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Standard Test Method for Testing Wood-Base Panel Corner Impact Resistance[1]

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INTRODUCTION

Corner impact resistance may be an important property for wood-base panel applications such as pallets, cargo crates, concrete form boards, fruit and vegetable boxes and furniture. There is a need to have suitable corner impact resistance in such products to ensure satisfactory end–use performance. This test method provides a technique to assess relative corner impact resistance of wood-base panels.

This test method uses a vertical test frame to create corner impact on a panel specimen. The test specimen is held in a fixture that free-falls to the floor. The test specimen is examined for distance of impact damage and for qualitative damage.

1. Scope

1.1 This test method shall be used to measure the relative corner impact resistance and other damage that may occur during the rough handling of wood-base panels or composite materials. This test method is suitable for all wood-base panels such as plywood, oriented strand board, hardboard, particleboard and medium density fiberboard as well as other composite panel products.

1.2 This test method covers determination and evaluation of the effects of panels being dropped from various heights with a predetermined amount of dead load and angle of impact to simulate an equivalent field application.

1.3 The values of all information will be stated in English units and regarded as standard. The SI values are written in parentheses.

1.4 *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:*

D 2395 Test Method for Specific Gravity of Wood and Wood-Base Materials[2]

D 4442 Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials[2]

3. Terminology

3.1 *Definitions:*

3.1.1 *actual damage*, *n*—distance of damage counted from tip to damage line after dropping.

3.1.2 *damage line*, *n*—the innermost line where crushing occurs.

3.1.3 *dropping head*, *n*—the part of the machine connected to the quick release mechanism that holds the test specimen and added amount of dead load. The dropping head free-falls to create the impact between the panel specimen and the floor.

3.1.4 *impact tip*, *n*—the part of the specimen that will make initial contact with the floor after dropping.

3.1.5 *peeling*, *n*—the furthermost splintering from the damage line. This provides additional understanding of damage characteristics.

3.1.6 *pull cord*, *n*—cord that is connected to the quick release mechanism that allows a quick release of the dropping head by pulling.

3.1.7 *quick release mechanism*, *n*—the equipment that allows for free release of the head when the pull cord is activated.

3.1.8 *reference line*, *n*—line from which all measurements are taken. This allows samples to be cut to approximate size and still ensure accurate values.

4. Summary of Test Method

4.1 Specimens are cut from the corners of the sample panel. The specimens are fastened to the lower edge of a dropping head and clamped into position. The weight of the dropping head is controlled to simulate the weight of the real application. The dropping head is raised to specified heights and released to fall to a rigid floor or other surface. The corner damage as well as peeling is measured to indicate the corner impact resistance. Peeling beyond the damage line may also be reported.

4.2 Optionally, sample can be subjected to wet-dry cycles to simulate end-use applications.

[1] This test method is under the jurisdiction of ASTM Committee D07 on Wood and is the direct responsibility of Subcommittee D07.03 on Panel Products.

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[2] *Annual Book of ASTM Standards*, Vol 04.10.

5. Significance and Use

5.1 This test method determines the corner impact damage that could be used to measure the relative corner impact resistance.

6. Apparatus

6.1 The drop test frame shall accommodate the test specimens as defined in Section 8. A test frame 15-ft (4572-mm) tall, 27-in. (686-mm) wide and 15-in. (381-mm) deep has been found suitable. The drop test frame shall be made of steel or other suitable material with two guide poles placed on either side to allow for smooth, low friction dropping from controlled heights. The lower half of the frame should be covered with a metal mesh to provide protection from flying debris. A door should be placed at the bottom of the frame to provide access for loading the specimens and changing the weight. A test frame found suitable for this method is shown in Fig. 1.

6.2 The dropping head should be large enough to attach to guide poles on either side of the test frame as well as be able to firmly attach the test specimen and hold additional weight. The weight of the dropping head, excluding the panel specimen shall be 31.5 ± 0.25 lb (14.29 ± 0.11 kg).

