Designation: D3345 – 17

Standard Test Method for Laboratory Evaluation of Solid Wood for Resistance to Termites[1]

This standard is issued under the fixed designation D3345; 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 laboratory evaluation of treated or untreated solid wood for its resistance to subterranean termites. This test is considered as a screening test for treated material and further evaluation by field methods is required.

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 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. (***Warning—***See 7.1.4.)*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D1413 Test Method for Wood Preservatives by Laboratory Soil-Block Cultures (Withdrawn 2016)[3]

2.2 *Other Documents:*[4]

AWPA E10 Testing Wood Preservatives by Laboratory Soil-Block Cultures

3. Choice or No-Choice Methodology

3.1 There are two types of basic information that can be obtained from termite bioassays:

3.1.1 Choice test data-termites are presented with multiple feeding targets and preferential mass loss indicates a material preference over an alternative food source.

3.1.2 No-choice data-termites are presented with a singular choice and mass loss indicates ability of the insect to consume the material. In no-choice data, mortality data is needed to determine dose mortality based on consumption of the test material, which is often treated with suspected insecticidal compounds.

3.2 Both choice and no-choice tests shall be permitted when evaluating materials for resistance to subterranean termites as the different tests address different behavioral responses of the termites.

4. Apparatus

4.1 *Containers, Glass or Clean Plastic,* with loosely fitting tops with liners removed, 220 to 450 cm^3 (8 to 16 oz).

4.1.1 If volatile chemicals are to be tested, a 4.8 mm (No. 12 or approximately 3⁄16 in.) hole is drilled in the center of the top and the appropriate solvent controls shall be included as treatments to identify possible solvent/carrier effects.

4.2 *Tray,* enamel, stainless steel, or plastic, 0.25 m by 0.51 m (10 by 20 in.) and bucket.

4.3 *Paper Towels.*

5. Reagents and Materials

5.1 *Benzalkonium Chloride Solution* (1+750)—Add 1 part benzalkonium chloride to 750 parts water. A comparable surface antiseptic is satisfactory.

5.2 *Distilled Water.*

5.3 *Sand,* brown or white, screened, washed, and heat-sterilized.

5.4 *Southern Yellow Pine (SYP)* (*Pinus* spp.) measuring 25.4 mm (1.00 in.) square by 6.4 mm (0.25 in.) in the tangential direction. Sapwood, no visible defects, smoothed surfaces equivalent to planed or sanded, 2 to 3 rings/cm (4 to 6 rings/in.). All test samples shall come from same parent board.

5.4.1 Other wood species may be used, but in each separate test using other species as the major test wood, five SYP sapwood blocks shall be used as additional controls to permit the correlation of test results among laboratories.

5.5 *Subterranean Termites*—Use a major common species of the region being studied.

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[1] This test method is under the jurisdiction of ASTM Committee D07 on Wood and is the direct responsibility of Subcommittee D07.06 on Treatments for Wood Products.

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

[4] Available from the American Wood Protection Association (AWPA), PO Box 361784, Birmingham, AL 35236-1784, http://www.awpa.com.

5.5.1 Specific identification of any termites used shall be obtained and reported with the test data.

6. Determination of Sand Water-Holding Capacity

6.1 Determine the quantity of distilled water to be added to the sand during the test as follows:

6.1.1 Place 100 g of oven-dry sand in a beaker and determine the volume of water required to saturate the sand. The saturation point is defined as the point when the addition of more water will result in free water on the surface of the sand.

6.1.2 Calculate the percent saturation as follows:

$$\% \text{ Saturation} = (\text{weight of water/oven dry weight of sand}) \times 100 \quad (1)$$

6.1.3 Add water to the sand as follows:

$$\% \text{ water to add} = \text{saturation} - 7.0 \quad (2)$$

6.1.4 For example, the saturation point was reached at 20 mL of water:

$$\text{Saturation} = (20/100) \times 100 = 20.0\,\% \quad (3)$$

$$\% \text{ Water to add} = 20.0 - 7.0 = 13.0\,\%$$

7. Collection of Termites

7.1 *Subterranean Termites,* for example, (*Reticulitermes*, *Coptotermes*, spp.)—Collect from an active, large colony (over 50 000) in a natural forest situation, for example, from fallen logs, stumps, and so forth, or from strong laboratory cultures. It is vital to the execution of this assay that healthy termites are collected for use in the laboratory tests. Non-aggressively feeding termite data can skew results and often lead to improper conclusions. Careful attention shall be paid to untreated control data over the duration of each test and if mass loss due to feeding is not in an acceptable range based on past studies (1, 2) the test shall be repeated with a fresh collection of termites.

