter or its equivalent. The essential components, properly assembled for the test as shown in Fig. 1, shall comprise the following:

4.1.1 *Test Plates*—Test plates, essentially in two parts, the lower half being the hydrogen chamber and the upper half containing the analysis cell. The specimen to be tested shall be sandwiched between the upper and lower plates. The analysis cell is part of a Wheatstone bridge arrangement, which is contained in the control box. The hydrogen diffusing into the analysis cell produces a current thermal charge in the sensor. This thermal charge causes a

voltage imbalance in the system that is registered on the galvanometer.

4.1.2 *Waxing Plate Assembly*—A waxing plate assembly as shown in Fig. 2, consisting of two metal plates 127.0 ± 1 mm in diameter (125 cm^2 in area) mounted in a holder so that the fabric specimen may be clamped between them with a peripheral ring approximately 8 mm in width exposed for wax coating.

4.1.3 *Control Box*—A control box, essentially a Wheatstone bridge, with a standard cell. A 6-V storage battery or any other means of supplying the proper voltage with steady current to the operating circuit may be used.

4.1.4 *Galvanometer*—A galvanometer calibrated by the manufacturer to read in litres of hydrogen per square metre per 24 h at a state temperature.

5. Test Temperature

5.1 Unless otherwise specified, $23 \pm 2^\circ\text{C}$ ($73 \pm 4^\circ\text{F}$) shall be taken as the standard temperature for calibration and test. The test shall be conducted at the temperature at which the apparatus is calibrated within a tolerance of $\pm 2^\circ\text{C}$ ($\pm 3.6^\circ\text{F}$). All specimens, equipment, and gases shall be preconditioned at this temperature for 1 h prior to test. A temperature-measuring device shall be provided at the back of the lower test plate for measurement of the actual temperature while testing.

¹ This method is under the jurisdiction of ASTM Committee D-11 on Rubber and is the direct responsibility of Subcommittee D11.37 on Coated Fabrics and Rubber Thread.

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² *Annual Book of ASTM Standards*, Parts 37 and 38.