



Standard Test Method for Sampling Chrysotile Asbestos¹

This standard is issued under the fixed designation D2590/D2590M; 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.

^{ε1} NOTE—Units information was editorially corrected in February 2012.

1. Scope

1.1 This test method covers procedures for taking a composite or a master composite sample, at the mine or at the factory or from a consignment, of a lot of milled asbestos fiber used as raw material in the chrysotile asbestos industry, conditioning this sample and reducing it in quantity through a series of steps to provide a relatively small test specimen of loose asbestos fibers, representative of the lot and suitable for the determination of a single property.

1.2 This sampling method is suitable for taking test specimens of chrysotile asbestos for Test Methods: [C1119](#), [C1120](#), [C1121](#), [C1122](#), [C1123](#), [C1124](#), [C1125](#), [C1162](#), [D1118](#), [D2589](#), [D2752](#), [D2946](#), [D2947](#), [D2985](#), [D2987](#), [D3639](#), [D3752](#) and [D3880](#).

1.3 Test Method [D3879](#) covers the sampling of amphibole asbestos fibers.

1.4 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

1.5 *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 and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:²

[C1119](#) Test Method for Vacuum Drainage of Asbestos-Cement Mixes

¹ This test method is under the jurisdiction of ASTM Committee [C17](#) on Fiber-Reinforced Cement Products and is the direct responsibility of Subcommittee [C17.03](#) on Asbestos - Cement Sheet Products and Accessories.

Current edition approved Nov. 1, 2011. Published February 2012. Originally approved in 1967. Last previous edition approved in 2006 as D2590 – 98 (2006)^{ε1}. DOI: 10.1520/D2590_D2590M-98R11E01.

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.

[C1120](#) Test Method for Wash Test of Asbestos

[C1121](#) Test Method for Turner and Newall (T and N) Wet-Length Classification of Asbestos

[C1122](#) Test Method for Wet Volume of Asbestos

[C1123](#) Test Method for Compressibility and Recovery of Asbestos

[C1124](#) Test Method for Kerosene Retention of Asbestos

[C1125](#) Test Method for Penetration Index of Asbestos

[C1162](#) Test Method for Loose Density of Asbestos

[D1118](#) Test Method for Magnetic Rating of Asbestos Fiber and Asbestos Textiles

[D2589](#) Test Method for McNett Wet Classification of Dual Asbestos Fiber

[D2752](#) Test Methods for Air Permeability of Asbestos Fibers

[D2946](#) Terminology for Asbestos and Asbestos-Cement Products

[D2947](#) Test Method for Screen Analysis of Asbestos Fibers

[D2985](#) Test Method for Color of Asbestos

[D2987](#) Test Method for Moisture Content of Asbestos Fiber

[D3639](#) Test Method for Classification of Asbestos by Quebec Standard Test

[D3752](#) Test Method for Strength Imparted by Asbestos to a Cementitious Matrix

[D3879](#) Test Method for Sampling Amphibole Asbestos (Withdrawn 2009)³

[D3880](#) Test Method for Asbestos Strength Units

2.2 ASTM Adjuncts:

Laboratory Filter Drawings⁴

3. Terminology

3.1 Definitions:

3.1.1 *bag*—any quantity of asbestos fiber corresponding to one particular grade that is packed in a suitable container.

NOTE 1—In the asbestos industry, the typical quantity contained in a bag is 45 kg [100 lb approximately].

3.1.2 *composite sample*—a set of unit samples of asbestos fiber (drawn systematically or at random) taken from a lot,

³ The last approved version of this historical standard is referenced on www.astm.org.

⁴ Available from ASTM International Headquarters. Order Adjunct No. [ADJD2590](#).