7.1.1 Remove short log sections to the laboratory and split them. Shake the insects out onto a tray or trays. After distributing the debris and insects evenly on the tray(s), lay damp paper towels, sheets of kraft paper, and so forth, over the debris. The termites will cling to the damp paper after a few minutes.

7.1.2 Prepare an 8 to 11-L (2 to 3-gal) pail by placing about ten unfolded, slightly crumpled, damp paper towels in the bottom of the pail. Rinse these towels in distilled water and squeeze damp a number of times. Cover these towels with about ten unfolded, dry paper towels.

7.1.3 Shake the damp towels covering the tray debris into the above described pail. After 2 to 4 h, remove the dry towels and any insects and debris on them from the pail and discard. Use insects clinging to the lower, damp towels in the test.

7.1.4 Do not hold termites in the pail longer than 24 h before using. (**Warning—**Exercise reasonable care to ensure that any termites discarded (for example, 7.1.3) are dead. Oven-drying debris and towels used at 100°C for 6 h is sufficient. When a test is finished, exercise reasonable care to ensure that living insects are not discarded.)

8. Weathering of Test Blocks

8.1 If the test material is weathered prior to exposure to the insects, report the complete details on the weathering.

8.2 The ASTM weathering procedure for the soil-block test is recommended (see Test Method D1413).

9. Treatment and Conditioning of the Test Blocks

9.1 Treatment of test blocks shall follow standard treatment methods detailed in AWPA E10-16 (AWPA 2016), initial and final weights shall be reported to determine uptake and retentions of treatments used in bioassays.

9.2 Condition all test blocks, following weathering if used, to a constant weight within the equilibrium moisture content range from 6 to 14 % moisture content to ensure that all solvent is removed prior to exposure to insects.

9.3 The ASTM soil-block conditioning procedure is recommended (see Test Method D1413).

10. Block Quantity and Identifications

10.1 Prepare five replicate blocks for each variable under test, for example, for each retention of each preservative or chemical to be tested.

10.2 Use five untreated blocks as described in 10.1 as controls for each separate study.

10.3 If SYP is not used as the species in 10.1 and 10.2, then add five blocks of untreated SYP to each study to permit a comparison to studies using SYP as the major species.

10.4 Identify all blocks with a number in a suitable manner.

11. Assembling Containers

11.1 Prior to using, wash all containers rinsed in the surface antiseptic solution, and dry.

11.2 Place the test block in the bottom of the container with one edge of the block up against the side of the container.

11.3 Add 200 g of sand to each container.

11.4 Use suitable numbers on each container.

11.5 Add sufficient distilled water to each container as determined in Section 5. After addition of the water, allow the containers to stand overnight.

11.6 Assemble five containers with sand, water, and termites but without test blocks.

12. Adding Termites

12.1 Weigh out 1 ± 0.05 g of subterranean termites (Section 7) and add to each of the previously prepared containers. Select the termites so that about 90 % are workers.

12.2 Replace the container tops loosely.

13. Container Storage and Inspections

13.1 Select five test containers randomly and weigh individually. Maintain all containers at 25.5 to 27.7°C (78 to 82°F) for four weeks.

13.2 At the end of the first and fourth weeks, examine the containers and record the presence of tunneling, termite mortality, and position of the termites in the container as follows:

13.2.1 After one week, containers assembled in accordance with 11.6 shall show virtually complete survival, thereby indicating that test procedures have been followed and vigorous termites used.

13.2.2 *Tunneling Present—Yes* or *no.* (Tunneling indicates vigor of insects.)

13.2.3 *Majority Termite Position*—(On or beneath surface. Position on surface suggests response of termites to an antagonizing effect such as repellency of preservative.)

13.2.4 *Approximate Termite Mortality*— Slight (0 to 33 %), moderate (34 to 66 %), heavy (67 to 99 %), complete (100 %).

13.2.5 Weekly reweigh the five selected containers (13.1) and add distilled water to all containers if the moisture content of the sand drops below two percentage points of the original moisture content (see Section 6).

