11-GP-0
22 January 1960
CANCELLATION
September 1970

CANADIAN GOVERNMENT SPECIFICATIONS BOARD

Methods of Sampling and Testing Fibreboard

CGSB 11-GP-0, Methods of Sampling and Testing Fibreboard, dated 22 January 1960, is cancelled as of September 1970 because the publication is no longer referenced in any CGSB material standards for fibreboard products.

NADA

CANADIAN GOVERNMENT SPECIFICATIONS BOARD

METHODS OF SAMPLING AND TESTING FIBREBOARD

11-GP-0

22 JANUARY 1960

SUPERSEDES 9 - GP - 17P
OCTOBER 1953

Withdrawn/Retirée

DEPARTMENT OF DEFENCE PRODUCTION, OTTAWA, CANADA

Price
35 CENTS

COMMITTEE ON SPECIFICATIONS FOR WOOD FIBREBOARD,
PARTICLE BOARD AND RELATED PRODUCTS

SUBCOMMITTEE ON FIBREBOARD

(membership at date of approval for submission to the CGSB)

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11-1-1

Withdrawn / Retirée

11-GP-0
22 January 1960
Supersedes 9-GP-17P
October 1953

FOREWORD

This standard contains the methods of testing building fibreboard for conformance with the specifications of the Canadian Government Specifications Board. It is intended to provide a uniform basis for testing procedures and thus eliminate divergence in numerical results arising from variations in the methods used.

Withdrawn/Retirée

SAMPLING

Samples shall be taken at random so as to give a fair representation of the entire shipment. A sample of sufficient size for all the required tests shall be taken from each of four panels* from any carload or from each one-half of one per cent of the number of panels in less than carload shipments. The samples shall not be cut into smaller pieces before delivery to the testing laboratory. When a shipment consists of more than one car or carrier load, a set of samples shall be taken from each car or carrier. In cases of dispute the sampling shall be undertaken by a representative of the testing laboratory in the presence of representatives of both the manufacturer and purchaser.

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* Note: Based on panels not less than 4 feet x 8 feet in dimension. When panel sizes are less than 4 x 8 feet, the number of panels sampled shall be increased proportionately. When a carload contains more than one size, separate sampling shall be carried out for each size represented.

Withdrawn/Retiree

CONDITIONING SPECIMENS FOR TEST

The strength properties of fibreboard depend on the moisture content at time of test. Therefore, material for test shall be conditioned to approximately constant weight and moisture content before test. Except where otherwise stated, a temperature of 70°F ± 2°F with a relative humidity of 65 ± 1 per cent is to be used for conditioning specimens for test in the dry state. This condition corresponds to the standards for wood and wood-base materials. If there is any departure from this recommended condition, it shall be so stated in the report.

Withdrawn/Retirée

THICKNESS

Apparatus

An instrument such as a dial gauge indicator on which the contacting surfaces are flat, and have a minimum diameter of 1/2 inch, shall be used for thickness measurements. Pressure on the contacting surfaces shall be not greater than 1 psi nor less than 0.25 psi, and the instrument shall read to an accuracy of 0.001 inch.

Test Specimens

The specimens shall be at least 6 inches square and shall be conditioned in accordance with Method 2.1. Three specimens from each sample of board shall be tested.

Procedure

Measure the thickness at fi e points, near each corner and near the centre, to an accuracy of ±0.001 inch. Care shall be taken that the specimen is not deformed when the thickness measurements are taken.

Calculation and Report

Report the average of the five measurements as the thickness of the specimen. Report as the average of the sample, the average of the three specimens.

Withdrawn/Retirée

TRANSVERSE BREAKING STRENGTH AND DEFLECTION

Scope - Static bending tests shall be made on conditioned (Method 2.1) specimens and/or soaked specimens, as specified. Four test specimens shall be prepared from each sample board with the long dimension parallel and four specimens with the long dimension perpendicular to the long dimension of the board, in order to evaluate directional properties.

Test Specimen - Each test specimen shall be 3 inches in width if the nominal thickness is greater than 1/4 inch and 2 inches in width if the nominal thickness is 1/4 inch or less. The depth (thickness) shall be the thickness of the material. The length of each specimen shall be 2 inches plus 24 times the depth (Note 1). The width and length of each specimen shall be measured to the nearest 0.01 inch and the thickness measured to the nearest 0.001 inch.

(Note 1: Long-span specimens are desired for tests in bending so that the effects of deflections due to shear deformation will be minimized and the values of moduli of elasticity obtained from the bending tests will approximate the true moduli of the materials.)

Specimens Soaked before Test - The specimens to be tested in the soaked condition shall be submerged in water at room temperature for 24 hours before test and shall be tested immediately upon removal from the water.

Span and Supports - The span for each test shall be 24 times the nominal thickness (depth) of the specimen (Note 2). The supports shall be such that no appreciable crushing of the specimen will occur at these points during the test. The supports either shall be rounded (Fig. 1) or shall be knife edges provided with rollers and plates under the specimen at these points. When rounded supports are used, the radius of the rounded portion shall be at least 1-1/2 times the thickness of the material being tested. If the material under test deviates from a plane (Note 3), laterally adjustable supports shall be provided.

(Note 2: A constant span-to-depth ratio is required to allow an accurate comparison of test values for materials of different thickness.)

(Note 3: The laterally adjustable knife edges may be necessary for the specimens tested in the soaked condition because of warping or twisting that may occur due to soaking.)