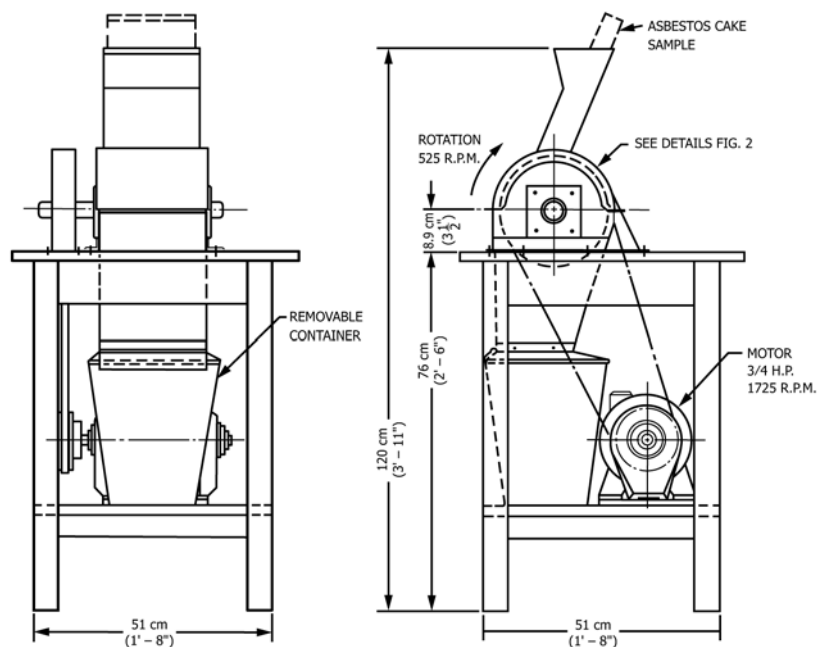


FIG. 1 Laboratory Fiber Conditioner

comprising not less than two and not more than 200 bags, for use in the laboratory as a test sample; that is as a source of test specimens.

3.1.3 *conditioning*—process by which the fiber is put into proper condition to be tested. This can be done by hand (Method A) or mechanically (Method B).

3.1.4 *finest, n—in asbestos*, the class of material having the smallest range of particle size that is segregated by particle size classification of asbestos by any relevant test method. Customarily the fraction that passes through the finest aperture screen used in Test Method D2589 for McNett classification of asbestos fiber.

3.1.5 *grade*—asbestos fiber that has the same chemical, physical, and mechanical properties and which is designated by a particular code corresponding to any given specifications.

3.1.6 *handful*—as much fiber as the hand can contain.

3.1.7 *lot*—not less than two and not more than 2000 bags of asbestos fiber of the same type and grade offered at any one time for delivery or testing.

3.1.8 *master composite sample*—not less than two and not more than ten composite samples so combined and reduced as to form a test sample that represents a lot that consists of more than 200 bags but not more than 2000 bags.

3.1.9 *milled asbestos, n*—all grades of asbestos that are recovered as the result of mechanical comminution and screen classification or air classification of asbestos ore.

3.1.10 *pinch*—as much fiber as can be taken up between the tips of the index finger and thumb.

3.1.11 *random sample*—the composite sample is random if each individual bag in the lot being examined has an equal chance of being included in the sample.

3.1.12 *referee sample*—a sample on which acceptability is based. Acceptability will be based on a composite sample if the lot is 200 bags or less, or on a master composite sample if over 200 bags, but not in excess of 2000 bags.

3.1.13 *shipment*—any consignment formed of one or several lots of asbestos fiber.

3.1.14 *systematic sample*—the composite sample is systematic if it is formed of every *k*th bag of the lot to be examined.

3.1.15 *test specimen*—the specific portion of a test sample upon which a test is to be performed, and that is obtained by systematically reducing the size of the sample until a representative specimen of the required mass is obtained.

3.1.16 *unit sample*—a sample drawn from one bag.

3.1.17 Additional definitions are contained in Terminology D2946.

4. Significance and Use

4.1 Sampling and conditioning are equally as important as testing. The reliability of the test results depends primarily upon how well the specimens tested represent the true character and condition of the lot of asbestos fiber. Much care and effort are required to be sure that all the sampling operations are systematic or at random and are representative. Failure to provide a test specimen that accurately represents the lot from which it is drawn will produce misleading test results regardless of the accuracy and the precision of the test method.

