

Australian/New Zealand Standard™

Methods of test for veneer and plywood

Method 2: Bond quality of plywood (chisel test)

1 SCOPE

This Standard sets out the method for determining the quality of bond in plywood.

2 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS/NZS

4491 Timber—Glossary of terms in timber-related Standards

ISO

9000 Quality management systems—Fundamentals and vocabulary

3 DEFINITIONS

For the purpose of this Standard the definitions in AS/NZS 4491 and AS/NZS ISO 9000 apply.

4 PRINCIPLE

The veneers are removed by force along the glueline. The percentage of wood fibre in the exposed glueline is evaluated.

In a well-made glueline, the separation of plies occurs, predominantly, through breaking of the wood itself and not by separation of the plies along the glueline. Therefore, a satisfactory glueline will include a substantial amount of adhering wood fibre when the plies are forcibly separated. Consequently, the proportion of fractured wood adhering to both plies will provide a measure of the quality of the bond.

5 APPARATUS

5.1 All tests

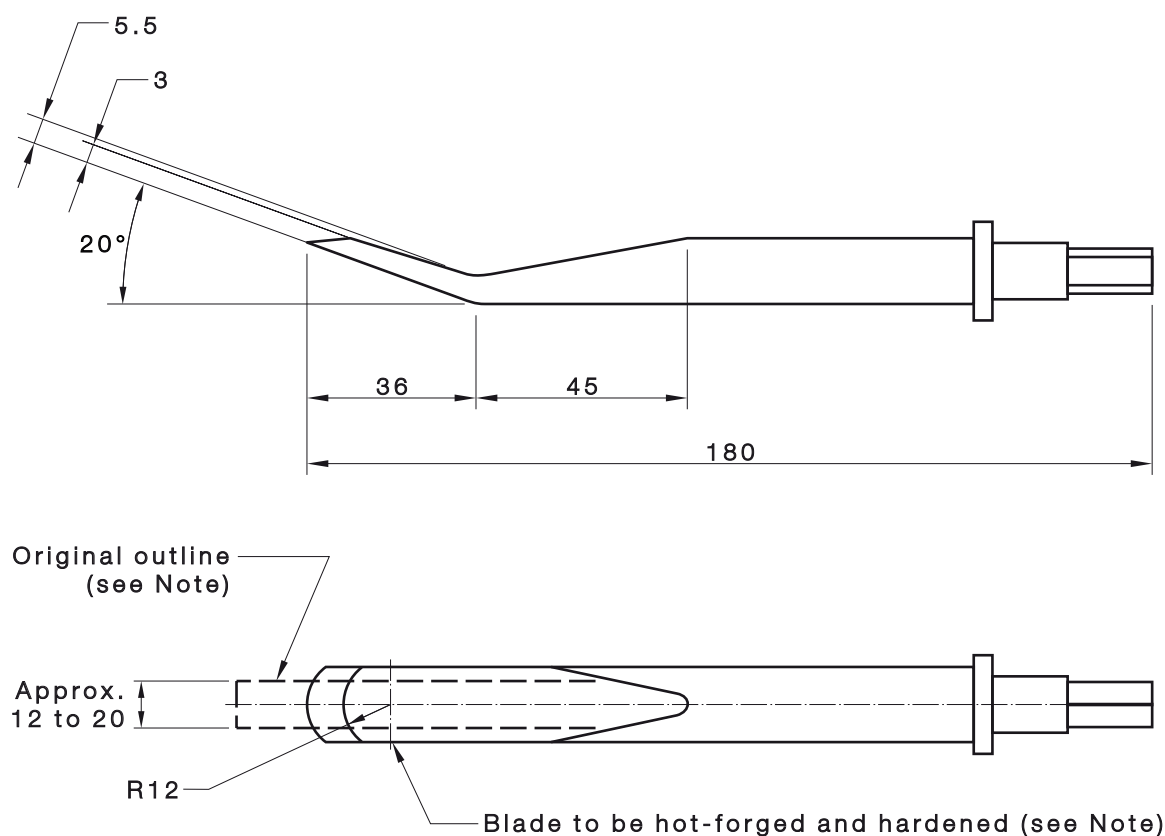
The following apparatus is required for all tests:

- (a) Chisel (knife) as shown in Figure 1 or Figure 2.