Method of Loading - Load the specimens in the testing machine at the centre of the span, applying the load at a uniform rate through a rounded bearing block. The bearing block shall be at least 3 inches in width and shall have a length (in the direction of the span) equal to twice the radius of curvature of the rounded portion of the loading block. The radius of the rounded portion shall be approximately equal to 1-1/2 times the thickness of the specimen. Apply the load to the finished face of one-half of the specimens and to the unfinished face of the remaining half of the specimens.

Withdrawn/Retired

Speed of Testing - Apply the load continuously throughout the test at a uniform rate of motion of the movable crosshead of the testing machine as calculated by the following formula (Notes 4 and 5):

$$N = \frac{zL^2}{6d}$$

where:

N = rate of motion of moving head in inches per minute
z = unit rate of fibre strain in inches per inch of outer fibre length per minute
= 0.005 for hardpressed fibreboard.
= 0.02 for insulating fibreboard.

L = span in inches
d = depth (thickness) of specimen in inches.

(Note 4: The testing machine speed used shall not vary by more than plus or minus 50 per cent from that specified for a given test. The testing machine speed used shall be recorded on the data sheet. The crosshead speed shall mean the free-running or no-load crosshead speed for testing machines of the mechanical drive type, and the loaded crosshead speed for testing machines of the hydraulic-loading type.)

(Note 5: The calculated rates of head descent for hardpressed and insulating fibreboard respectively are therefore 0.12 (0.48)inch per minute for specimens 1/4 inch in thickness, 0.24 (0.96) inch per minute for specimens 1/2 inch in thickness, 0.36 (1.44) inch per minute for specimens 3/4 inch in thickness, and 0.48 (1.92) inch per minute for specimens 1 inch in thickness.)

Load-Deflection Curves - Obtain load-deflection curves to maximum load for all bending tests. Obtain the deflection of the centre of the specimen during loading by measuring the deflection of the bottom of the specimen at the centre by means of an indicating dial (Note 6) attached to the base of the testing jig, with the dial plunger in contact with the bottom of the specimen at the centre. Note the load and deflection at first failure and at maximum load. Take readings of deflection at least to the nearest 0.005 inch. Fig. 2 shows a typical load-deflection curve.

(Note 6: The range of standard 0.001 inch indicating dials is 1 inch. The total deflection of some thicknesses and types of fibreboard may exceed 1 inch at failure. When this happens, either a 2-inch total-travel indicating dial or a suitable 2 to 1 reducing lever in conjunction with a 1-inch-travel dial should be used so that maximum deflections can be obtained.)

Moisture Content and Density - Determine the moisture content and density of each specimen in accordance with Method 12.1.

Calculations and Report - Report results in terms of modulus of rupture and apparent modulus of elasticity or in terms of load and deflection as required by the specification being followed. Report the strength average of machine direction and cross-machine direction, together with the average of both directions. Unless otherwise specified, the average of both directions shall be used to determine compliance with the specification requirement.

Withdrawn/Retirée

(a) When modulus of rupture is to be reported, it shall be calculated for each specimen by the following formula, and the value determined shall be included in the report:

$$R = \frac{3PL_2}{2bd}$$

where:

P = actual maximum load in pounds
L = length of span in inches
b = width of specimen in inches
d = measured thickness (depth) of specimen in inches, taken at centre of specimen
R = modulus of rupture in pounds per square inch.

(b) When stiffness (apparent modulus of elasticity) is to be reported, it shall be calculated for each specimen by the following formula, and the values determined shall be included in the report:

$$E = \frac{P_1 L^3}{4bd^3 y_1}$$

where:

P_1 = actual load in lb. at which deflection y_1 is taken (load in lb. within the proportional limit).

y_1 = centre deflection at load P_1, in inches.
L = length of span in inches
b = width of specimen in inches
d = measured thickness (depth) of specimen in inches taken at centre of specimen
E = stiffness (apparent modulus of elasticity) in pounds per square inch.