5. Apparatus

5.1 *Clean Containers*, approximately 28-L [1-ft³] capacity, one for each composite sample of fiber.

5.2 *Horizontal Area* with a smooth surface.

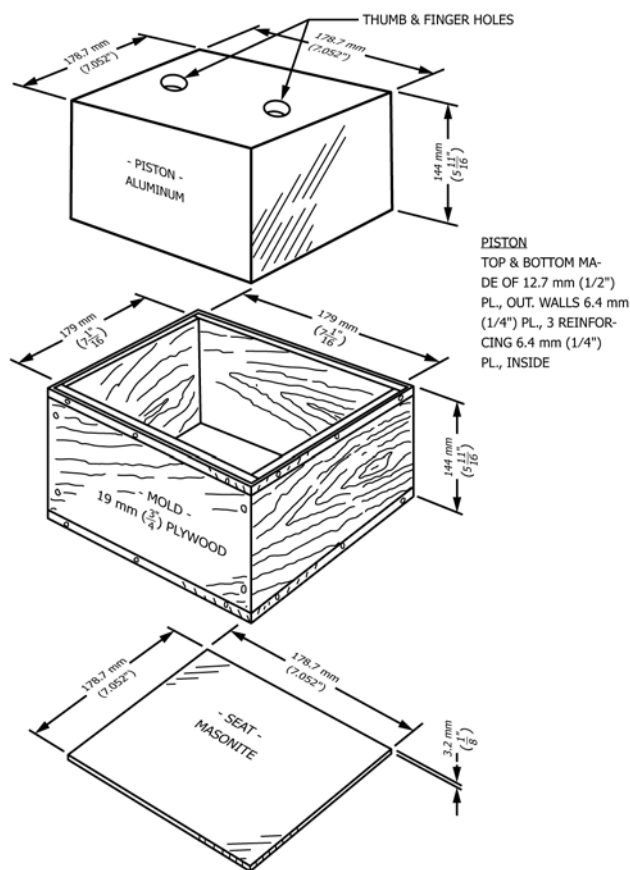


FIG. 2 Fiber Mold

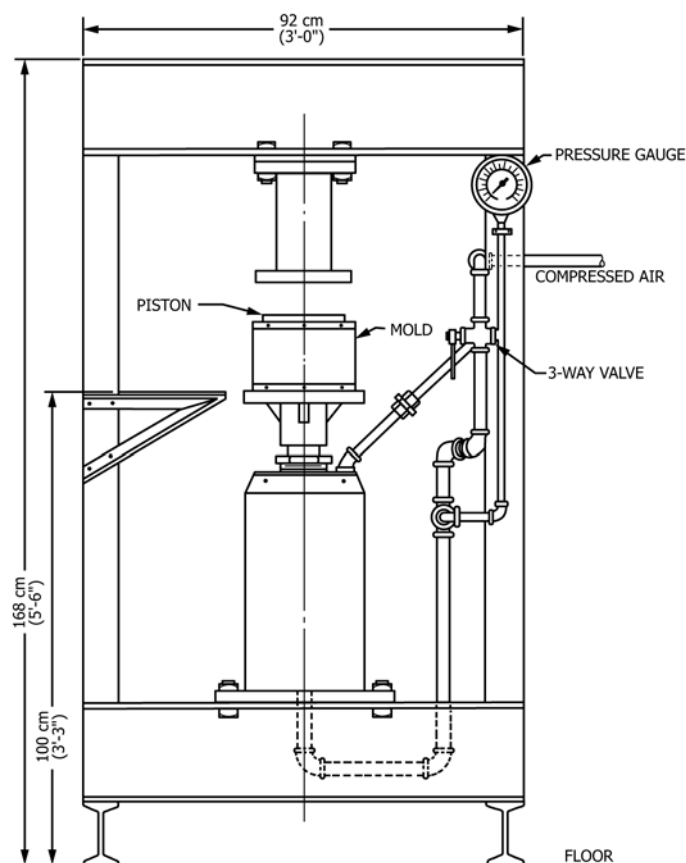


FIG. 3 Fiber Press

5.3 *Balances*, of various capacities depending on the size of the test specimen required, that is, from 2.5 kg [5 lb] down. See Fig. 3 of Test Method D3879.