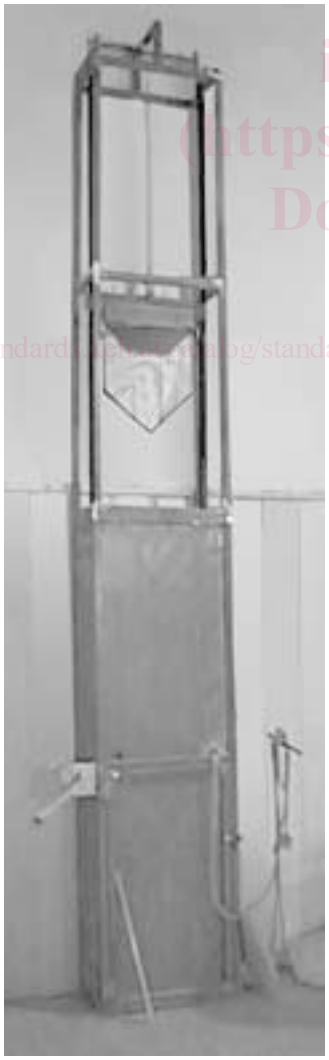

FIG. 1 Drop Test Machine

NOTE 1—The weight of the dropping head may be adjusted to target a different weight if relevant to a specific intended application. This typically requires additional weight to be added to the dropping head.

6.3 Metal bars should support the dropping head while changing specimens and the dead load to ensure no accidents occur during adjustments. The test specimen should be clamped to the bottom of the dropping head to make sure the corner of the specimen will contact the floor first. A hook is mounted at the top of the dropping head to attach to the quick release mechanism.

6.4 Attached to the quick release mechanism is a pull cord for the operator to start the test. A hand winch with a cable is also connected to the quick release mechanism to winch the dropping head and test specimen to the desired height.

6.5 The test frame is equipped with a measuring device to control the drop height as measured from the lowest tip of the panel specimen to the floor. The drop height is measured to the nearest ⅛ in. (3 mm).

6.6 The test frame shall be mounted on a concrete floor or other solid rigid surface that will provide negligible deformation upon impact. The panel specimen impacts directly on the floor or other rigid surface.

NOTE 2—If the field condition involves impact at an angle, the impact surface may be angled to simulate the condition.

6.7 The dropping head, with panel specimen affixed, is dropped from heights of increasing 1–ft (305–mm) increments starting at 1 ft (305 mm). A new panel specimen is used for each drop. After each drop, the performance of the specimen is reported (see Section 12). Drop height is increased up to 15 ft (4572 mm), or until the impact damage exceeds practical limitations of the panels ability to perform for the intended application.

NOTE 3—Testing may begin at drop heights greater than 1 ft (305 mm) if lower drops deemed unnecessary. Similarly, incremental heights may be spaced greater than 1 ft (305 mm) as desired.

7. Hazards

7.1 *Safety Hazards*—Protective measures should be taken as test panel impact may create flying debris.

8. Test Specimen

8.1 The drop test specimens shall be cut in pentagonal shape with 4 sides measuring an equal 12 in. (305 mm) and the side directly opposite the impact tip shall measure 17 in. (432 mm). The impact tip should be cut from the corner of the panel (Fig. 2) or from representative areas of the panel.

8.2 A reference line should be drawn on each specimen (Fig. 3), 15 in. (381 mm) from the impact tip. The reference line is drawn parallel to the back edge. Two holes shall be drilled close to the back edge to allow the sample to be clamped into the dropping head. The thickness shall be measured at the center of the two edges adjacent to the impact corner to an accuracy of ±1 %.

9. Specimen Moisture Condition

9.1 Specimens for dry testing shall be conditioned to constant weight and moisture content in a conditioning chamber at a relative humidity of 65 ± 5 % and a temperature of 20 ± 6°C (68 ± 12°F).