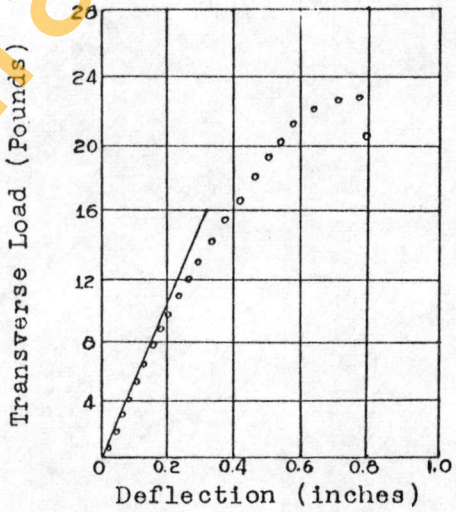


Fig. 2 - Typical Load-Deflection Curve for Static Bending Test

Withdrawn/Retirée

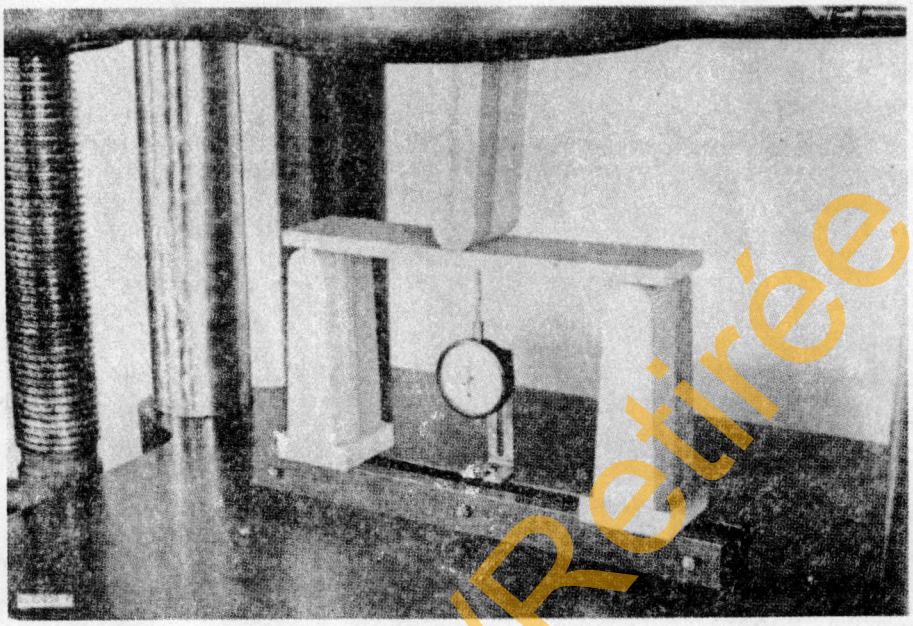


FIG. 1 - STATIC BENDING TEST ASSEMBLY

Withdrawn/Retirée

TENSILE STRENGTH PARALLEL TO SURFACE

Scope - The test of tensile strength parallel to the surface shall be made on specimens conditioned according to Method 2.1 and/or on soaked specimens. Four specimens from the long dimension of the board and four perpendicular to the long dimension shall be tested.

(Note 1: This test may be applied to material 1 inch or less in thickness. When the material exceeds 1 inch in thickness crushing at the grips during test is likely to affect adversely the test values obtained. It is recommended that for material greater than 1 inch in thickness, the material be resawed to 1/2-inch thickness. Test values obtained from resawed specimens may be only approximate because strengths of material near the surface may vary from the remainder.)

Test Specimen - Each test specimen shall be prepared as shown in Fig. 1. The reduced section shall be cut to the size shown, with a band saw. A sharp saw shall be used to ensure a smooth surface in the centre section. The thickness of the board at the reduced section shall be carefully measured to the nearest 0.001 inch. The minimum width of the reduced section shall be determined to at least the nearest 0.01 inch. These two dimensions shall be used to determine the net cross-sectional areal for determining maximum stresses.

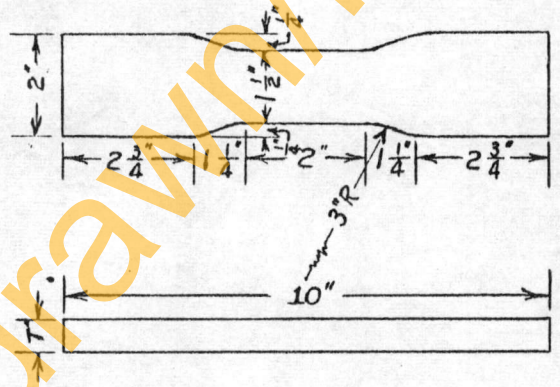


Fig. 1

Specimens Soaked before Test - Specimens to be tested in the soaked condition shall be prepared in accordance with the third paragraph of Method 5.1.

Method of Loading - Use self-aligning, self-tightening grips with serrated gripping surfaces at least 2 inches in width and at least 2 inches in length to transmit the load from the testing machine to the specimen. Place the specimen in the grips so that approximately 1/2 inch of the wide parallel portion lies between the grips and the tapering portion.

Speed of Testing - Apply the load continuously throughout the test at a uniform rate of motion of the movable crosshead of the testing machine of 0.15 inch per minute.

Withdrawn/Retired

Calculation and Report - Obtain tensile strength values in psi by dividing the breaking load by the cross-section area of the specimen at the place of failure. If the failure is within 1/2 inch of either grip, disregard the test value. Include in the report the average tensile strength value of all the specimens tested and the location and description of the failures.

Moisture Content and Density - Determine the moisture content and density of each specimen as specified in Method 12.1.

Withdrawn/Retirée

TENSILE STRENGTH PERPENDICULAR TO SURFACE

Scope - The test of tensile strength perpendicular to surface shall be made on conditioned (Method 2.1) specimens when the strength of the material under test is less than the bond between the material and the blocks that are used to apply the load.

(Note 1: This test is included because of the increased use of fibreboards of lower density as core stock for constructions where wood, plywood or other more dense materials are glued to the faces of the fibreboard. Tests in the soaked condition shall be made if the material is to be used under severe weather conditions.)

Test Specimens - The test specimens shall be 2 inches square by the thickness of the finished board. Loading blocks of steel or aluminum alloy 2 inches square and 1 inch in thickness shall be bonded with a suitable adhesive (Note 2) to the 2-inch square faces of the specimen as shown in Fig. 1. Cross-sectional dimensions of the specimens shall be measured to the nearest 0.01 inch. Four specimens shall be tested.

(Note 2: Any suitable adhesive that provides an adequate bond may be used for bonding the fibreboard specimen to the loading blocks. Epoxy resins are recommended as a satisfactory bonding agent. The pressure required to bond the blocks to the specimen will depend on the density of the board and the adhesive used. and should not be so great as to measurably damage the fibreboard. The resulting bond shall be at least as strong as the cohesive strength of the material perpendicular to the plane of the fibreboard.)

Procedure - Attach steel hooks or eyelets threaded into the loading blocks, as illustrated in Fig. 1, to the heads of the testing machine. Stress the specimen by separation of the heads of the testing machine until failure occurs. The direction of loading shall be as nearly perpendicular to the faces of the fibreboard as possible, and the centre of load shall pass through the centre of the specimen.