5.4 *Laboratory Fiber Conditioner* (Method B), see Fig. 1.⁴

5.5 *Fiber Mold* (Method B), see Fig. 2.

5.6 *Fiber Press* (Method B), see Fig. 3.

5.7 A combination fiber press and two-stage fiber conditioner is illustrated in Fig. 4.

5.8 *Source of Random Numbers*.

5.9 *Rolling Sheet*.

6. Procedure for Test Specimens

6.1 Sprinkle the conditioned and mixed sample as obtained in 9.3, on a smooth and clean area in order to obtain a flat pile of approximately 50 to 70 mm [2 to 3 in.] thick.

6.2 Quarter the 2.5-kg [5-lb] sample, placing aside the full thickness of two diametrically opposite quarters for storage.

6.3 Reblend the remaining 1.25 kg [2.5 lb] by coning or rolling the fiber by means of the rolling sheet, spread it out evenly 25 to 35 mm [1½ to 1 in.] thick, quarter, and use two diametrically opposite quarters for the Quebec standard test specimen sample in accordance with Test Method D3639.

6.4 Reblend remainder by coning or rolling and spread on the smooth and clean surface to form a flat pile approximately 15 to 25 mm [½ to 1 in.] thick.

6.5 Select a test specimen by taking pinches from random locations of the pile until a sample is obtained that will require minimum adjustment to the desired weight.

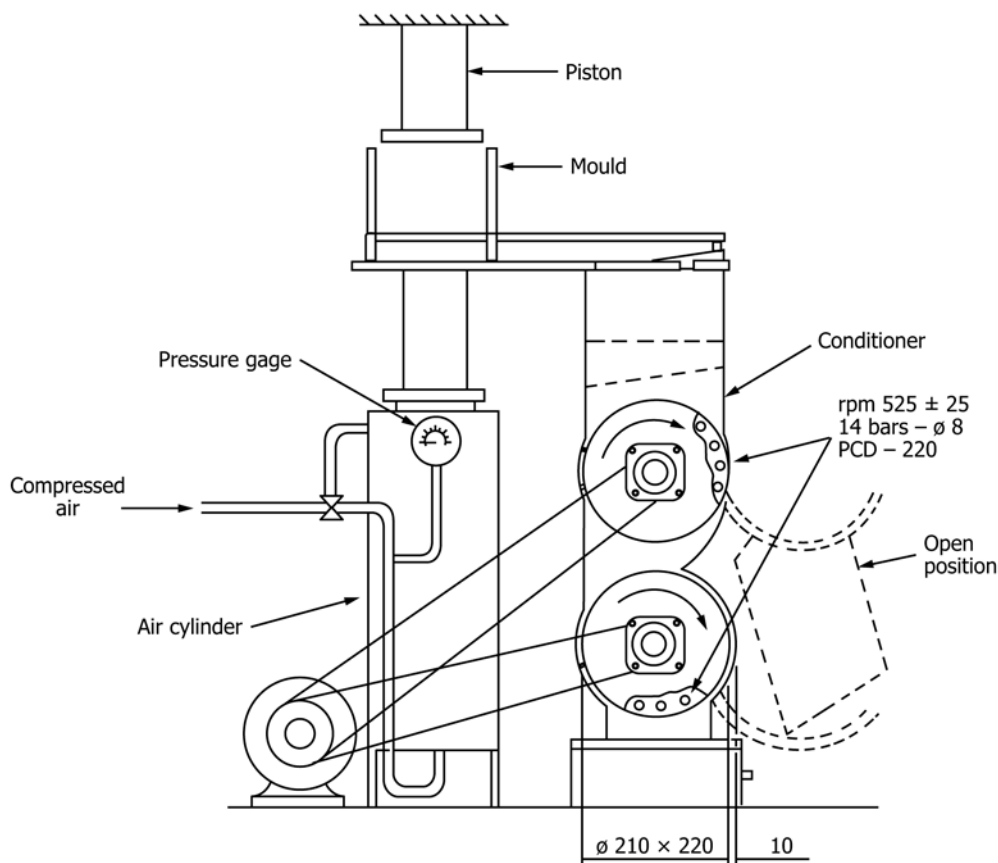
NOTE 2—As pinches are taken, care must be exercised that each pinch contains the total cross section of the pile from top to bottom at the point it is taken, including any grit or fines which may have segregated to the bottom.