NOTE: The percussion chisel shown in Figure 1 requires a percussion mechanism to assist in forcing the chisel along the glueline.

- (b) A bench with a timber backstop.
- (c) A light source fitted with a minimum clear incandescent 150 W lamp or a 15 W fluorescent tube.
- (d) A well-ventilated thermal oven with wire mesh shelves or other open material that allows free internal circulation of air, and capable of maintaining a temperature of above 90°C without degrading the specimen; *or*

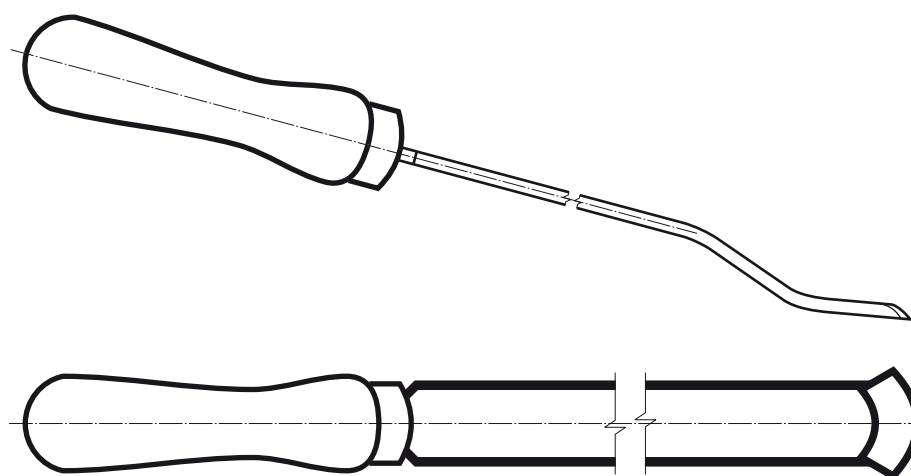
A suitable microwave oven equipped with a cooling fan and cavity air exhaust.



NOTE: Blades made from approximately 12 mm to 20 mm flat-face chisel have been found to be suitable.

DIMENSIONS IN MILLIMETRES

FIGURE 1 PERCUSSION CHISEL FOR BOND TESTING OF PLYWOOD



NOTE: A chisel of this kind may be made from a 250 mm × 25 mm file.

FIGURE 2 HAND CHISEL FOR BOND TESTING OF PLYWOOD

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5.2 Water immersion

The following apparatus is required for preparation of test pieces by water immersion:

- (a) A water bath of sufficient size to accommodate test pieces up to 200 mm × 85 mm and of a temperature range appropriate to the type of bond (see Clause 7.2.2.)

NOTES:

- 1 For temperatures of 15°C to 20°C, temperature control is not usually necessary.
 - 2 For a temperature of 70°C, adequate control and circulation equipment is necessary to ensure that the temperature of the bath does not vary by more than $\pm 1^\circ\text{C}$ from the prescribed temperature.
 - 3 For a temperature of 100°C, only heating is normally essential; however, a constant level attachment and a means of adjusting the rate of heating are desirable.
- (b) Racks or other means of keeping all test pieces separated so they do not come in contact but are completely immersed in water. The racks shall not contaminate the water or be corroded by it.

5.3 Steaming

The following apparatus is required for preparation of test pieces by steaming:

- (a) An adequately drained autoclave or similar vessel of sufficient size to accommodate test pieces up to 200 mm × 85 mm, designed to withstand safely a pressure of at least 220 kPa above atmospheric pressure and capable of controlling pressure within ± 7 kPa of the prescribed pressure.
- (b) Racks or other means of keeping all test pieces separated so they do not come in contact but are completely immersed in steam. The racks shall not contaminate the water or be corroded by it.