Speed of Testing - Apply the load continuously throughout the test at a uniform rate of motion of the movable crosshead of the testing machine of 0.035 inch per minute.

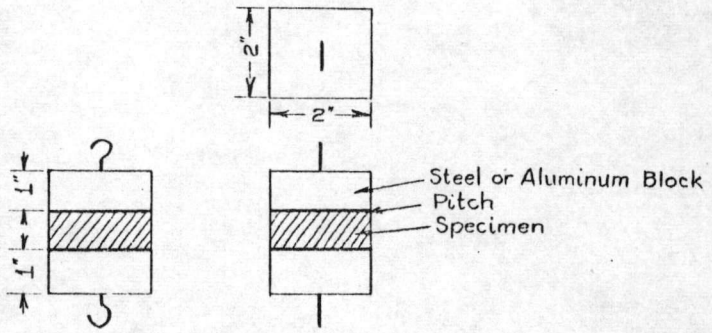


Fig. 1 - DETAIL OF SPECIMEN FOR TENSION TEST PERPENDICULAR TO SURFACE

Withdrawn/Retiree

Calculation and Report - Obtain maximum loads from which calculate the stress at failure. Calculate strength values in pounds per square inch, using the measured dimensions of the specimen. Report the average of results obtained from the four specimens, together with the location of the line of failure.

Moisture Content and Density - Determine the moisture content and density of each specimen as specified in Method 2.1.

Withdrawn/Retirée

WATER ABSORPTION AND THICKNESS EXPANSION

Scope - This test determines the percentage water absorption and the percentage thickness expansion of conditioned fibreboard specimens after immersion in distilled water at 70 ± 1°F for the specified time.

Test Specimen - The test specimen should be 12 x 12 inches in area with all four edges trimmed square. When a board is less than 12 inches in one or both dimensions, the largest piece with edges trimmed square approaching 12 x 12 inches should be used as the specimen, but this shall be at least 6 x 6 inches.

Weight and Volume of Test Specimen - Condition the specimen in accordance with Method 2.1, weigh, measure the length and width to the nearest 0.01 inch and measure the thickness to the nearest 0.001 inch at five points - near each corner and near the centre. Mark the calipered points on hard pressed fibreboard having a density equal to or greater than 50 lb. per cubic foot. Compute the volume of the specimen from these measurements.

Submersion in Water - Submerge the specimen horizontally with top surface of specimen one inch under the surface of distilled water maintained at a temperature of 70 ± 1°F. After a 2-hour submersion (Note), place the specimen on end to drain for 10 minutes, at the end of which time remove excess surface water by hand with a blotting paper or paper towel. Then immediately weigh the specimen and measure its thickness.

(Note: The 2-hour immersion period is for fibreboard of density less than 50 lb. per cubic foot (conditioned volume, oven-dry weight basis). For hard fibreboard with density equal to or greater than 50 lb. per cubic foot, the immersion time shall be 24 hours, and the specimen thickness shall be remeasured at the marked points in order to allow calculation of thickness expansion.)

Calculation and Report - Calculate the volume of water absorbed from the increase in weight of the specimen during submersion, and express the water absorption as a percentage of volume based on the volume after conditioning. The specific gravity of the water shall be assumed to be 1.00 for this purpose.

Calculate the increase in thickness from the average increase in thickness measurement of the specimen during submersion and express this thickness expansion as a percentage of the average thickness of the specimen after conditioning.

Withdrawn/Retirée

WATER PERMEABILITY

Scope - This test determines the length of time required for water to penetrate conditioned fibreboard specimens that are floated on water at 70°F ± 2°F.

Test Specimens - The test specimens shall be 4 x 4 inches in area, conditioned according to Method 2.1. A total of eight specimens shall be tested.

Procedure - Sprinkle an indicator consisting of a mixture of eosin dye, powdered sugar and starch on one surface of each of the specimens, seal a glass cover over the indicator, and seal the edges of the specimen with wax to prevent water from reaching the indicator except by penetration through the board, and to prevent evaporation of the transuded moisture. Float the specimens on water at 70° ± 1°F, and record the time of transudation of water in an amount sufficient to develop color in the indicator as a measure of the permeability. Test four specimens with the finished face next to the water and four specimens with the unfinished face next to the water.

Withdrawn/Retiree

LINEAR EXPANSION

Scope - Tests for linear expansion measure the dimensional stability of fibreboard with change in moisture content.

Test Specimen - Where possible, the test specimen shall be 3 inches in width and 10 inches in length, the sides and ends of the specimen being square and smoothly cut. Four specimens shall be provided, two cut parallel with and two cut perpendicular to the long dimension of each sample board. When the board does not permit obtaining a 10 inch specimen, the maximum length possible shall be used, but it shall be at least 6 inches.

Procedure - Condition the specimens until practical equilibrium is obtained, at a relative humidity of 50 ± 5 per cent and a temperature of 70 ± 2°F. Measure the specimen length by means of a dial gauge comparator. Care must be exercised when measuring to hold the specimen flat and to orient it in the dial gauge comparator the same way each time a measurement is made.

Condition the specimens until practical equilibrium is obtained at a relative humidity of 90 ± 5 per cent and a temperature of 70 ± 2°F. Measure the length of the specimen again, by means of the dial comparator. Make the measurement in the conditioned atmosphere, or as quickly as possible after the specimen is removed therefrom.

Calculation and Report - Report the linear variation with change in moisture content as the percentage change in length of the specimen, based on the length at 50 per cent relative humidity. Report the average of the specimens tested for compliance with the specification requirement.

