



Designation: ~~D3345~~–17 D3345 – 22

Standard Test Method for Laboratory Evaluation of Solid Wood for Resistance to Subterranean Termites¹

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 reappraisal. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reappraisal.

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, health, and environmental practices and determine the applicability of regulatory limitations prior to use. (Warning—See 7.1.4.)*

1.4 *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

~~D1413~~ D1413 Test Method for Wood Preservatives by Laboratory Soil-Block Cultures (Withdrawn 2016)³

2.2 *Other Documents:*⁴

~~AWPA E10~~ AWPA E10 ~~Testing Wood Preservatives by Laboratory Soil-Block Cultures~~ Laboratory Method for Evaluating the Decay Resistance of Wood-Based Materials Against Pure Basidiomycete Cultures: Soil/Block Test

~~AWPA E1~~ AWPA E1 ~~Laboratory Method for Evaluating the Termite Resistance of Wood-Based Materials: Choice and No Choice Tests~~

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—Choice test data—termites—termites~~ are presented with multiple feeding targets and preferential mass loss indicates a material preference over an alternative food source. two feeding targets which may or may not contain insecticidal components. Difference in mass loss may be indicative of preference or avoidance of one material over another.

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. Current edition approved Jan. 1, 2017/Jan. 1, 2022. Published March 2017/March 2022. Originally approved in 1974. Last previous edition approved in 2008/2017 as ~~D3345–08~~–D3345–17. DOI: 10.1520/D3345-17.10.1520/D3345-22.

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.

3.1.2 No-choice test—~~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 tests~~, mortality data is needed to determine dose mortality based on consumption of the test material, which is often treated with suspected insecticidal compounds.

NOTE 1—It is recommended that both choice and no-choice tests be performed when evaluating materials for resistance to subterranean termites as the different tests address different behavioral responses of the termites.

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.~~ Details regarding test methodology shall be included in the final report, and use of choice or no-choice, or both, shall be indicated in the report title.

4. Apparatus

4.1 Containers, Clear, Clean Glass or Clean Plastic, with loosely fitting tops with liners removed, ~~220~~220 cm³ to 450 cm³ (8 to 16 oz); ~~(225 mL (8 oz) to 480 mL (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~~ 0.25 m by 0.51 m (10 in. by 20 in.) and bucket.

4.3 ~~Paper Towels~~—Towels or Corrugated Cardboard.

4.4 Incubation Room (or Cabinet), maintained at a temperature between 25 °C to 28 °C (77 °F to 82 °F).

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 or Deionized Water, heat-sterilized.

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 spp., measuring 25.4 mm (1.00 in.) square by 6.4 mm (0.25 in.) in the longitudinal or 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~~ board (1, 2).⁵

5.4.1 Other wood species may be used, but in each separate test using other species as the major test wood, ~~five~~ untreated 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.

5.5.1 Specific identification of any termites used shall be obtained and reported with the test data. Methods used for termite identification, as well as source of termites/collection location, shall also be reported.

6. ~~Determination of Sand Water-Holding Capacity~~ Determining Amount of Water Based on Moisture Content

6.1 Determine the quantity of sterile distilled or deionized water to be added to the sand ~~during the test as follows:~~ based on genus of termite used in testing. A moisture content between 8 % to 10 % and 15 % to 20 % shall be used for tests using Coptotermes spp. and Reticulitermes spp., respectively (2).

⁵ The boldface numbers in parentheses refer to a list of references at the end of this standard.

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. Water shall be added to oven dried sand in the following ratios:

6.1.1.1 Coptotermes spp., 100 g sand + 8 mL to 10 mL water.

6.1.1.2 Reticulitermes spp., 100 g sand + 15 mL to 20 mL water.

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 (for example, (*Reticulitermes*, *Reticulitermes* spp., *Coptotermes*, *Coptotermes* spp.))—Collect from an active, large colony (over 50 000) in a natural forest situation, for situation (for example, from fallen logs, stumps, and so forth, stumps), 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 (13, 24) the test shall be repeated with a fresh collection of termites. termites (see also 15.1.2). (Note: Survival, wood consumption, and behavior can vary by termite colony. Therefore, depending on availability, tests may be run using termites from multiple colonies.)

7.1.1 RemoveTransport short log sections sections of infested logs or cellulosic collection materials (for example, corrugated cardboard traps) to the laboratory and split them. carefully break open. Shake the insects out onto a tray or trays. After distributingtrays and distribute the debris and insects evenly on the tray(s), laytray(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 88 L to 111 L (211 L (2-gal 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. times until damp. 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 Gently shake insects clinging to the lower, damp towels in the test into a clean tray. Using a small piece of paper (approximately 7.5 cm by 7.5 cm (3 in. by 3 in.)), gently slide the paper under the termites and lift up, tilting the paper slightly so any remaining debris falls off. Healthy termites will cling to the paper. Collect termites for testing into a clean tray by lightly tapping the hand holding the paper, which will cause the termites to fall off.

7.1.4 Add termites to test containers as soon as possible once separated from debris. Do not hold termites in the pail or tray longer than 24 h 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 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. termite exposure, the weathering procedure shall follow that of Test Method D1413 or AWPA E10.

