



# Standard Practice for Rubber—Preparation of Pieces for Test Purposes from Products<sup>1</sup>

This standard is issued under the fixed designation D3183; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

*This standard has been approved for use by agencies of the U.S. Department of Defense.*

## 1. Scope

1.1 This practice covers methods for the preparation of pieces of a rubber vulcanizate that is not in the form of sheet. Such pieces are used as a source from which specimens are obtained for testing.

1.2 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

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

## 2. Referenced Documents

2.1 *ASTM Standards:*<sup>2</sup>

**D3182 Practice for Rubber—Materials, Equipment, and Procedures for Mixing Standard Compounds and Preparing Standard Vulcanized Sheets**

## 3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *piece, n*—a rubber vulcanizate of a geometry from which a specimen, suitable for testing, may be obtained.

## 4. Significance and Use

4.1 This practice is used when it is necessary to test a product from which specimens cannot be cut directly. Procedures are given for preparing pieces suitable for preparing specimens of the product.

<sup>1</sup> This practice is under the jurisdiction of ASTM Committee D11 on Rubber and is the direct responsibility of Subcommittee D11.10 on Physical Testing.

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<sup>2</sup> 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.

## 5. Conditioning

5.1 Pieces shall be prepared for specimen cutting and testing not sooner than 16 h after vulcanization and not later than 60 days after delivery to a purchaser (Note 1).

5.2 Testing, for the purpose of production control, may require that the pieces be prepared and tested prior to 16 h as specified in 5.1. This practice shall be noted in the respective test report.

NOTE 1—This procedure's time limit may be modified as agreed upon between laboratories or between supplier and user.

## 6. Pieces

6.1 Pieces shall be obtained, if possible, from the product to be tested in accordance with the specification for the particular product. The pieces shall be prepared in accordance with Section 7.

6.2 When it is not feasible to prepare suitable pieces from the product, specially molded pieces or sheets may be prepared from the same unvulcanized rubber compound used to prepare the product. The sheets shall be vulcanized in accordance with Practice D3182 and shall have an equivalent state of vulcanization judged from such properties as can be determined on the product. The sheets shall have one of the following thicknesses unless another thickness is technically necessary:

mm	in.
2 ± 0.2	(0.08 ± 0.008)
4 ± 0.2	(0.16 ± 0.008)
6.3 ± 0.3	(0.25 ± 0.12)
12.5 ± 0.5	(0.50 ± 0.02)

## 7. Preparation of Pieces

7.1 Rubber vulcanizates, particularly products, may not have a suitable form or size for use in cutting specimens for test. Procedures in this section describe the preparation of pieces from vulcanizates that are too thick, have uneven surfaces, or contain textiles.

7.1.1 After the piece is prepared, it shall rest at least 30 min before the specimens are cut.

7.2 *Separation of Textiles*—The separation should preferably avoid the use of a swelling liquid. If this is not possible,

use commercial isooctane (2,2,4-trimethylpentane), following the safety recommendations from the supplier and the MSDS.

7.2.1 Take care to avoid excessive stretching of the rubber during the separation, by separating a little at a time while the rubber is gripped near the point of separation.

7.2.2 If a liquid is used, place the rubber so as to permit free evaporation of the liquid. Allow time for the complete evaporation of the liquid before the specimens are cut and tested.

7.2.2.1 Some skiving machines can separate plies of rubber as in belts, hose, and tires (see 7.4).

7.3 *Cutting Knife Procedure*—This procedure is based on commercial slicing machines. The machine consists of a motor- or hand-driven disk cutter of suitable diameter with a movable cutting table that transports the sample to the cutting edge. An adjustable slow-feed mechanism is fitted to the cutting table that feeds the rubber forward to the line of cut and controls the thickness of the slice. Clamping devices should be available to secure the rubber. The knife should be lubricated with a mild soap solution to ease the cutting operation.

7.4 *Skiving Procedure*—This procedure is based on commercial leather slitting machinery, and convenient types are available for cutting about 50-mm (2-in.) wide strips with thicknesses up to about 12 mm (0.5 in.). Adjustments should be available to vary the thickness of cut, and feed rollers should be provided to transport the material past the knife. Provision should be made for continuous sharpening of the cutting edge. Attachments are available for splitting and cutting sections from cable sheathing and hose.

7.5 *Buffing Techniques*—Use the buffing techniques described below when it is necessary to remove any unevenness of surface. Unevenness of surface may result from contact with fabric components, cutting techniques, or other reasons.

7.5.1 *Abrasive Wheels*—The buffing apparatus, commonly known as an Emerson Type Rubber Buffer,<sup>3</sup> should consist of a grinder with motor-driven abrasive wheel. It is important that

<sup>3</sup> The sole source of supply of the apparatus known to the committee at this time is CCSi, Inc., 221 Beaver St., Akron, OH 44304. If you are aware of alternative suppliers, please provide this information to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee,<sup>1</sup> which you may attend.

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the wheel should run true, without vibration, and that the abrasive surface based on aluminum oxide or silicon carbide is true and sharp. The grinder should be equipped with a slow-feed mechanism so that very light cuts may be made to avoid over-heating of the rubber. Suitable means should be provided for securing the rubber to prevent excessive deformation and for controlled traversing of the rubber pass the abrasive wheel (Note 2). In operation the depth of cut should not exceed approximately 0.2 mm (0.008 in.). The successive cuts should be progressively thinner to avoid over-heating. Do not carry out buffing beyond the point where unevenness of thickness has been eliminated. For removal of greater thicknesses of rubber, use the cutting techniques indicated in 7.3 and 7.4.

NOTE 2—Wheels of 125 to 150-mm (5 to 6-in.) diameter operating at a surface speed in the range of  $20 \pm 5$  m/s ( $4000 \pm 700$  ft/min) of grit size 0.42 to 1.00 mm (grit No. 30) for roughing and of grit size 0.18 to 0.42 mm (grit No. 60) for finishing have been found suitable.

7.5.2 *Abrasive Flexible Bands*, The apparatus shall consist of either a motor-driven drum, on which a spiral helix of the abrasive is secured, or two pulleys, one motor-driven and the other adjustable to tension to centralize the movement of the band. The abrasive bands should be of textile or paper, or a combination of the two, with the abradant based on aluminum oxide or silicon carbide bonded to its surface with a resin unaffected by water. Equipment should be provided for slow feeding of the material to the abrasive band and for securing the material without excessive deformation (Note 3). In operation, cuts removing several tenths of a millimetre of rubber are practicable as the heat build up is much lower than with the method of 7.5.1. The buffing may be either against the drum, against one of the pulleys, or against the taut band between the pulleys.

NOTE 3—Grit sizes of 0.42 to 1.00 mm (grit No. 30) for roughing and of 0.05 to 0.18 mm (grit No. 100 or 180) for finishing with surface speed of the band in the range  $20 \pm 5$  m/s ( $4000 \pm 700$  ft/min.) have been found suitable.

## 8. Keywords

8.1 cutting; Emerson Type rubber buffer; rubber buffer; rubber buffing; skiving; test piece; test piece preparation; test specimen; testing of finished products