Withdrawn/Retired

MOISTURE CONTENT AND DENSITY

Procedure - The moisture content and density at time of test shall be determined because of their relation to the strength properties. Values of density calculated from the volume and weight are satisfactory for these materials.

Weigh and measure the specimens immediately before test. Weigh on balances accurate to 0.01 gram. Measure the length and width to the nearest 0.01 inch and the thickness to the nearest 0.001 inch. When, as in the case of tension-parallel-to-surface specimens, it is impossible to measure the width of the specimen after shaping, obtain the dimensions and weight after conditioning and before shaping and return the specimen to the conditioning chamber until the test is made.

After testing, if the specimen is not too large cut a coupon, not smaller than 3 inches long by the width of the specimen, from the test specimen as near to the failure as possible and weigh to the nearest 0.01 gram. Then dry to constant weight in an oven at 100°C and weigh again. If the test specimens themselves are reasonably small, the whole specimen or half a specimen may be weighed and oven dried.

Calculation

(a) Calculate the moisture content as follows:

$$M = 100\,\frac{W - F}{F}$$

where:

M = moisture content in per cent
W = initial weight, and
F = final weight when oven-dry.

(Note: When reporting moisture content of specimens, it shall be definitely stated that it is a percentage of the oven-dry weight of the specimen.

(b) Calculate the density as follows (See Note)

$$\text{Density} = \frac{3.81F}{Lwt}$$

where:

F = final weight, when oven-dry, in grams
L = length of coupon in inches
w = width of coupon in inches, and
t = thickness of coupon in inches.

(Note: The density as determined by this equation is based on volume at test and weight when oven dry.)

Withdrawn/Retirée

NAIL WITHDRAWAL TEST

Scope - Nail-holding tests are made with nails driven through the fibreboard from face to face to measure the resistance to withdrawal in a plane normal to the face.

Test Specimen - The test specimen shall be of convenient size (at least 3 inches in width and 6 inches in length). Four specimens shall be tested. The nails shall have a diameter of approximately 0.116 inch and shall be driven through the boards at right angles to the face, leaving at least 1/2 inch of the shank portion projecting above the surface of the material (Note).

(Note: 2-1/4 inch common wire nails, 2-3/4 inch or 3 inch bright box or 3-inch finishing nails may be used.)

Specimens Tested in the Dry Condition - When the tests are made in the dry state, condition the specimens according to Method 2.1 and make the withdrawals immediately after the nails have been driven.

Specimens Soaked before Test - Specimens that are to be tested in the soaked condition shall be submerged in water at room temperature for 24 hours before test and shall be tested immediately upon removal from the water. Nails shall be driven before the specimens are soaked.

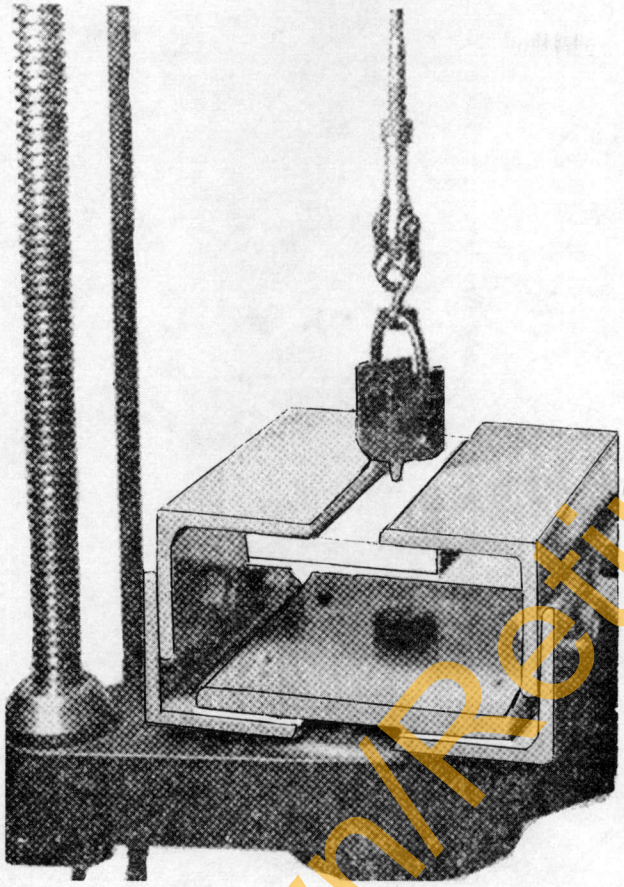
Method of Loading - The assembly is shown in Figure 1 following. Attach the specimen-holding fixture to the lower platen of the testing machine. Insert the specimen in the fixture with the heads of the nails up. Engage the heads of the nails by the load-applying fixture equipped with a slot for easy attachment. Attach this loading fixture to the upper platen of the testing machine. Apply loads by separation of the platens of the testing machine.

Speed of Testing - Apply load to the specimen throughout the test by a uniform motion of the movable head of the testing machine at a rate of 0.06 inch per minute. (See Note 4, Method 5.1)

Test Data and Report - Record the maximum load required to withdraw the nail as the measure of resistance of the material to direct nail withdrawal. Report the average of results from the four specimens.

Moisture Content and Density - Determine and report the moisture content and density according to the procedure in Method 12.1.