6 TEST PIECES

The number of test pieces specified in the appropriate product Standard shall be cut from the plywood sample. Each test piece shall be the full thickness of the plywood and a minimum of 150 mm long and 65 mm wide to a maximum of 300 mm × 300 mm. Each test piece shall be marked to identify it with the plywood sample from which it was cut.

7 PREPARATION OF TEST PIECES

7.1 Test in dry condition

Test pieces for testing in the dry condition shall be tested in the 'as cut' condition.

7.2 Test in boil, steam and soak condition

7.2.1 General

For the treatment of all test pieces, the water or steam shall have free access to all edges of every test piece. All test pieces shall be free of any edge coating or sealing that is likely to prevent or hinder the entry of water or steam into the edges. Preparation procedures for the various types of bonds shall be as given in Clauses 7.2.2 to 7.2.5.

7.2.2 Type A bond test

The preparation procedure shall be as follows:

- (a) Submerge the test pieces in water at 100°C for 72 h +1 h –0 min;
or

Steam the test pieces in an adequately drained vessel at 200 ± 7 kPa above atmospheric pressure for 6 h +15, –0 min.

NOTE: The 72 h submersion in boiling water may be the aggregate of shorter periods, provided the test pieces are stored in cold water between periods of boiling.

- (b) At the conclusion of the boil or steam treatment, immerse the test pieces in water at normal room temperature until cooled to ambient temperature.
- (c) Keep the test pieces wet until they are tested.

NOTE: Testing should be completed within 24 h of the removal of the test pieces from the boiling water or steam.

7.2.3 Type B bond test

The preparation procedure shall be as follows:

- (a) Submerge the test pieces in water at 100°C for 6 h +5, –0 min.
- (b) At the conclusion of the boiling treatment, immerse the test pieces in water at normal room temperature until cooled to ambient temperature.
- (c) Keep the test pieces wet until they are tested.

NOTE: Testing should be completed within 24 h of the removal of the test pieces from the boiling water.

7.2.4 Type C bond test

The preparation procedure shall be as follows:

- (a) Submerge the test pieces in water at 70 ±1°C for 3 h +5, –0 min.
- (b) At the conclusion of the hot water soak, immerse the test pieces in water at normal room temperature until cooled to ambient temperature.
- (c) Keep the test pieces wet until they are tested.

NOTE: Testing should be completed within 24 h of the removal of the test pieces from the boiling water.

7.2.5 Type D bond test

The preparation procedure shall be as follows:

- (a) Submerge the test pieces in water at normal room temperature, typically 15°C to 25°C, for not less than 16 h and not more than 24 h.
- (b) Remove the test pieces from the water and test immediately.

8 PROCEDURE

The procedure for the plywood bond test shall be as follows:

- (a) Remove the uppermost veneer of the test piece (see Note 1) by forcing the chisel along the glueline in a direction perpendicular to the grain of the veneer by guiding the chisel forward 25 mm to 50 mm as nearly as practicable along the glueline (see Notes 2 and 3).

NOTES:

- 1 Instead of separating all the veneers of the one test piece, individual test pieces may be used for each glueline; thus, for 3 ply, two test pieces would be cut from the sample plywood.
- 2 The chisel may be applied to the surface of the test piece or to its edge at the glueline.
- 3 A slight wriggle in the motion of the chisel will assist penetration.

- (b) Break the veneer with a lever action of the chisel.

NOTE: When using a percussion chisel, only use the percussion action to penetrate the glueline. Use the chisel in the 'dead' condition for the lever action for lifting and breaking the veneer.

- (c) Separate all the veneers of the test piece by repeating Steps (a) and (b), taking care not to remove any wood fibre adhering to previously exposed gluelines.