



Designation: D5775 – 95 (Reapproved 2023)

Standard Test Method for Rubber—Determination of Bound Styrene in Styrene Butadiene Rubber by Refractive Index¹

This standard is issued under the fixed designation D5775; 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 test method covers the determination of styrene content, and is intended for general use on solid uncompounded styrene-butadiene copolymers, commonly referred to as SBR, prepared by the emulsion process. SBR polymers prepared in solution will require the use of different refractive index tables because the vinyl content of the butadiene differs from that in the emulsion polymers. It is applicable to polymers having less than 55 % bound styrene.

NOTE 1—The nomenclature used in this test method is in accordance with Practice D1418.

1.2 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.3 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 ASTM Standards:²

D1418 Practice for Rubber and Rubber Latices—Nomenclature

D4483 Practice for Evaluating Precision for Test Method Standards in the Rubber and Carbon Black Manufacturing Industries

¹ This test method is under the jurisdiction of ASTM Committee D11 on Rubber and Rubber-like Materials and is the direct responsibility of Subcommittee D11.11 on Chemical Analysis.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

3. Summary of Test Method

3.1 A sample of dried ETA-extracted polymer is pressed between sheets of aluminum foil to provide sheeted rubber having a thickness of not more than 0.50 mm. The bound styrene content is calculated from the refractive index obtained at 25 °C on this thinly sheeted rubber.

4. Significance and Use

4.1 The bound styrene test is a measure of the bound monomeric composition of the rubber. It is used as a check on the accuracy of monomer charging and also as a guide to the uniformity of the product, since the bound styrene content affects the physical properties.

5. Apparatus

5.1 *Spiders*, consisting of 13-mm squares of sheet aluminum or stainless steel having a Nichrome wire leg about 38 mm long attached to each corner. Where the extracting solvent is ETA-acidified with HCl, the spider and the legs should be made of tantalum.

5.2 *Abbe-Type Refractometer*, having fourth decimal place accuracy, whose refracting prism can be placed in a nearly horizontal position for measurement of the refractive index of solids. An Amici-type compensating prism for achromatization is necessary unless a sodium vapor lamp is used as a light source.

5.3 *Vacuum Oven*, capable of being evacuated to a pressure of 1.3 kPa (10 mm Hg) and of maintaining a temperature of 100 °C.

5.4 *Aluminum Foil*, between 0.025 mm and 0.08 mm thick, having good tear strength.

5.5 *Glass Test Piece*, standard, for checking adjustment of the refractometer.

5.6 *Hydraulic Press*, that can be maintained at 100 °C and can apply a force of at least 2.2 kN (500 lbf) on each specimen or of 100 kN (11 ton) if pressing plates as described in 5.7 are used.

5.7 *Pressing Plates (Optional Apparatus)*, 210 mm by 210 mm by 3 mm, with a wooden handle. One of the plates