Withdrawn/Retirée



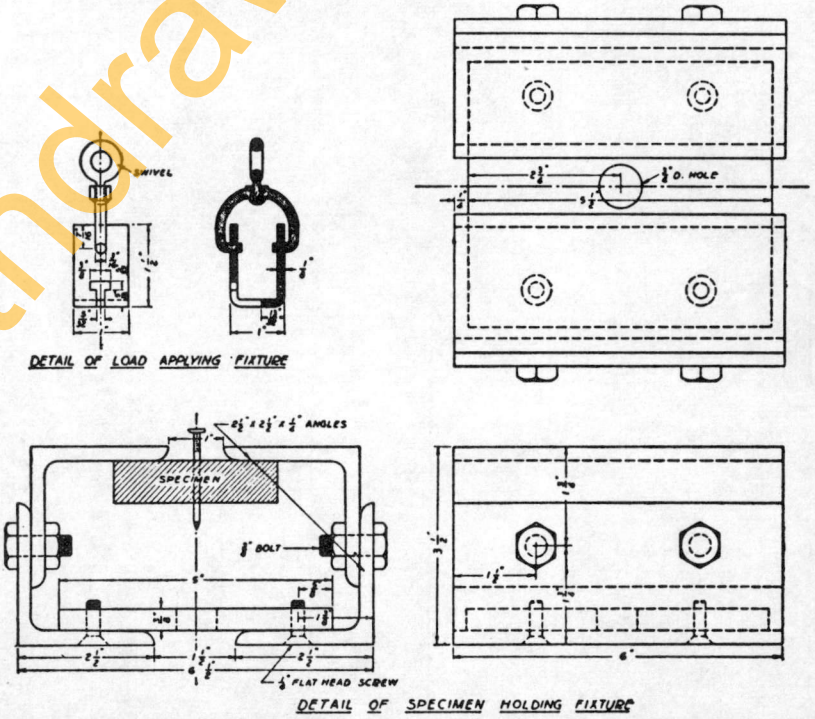


FIG. 1—Detail of Testing Equipment for Measuring the Resistance of Nails to Direct Withdrawal.

Withdrawn/Retirée

LATERAL NAIL RESISTANCE TEST

Scope - Nail-holding tests shall be made to measure the resistance of a nail to lateral movement through fibreboard (Notes1 and 2). One-half of the specimens shall be selected and positioned in test so that the movement of the nail will be parallel, and one-half so that the movement of the nail will be at right angles to the long dimension of the board, for evaluation of directional properties.

Note 1: If this test is performed on some hardboards, the nail may bend and pull out of the stirrup. If this happens, the maximum load will be apparent and not the true resistance of the board and will indicate only that the resistance is some figure higher than the apparent value. When this happens it shall be noted.

Note 2: Values obtained from this test are dependent on the thickness of the specimen. Values, however are not directly proportional to the thickness. For this reason values obtained from tests of different boards can only be compared exactly if the thicknesses are equal.

Test Specimen - Each specimen shall be 3 inches in width and of convenient length, and shall have a nail approximately 0.116 inch in diameter driven at right angles to the face of the board so that about an equal length of nail projects from each face (Note 3). The nail shall be centred on the width and located 1/4, 1/2 or 3/4 inch from one end. Four specimens shall be tested for each of the three end clearances for each material tested. Specimens shall be conditioned before test according to Method 2.1.

Note 3: 2-1/4 inch common wire nails or 3 inch bright box or finishing nails may be used.

Specimens Soaked before Test - Specimens that are to be tested in the soaked condition shall be submerged in water at room temperature for 24 hours before test and shall be tested immediately upon removal from the water. Nails shall be driven before the specimens are soaked.

Method of Loading - Clamp the end of the specimen that is opposite to the end with the nail in a position parallel to movement of the testing machine. Grips such as are suitable for tension tests parallel to the plane of the fibreboard are suitable. The nail is engaged by the stirrup, which is in turn connected to one platen of the testing machine by a rod. A typical test assembly is shown in Figure 1 following.

Speed of Testing - Load the specimen continuously throughout the test by separation of the heads of the testing machine at a uniform rate of crosshead speed of 0.25 inch per minute. (See Note 4, Method 5.1.)

Test Data and Report - Record the load required to move the nail to the edge of the specimen as the measure of the lateral resistance. Report the average of results from the four specimens and the nature of failure.

Moisture Content and Density - Determine the moisture content and density according to the procedure in Method 12.1 and report them.