7. Procedure for a Composite Sample

7.1 Divide the shipment into as many lots as necessary, each lot corresponding to any one type or grade of fiber. When large quantities must be sampled, where access to the individual bags is limited, and where restacking of the lot is impossible or implies unreasonable expense, the method for limited accessibility sampling described in Appendix X1 may be used if agreed upon between the purchaser and the supplier. (**Warning**—When handling asbestos fibers, avoid creating dust. Prolonged breathing of significant airborne concentrations of asbestos dust may cause serious bodily harm.)

7.2 Prepare a 2.5-kg [5-lb] composite sample from each lot consisting of 200 bags or part thereof (the number of bags in the lot being designated by N), by taking 20 handfuls (approximately 125 g [or 4 oz]), one in every $N/20$ th bag of the lot (systematic sample), or one in 20 different bags taken at random, using the source of random numbers.

NOTE 3—If the need for a larger sample is foreseen, a larger composite sample may be prepared.



Dimensions in millimetres

FIG. 4 Combination Fiber Press and Two-Stage Fiber Conditioner

7.3 Master Composite Samples:

7.3.1 When a lot exceeds 200 bags, but not 2000 bags, composite samples may be combined into one master composite sample at the discretion of the tester.

7.3.2 Prepare a 2.5-kg [5-lb] sample from the master composite sample by quartering it, placing aside the full thickness of two diametrically opposite quarters, and rebinding the remainder by coning. Continue this quartering until a 2.5-kg [5-lb] sample is obtained.

7.4 The 2.5-kg [5-lb] sample will be used as the source of test specimens for each individual test.

7.5 The samples shall be kept in closed containers placed in covered storage, ready for subsequent conditioning and mixing. In the case of samples intended for moisture determination, use moisture-proof containers and protect them from temperature changes.

8. Test Conditions

8.1 Each sample shall be allowed to come to equilibrium with workroom temperature and humidity except in the case of samples intended for moisture determinations.

8.2 Moisture content of sample should not exceed 3 % as determined by Test Method D2987.

9. Conditioning and Mixing

9.1 Spread the sample as obtained in Section 6, on a smooth and clean area.

9.2 Conditioning:

9.2.1 *Conditioning by Hand* (Method A)—Condition the sample by passing the fiber through the hands with gentle rubbing in order to break up lumps and separate clots. Take care not to break up fiber agglomerates consisting of close-packed fibers in parallel orientation (such as the four largest agglomerates listed in Table 3 of Terminology D2946).

9.2.2 *Mechanical Conditioning* (Method B)—For best results, it is recommended that the fiber be conditioned by means of the laboratory fiber conditioner.

9.2.2.1 Break up by hand all large lumps contained in the composite sample.

9.2.2.2 Put into the fiber mold 0.6 to 0.7 kg [1¼ to 1½ lb] of fiber, free of large lumps.

9.2.2.3 Place the mold in the fiber press and apply compressed air to yield a total force of 1900 ± 200 kg [4200 ± 500 lb] for 1 min to form a fiber cake. The piston diameter of the fiber press, specified in Fig. 3, is 200 mm [$7\frac{15}{16}$ in.].