14. Container Disassembly

14.1 After four weeks disassemble the containers and remove and clean the blocks. Prior to and during the disassembly, note the items in 13.2. Discard the used sand and termites (**Warning—** See 7.1.4.) and do not reuse for subsequent tests.

15. Block Evaluation

15.1 Examine and visually rate each block using the following rating system:

10	Sound, surface nibbles permitted
9	Light attack
7	Moderate attack, penetration
4	Heavy
0	Failure

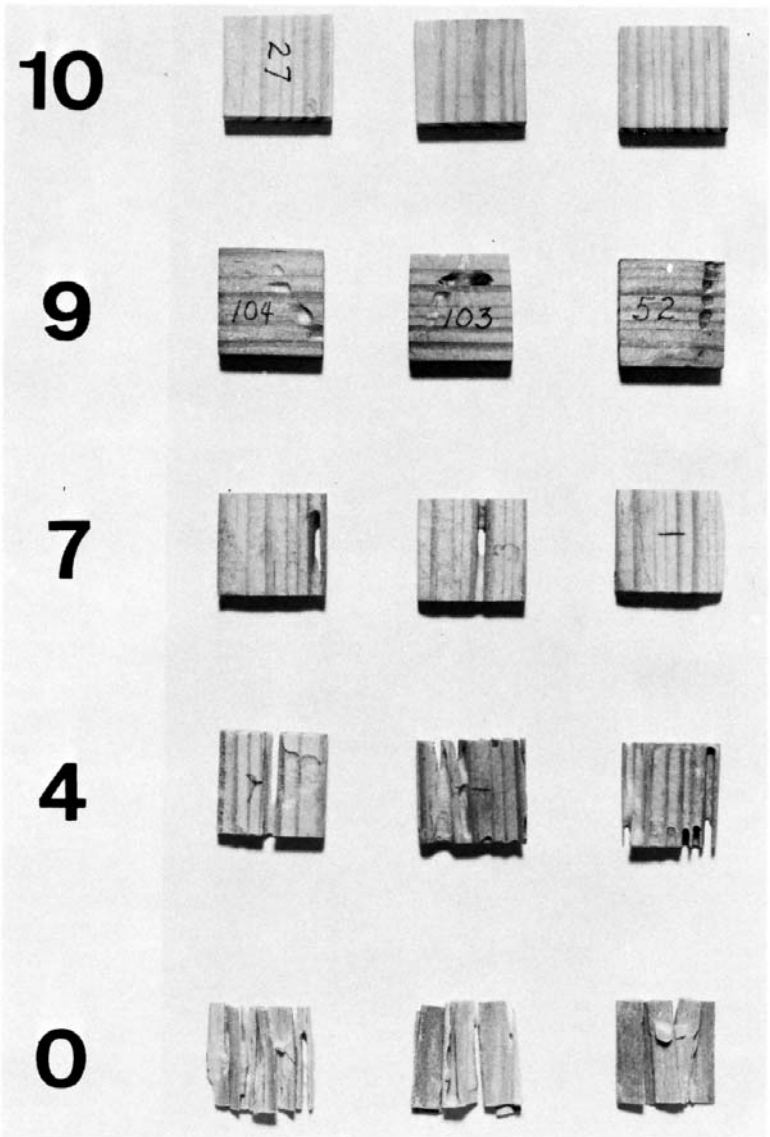

FIG. 1 Typical Ratings of Termite Attack on Test Blocks

15.2 Blocks representative of these levels of attack are shown in Fig. 1.

16. Keywords

16.1 solid wood; termites

REFERNCES

(1) Kard, Brad, Etheridge, Larry, Mallette, E., and Rich, N., "Procedures for Preparing Subterranean Termites for Laboratory Studies (Isoptera: Rhinotermitidae)," *Sociobiology*, Vol. 41, No. 2, 2003, pp. 495-511. (This paper does not take into account the effect of storage of termites and wood consumption or behavior but defines collection and storage.)

(2) Lindsey, Brian, "Evaluation of Parameters Specified in AWPA Standard E1-97, Standard Method for Laboratory Evaluation to Determine Resistance to Subterranean Termites," 70, 2010, Mississippi State. \http://sun.library.msstate.edu/ETD-db/theses/available/etd-03112010-150744/unrestricted/final.pdf