Withdrawn/Retirée

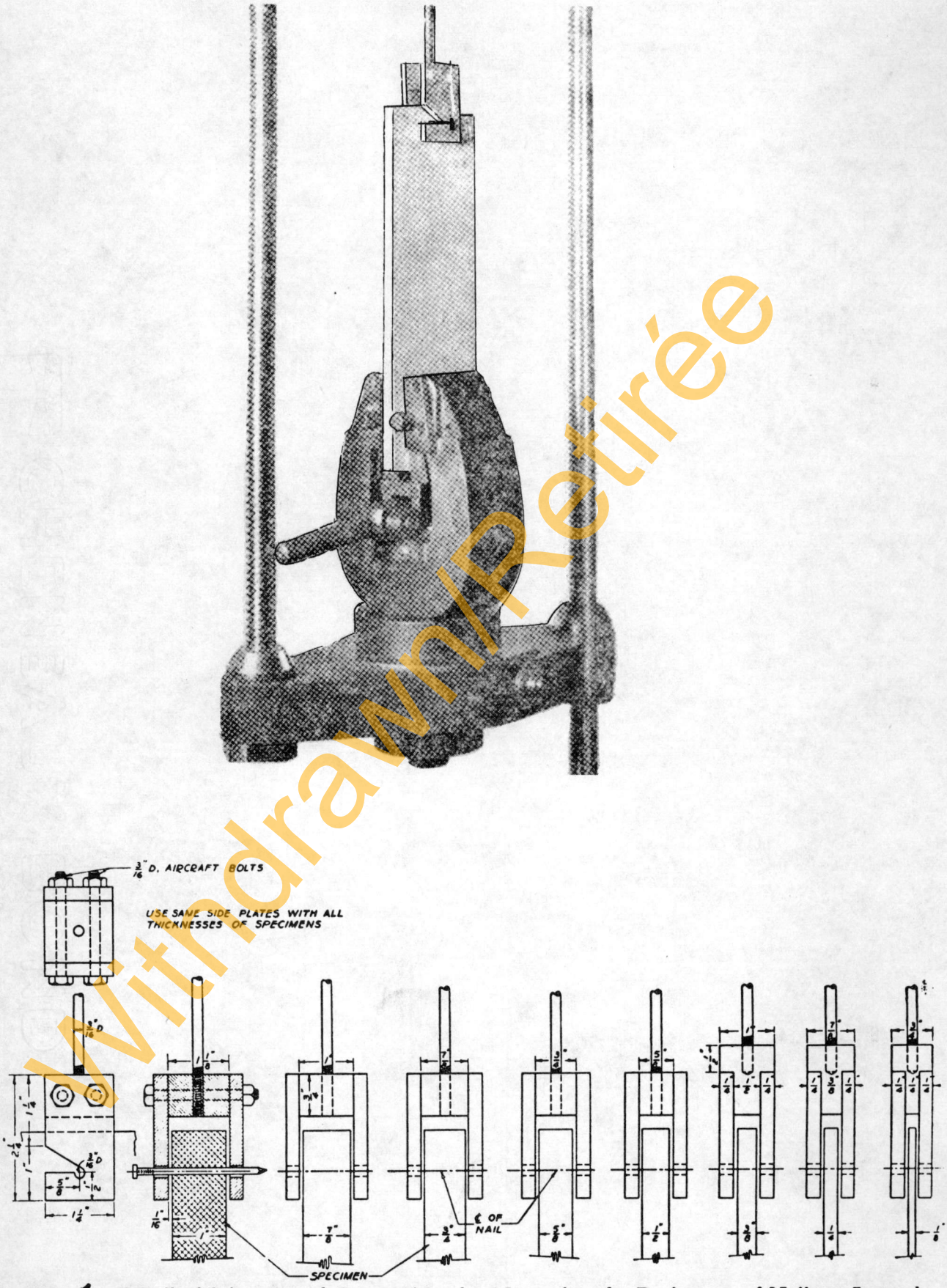


FIG. 1—Detail of Stirrups and Connections for Measuring the Resistance of Nails to Lateral Movement.

Withdrawn/Retirée

FLAME SPREAD RESISTANCE

Apparatus - Suitable means shall be provided for supporting the specimen at an angle of 45°, with the upper and lower edges horizontal. This may be accomplished by resting the specimen on four points; but it is necessary, whatever method of support is employed, that (1) the central portion of the specimen shall not be shielded from the flame, (2) the supports shall not prevent access of air for combustion, (3) the apparatus shall be such that the progress of the test can be observed.

A flat-bottomed cup of 5/8 inch internal diameter and 9/32 inch depth shall be placed on a support composed of cork-board. The cup shall be made of sheet iron about 1/32 inch thick. It shall be supported so that the centre of its base is 1 inch vertically below a point on the lower surface of the test specimen, 3 inches from its lower horizontal edge and midway between the inclined edges (see Figure 1).

A small gas pilot light shall be used for fuel ignition, made of a fine copper tube brazed into a 1/4 inch brass rod that is drilled centrally to a depth of about 2 inches (see Figure 2). The rod shall be mounted horizontally in bearings and provided with stops so that when it is rotated in one direction the pilot flame is vertical and away from the fuel cup, and when it is rotated in the other direction the tip of the copper tube just reaches, but does not touch the fuel cup. Laboratory gas is introduced by means of a rubber tube fastened over the end of the drilled rod, and ignited at the copper tube tip.

Test Specimens - Five 12 x 12 inch specimens of the sample board shall be tested.

Procedure - Condition each specimen until equilibrium is obtained at a temperature of 70 ± 2°F and 50 ± 5 per cent relative humidity.

Place the specimen on the test apparatus. Place 1 ± 0.05 ml of absolute ethyl alchohol in the cup from a suitable pipette or other means and immediately ignite (with the test specimen in place) by means of the rotatable gas pilot light which shall be rotated away from the cup as soon as the alcohol is lighted. The cup shall be at room temperature before each test. The test shall be made in a draftproof chamber designed to allow free circulation of air in uniform fashion across the burning area and have provision for visual examination of the test specimen during the test (see Figure 3).

One minute after the fuel has been exhausted, extinguish any flame and glow on the specimen and determine the area of char. If the duration of flaming is less than one minute, extinguish any smoldering and measure the area of char. Determine the area of char by cutting slots approximately along the major and minor axes of the elliptical char area to a depth sufficient to expose the board structure below the coating. Determine the lengths of these axes by taking the terminal of each line end as that point where a definite charring or decomposition of the fibre structure has first taken place.

Calculation and Report - Using the major and minor axes a and b of the area of char as those of a true ellipse, calculate the area of char as follows:

$$\text{Area of Char} = \frac{\pi ab}{4}$$

Report the area of char and the duration of flaming, taking the average of the five specimens as the test result.

In cases of dispute, referee tests shall be done on ten specimens and the report shall include a statement of both average and maximum deviations from the mean figure reported.