8.1.1 Complete details on the weathering procedure used shall be included in the final report and noted in the report title.

~~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 E10, initial, wet,~~ and final weights shall be reported to determine uptake and retentions of treatments used in bioassays.

9.2 All specimens shall be placed on a screen or mesh rack and maintained under open laboratory room conditions or under a laminar flow hood for at least 48 to 72 h prior to conditioning.

9.2.1 If volatile formulations are tested, appropriate solvent controls shall be included as treatments to identify possible solvent/carrier effects.

9.2.2 Blocks treated with volatile formulations should be placed on a screen or mesh in a flow hood for at least 1 week to allow for outgassing.

9.3 Condition all test blocks, following weathering if used, to a constant weight within the equilibrium moisture content range from 66 % to 14 % ~~moisture content~~ to ensure that all solvent is removed prior to exposure to insects.

9.4 Conditioned weights shall be recorded for all specimens prior to termite exposure.

9.5 The ~~ASTM soil-block conditioning procedure is recommended (see found in Test Method D1413);~~ shall be used prior to termite exposure.

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.

10.1 If SYP is not used as the species in No-choice testing: 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:

10.1.1 Prepare a minimum of five replicate blocks for each variable being tested, for example, for each retention of each preservative, chemical, or solvent.

10.1.2 Use a minimum of five untreated blocks as described in 5.4 as controls for each separate study. If SYP is not used as the species in 10.1.1, then five additional blocks of untreated SYP shall be included as a second set of controls.

10.2 Choice-testing:

10.2.1 Prepare blocks so that there are a minimum of five containers evaluating each set of treatment pairings (Table 1).

TABLE 1 Example Treatment Pairings for Choice Testing

Hypothetical Test Groups	Treatment Comparison Pairings	
Untreated Control (C)	C—C	T1—T2
Treatment #1 (T1)	C—T1	T1—T3
Treatment #2 (T2)	C—T2	T2—T3
Treatment #3 (T3)	C—T3	

10.2.2 Use a minimum of five paired untreated blocks as described in 5.4 as controls for each separate study. If SYP is not used as the species in 10.2.1, then five pairs of untreated SYP shall be added as a second set of controls.

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

10.3.1 Block numbers shall be noted on the outside of choice-test containers to identify placement of individual specimens within the container.

11. Assembling Containers

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

11.2 Add sand to each container in accordance with 6.1.1.

11.3 Add sufficient water to each container as determined in Section 6. After addition of the water, allow the containers to stand for approximately 2 h prior to adding termites.

11.4 Place the test block in the bottom of the container. Add test blocks to the containers as follows (Fig. 1 with one edge of the block up against the side of the container.):

11.4.1 For no-choice tests, test blocks shall be placed on the surface of the sand with one edge of the block up against the side of the container.

11.4.2 For choice tests, blocks should be placed on the surface of the sand at opposite ends with edges of the blocks up against the side of the container.

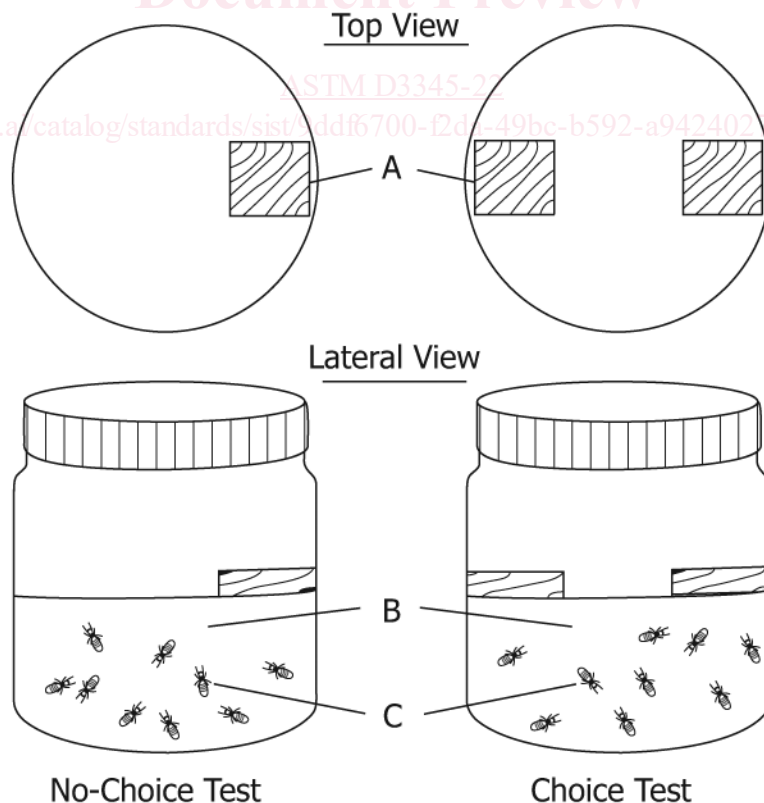


FIG. 1 Termite Test Set-up for No-choice (Left) and Choice (Right) Tests. General Testing Components Include: Wood Block Specimen (A), Wetted Sand Substrate (B), and Subterranean Termites (C)