9.2.2.4 Release the pressure and remove the pressed fiber cake, whole, by pushing it out with the piston of the mold.

9.2.2.5 Feed the pressed fiber cake into the laboratory fiber conditioner operating at 525 ± 25 rpm.

NOTE 4—Break Group 3 fiber cake, as determined by Method D3639, into three or four pieces before feeding it into the conditioner to prevent jamming.

9.2.2.6 If a two-stage fiber conditioner is used, pass portions of the composite sample through the conditioner, using choke-feeding, until the whole test sample has been conditioned. If a single-stage conditioner is used, pass the whole test sample twice through the conditioner, using choke-feeding on the second pass.

9.2.2.7 Break by hand any lumps remaining after the second conditioner pass.

9.3 *Mixing*—After conditioning, mix the sample thoroughly by passing the fiber through the hands with a gentle shaking motion.

10. Report

10.1 If a sampling report is necessary, include a statement as to how the samples were drawn (systematically or at random) and conditioned (Method A or B). Fully identify the sample with the lot that it represents.

11. Precision and Bias

11.1 Careful attention to the procedure of sampling, subsampling, and conditioning will produce test specimens that are representative of the original material.

12. Keywords

12.1 asbestos; chrysotile; referee sample; sample; sampling; test specimen

APPENDIX

(Nonmandatory Information)

X1. LIMITED ACCESSIBILITY SAMPLING

X1.1 Preamble

X1.1.1 For meaningful and accurate results, the complete unsimplified procedure is recommended for referee purposes. However, when it is impractical to comply with its requirements and when mutually agreed to by the parties concerned, the following simplifications are permitted:

X1.2 Principle

X1.2.1 The principle upon which sampling may be simplified is the application of the same specimen selection criteria to designated accessible portions of the pile, which portions shall be most nearly representative of the bags within the pile.

X1.2.2 The portions of the pile prescribed may include all of the exposed accessible surface layer of bags.

X1.2.3 In cases where the pile of bags was stacked in a known order, and one or more of the exposed accessible surfaces of the pile of bags are known to contain a representative array of lots from which the pile is composed, then select the samples from these surfaces to the neglect of other accessible, but less representative surfaces of the pile.

NOTE X1.1—The common practice in the asbestos-producing industry is to form large piles of bags of the same grade by stacking pallet loads in orderly rows in such a sequence that one exposed surface of the pile will contain a representative array of pallet loads from each production lot. The surface occupied by each lot is proportional to the volume of each lot.

X1.2.4 In cases where the pile of bags was not stacked in a known order, divide the accessible surface, or surfaces, into areas most nearly representing volumes of 200 bags within the pile, and select samples from these surface areas.

NOTE X1.2—A 6 by 6 area (36 bags) representing a 6 by 6 bag cube (216) is most suitable. Where the depth of the pile is greater, or less than 6 bags, the selected area should include a number of bags that equals 200 divided by the depth of the pile.

X1.3 Sampling

X1.3.1 Once a representative accessible surface, or surfaces, have been selected, proceed as follows to collect the specimens of which the sample is composed:

X1.3.2 Prepare a 2.5-kg [5-lb] composite sample from the chosen surface, representing a volume of 200 bags or part thereof by selecting 20 handfuls, approximately 125 g [4 oz] each, from a different 1/20th of the surface. Where the area representing the volume of 200 bags consists of less than 20 bags, the number of bags from which the 20 handfuls are selected may be reduced, but should not be less than 10. If an exposed area of less than 10 bags is accessible as representing the 200-bag unit, then draw the sample from all of the accessible bags and so record.

X1.3.3 When the accessible surface represents more than 200 bags, but not more than 2000 bags, composite samples may be combined into one master composite sample at the discretion of the tester, if agreed upon between the purchaser and the supplier.

X1.3.4 Keep samples in closed containers placed in covered storage for subsequent testing.

X1.4 Sample Preparation

X1.4.1 Proceed as in Section 6, and 8 to 10.1.

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