Withdrawn/Retiree

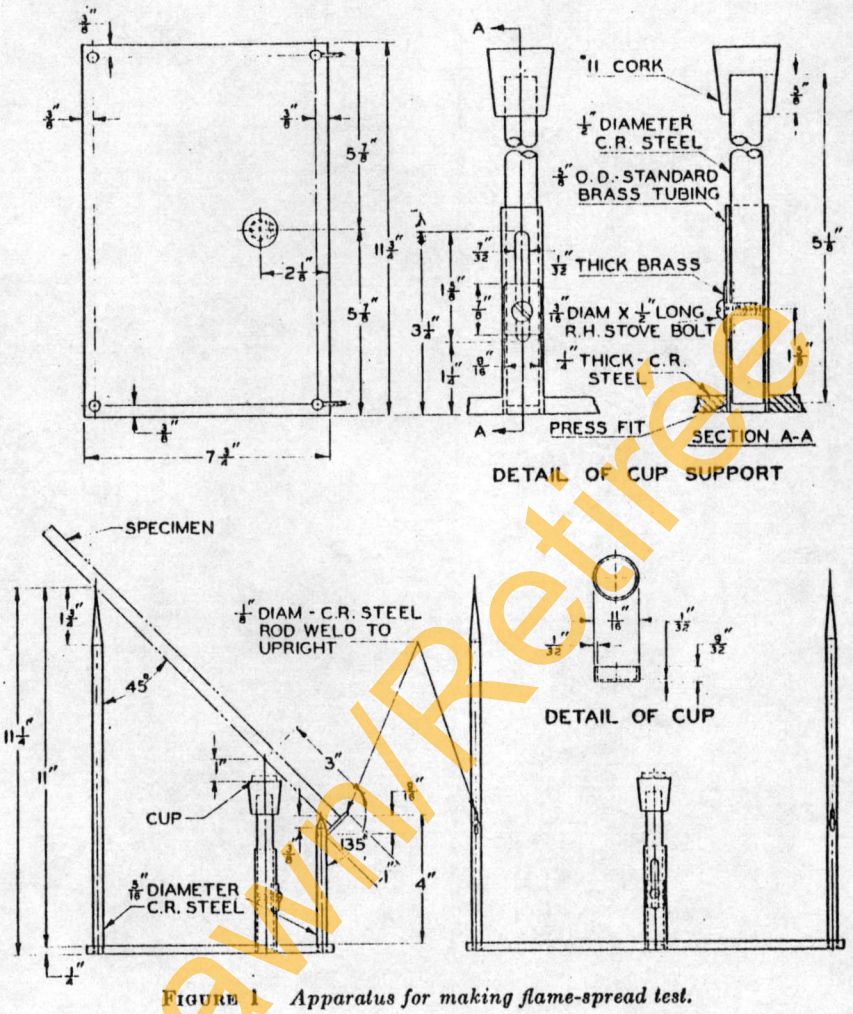
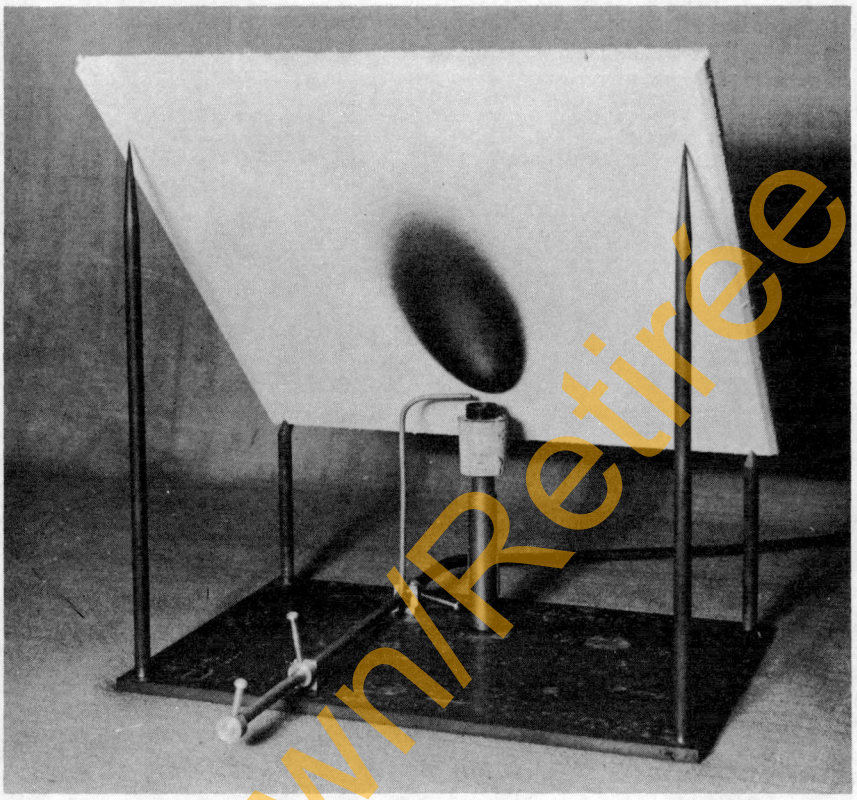


FIGURE 1 *Apparatus for making flame-spread test.*

Withdrawn/Retired



Withdrawn/Retiree

Figure 2

Pilot flame raised into position for the ignition of fuel. Except for this brief period, the tube is turned to a horizontal position with the pilot flame clear of the test panel.

Figure 3

Draft-free chamber containing conventional equipment for inclined panel flame-spread test. The glass window permits observation of the course of combustion.

Withdrawn/Retirée