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BY
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THE INSTITUTION OF MECHANICAL ENGINEERS.
THE INSTITUTION OF NAVAL ARCHITECTS.
THE IRON AND STEEL INSTITUTE.
THE INSTITUTION OF ELECTRICAL ENGINEERS.

BRITISH STANDARD SPECIFICATION FOR METHODS OF TESTING SMALL CLEAR SPECIMENS OF TIMBER.

LONDON:
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The following Government Departments and Scientific and Industrial Organisations were represented upon the Committees entrusted with the preparation of this Specification :—

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General Post Office.
India Office.
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Mines Department.
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Forest Products Research Laboratory.
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English Forestry Association.
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British Electrical and Allied Manufacturers' Association.
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NOTE.

In order to keep abreast of progress in the Industries concerned, the British Standard Specifications are subjected to periodical review.

Suggestions for improvements, addressed to the Secretary, British Engineering Standards Association, 28, Victoria Street, London, S.W.1, will be welcomed at all times. They will be recorded, and in due course brought to the notice of the Committees charged with the revision of the Specifications to which they refer.

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FOREWORD.

This Specification covers the standard methods to be adopted for ascertaining the mechanical properties of small clear specimens of timber for the purpose of comparing one species of timber with another.

It is desirable that the procedure adopted for the obtaining of specimens in different localities, the conversion of the log and the preparation of the test pieces, be as uniform as possible. It is therefore recommended that the procedure detailed in Project I of the Forest Products Research Laboratory be adopted wherever possible. Copies of this Project can be obtained, price 2/- net, on application to H.M. Stationery Office.

In those cases in which the tests are made with the express object of ascertaining the comparative value of a timber for a specific purpose, it will, in general, be unnecessary to carry out any tests other than those given in Appendix I as determinative for that particular purpose.

Almost all of the mechanical properties of seasoned timber vary with the moisture content and it is, therefore, essential that the moisture contents of all test pieces be determined at the time of test.

Mechanical tests should be carried out upon timber both in the green condition and in the seasoned condition. When comparing the results obtained with the seasoned samples, due allowance must be made for differences in the moisture content. A more extensive comparison with the results of tests from laboratories both at home and abroad may be obtained if the results of tests on seasoned material be referred to a moisture content basis of 12 per cent.

In the case of dried timber, information should be available regarding the method of drying, *e.g.*, whether naturally seasoned, kiln-dried, etc.

As the mechanical properties of timber vary with the rate of application of the load it is desirable that the specified rates should be adhered to wherever possible in order that comparable results may be obtained. If the testing machine be of a type which does not permit the specified rate of loading, the actual rate employed should be recorded with the results obtained in order that these results may be corrected as and when the relationship between the observed mechanical property and the rate of application of the load has been definitely established.

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It is recognised that some of these tests are of an arbitrary nature and are intended to provide comparative data rather than to measure absolute properties of the material. They have been included because they have been generally adopted and have produced useful results, not only in the comparison of species of timber, but also in the improvement of the design of timber structures and the general economic application of timber in manufacturing processes.

BRITISH STANDARD SPECIFICATION FOR METHODS OF TESTING SMALL CLEAR SPECIMENS OF TIMBER.

Moisture Content.

1. A small sample of the timber shall be cut from the test piece immediately after each mechanical test has been carried out. The sample shall be taken as a transverse section near the point of fracture.

The sample shall be weighed (W_1) and then dried in an oven at a temperature of 100° to 105° C. (212° to 221° F.) until the weight is constant (W_0).

The Percentage Moisture Content (X) is given by the formula :—

$$X = \frac{W_1 - W_0}{W_0} \times 100$$

The value so obtained shall be recorded with the results of the particular test to which it refers.

NOTE (i).—Great care should be taken to prevent any change in moisture content between the cutting of the sample and the first weighing, and between removal from the oven and the subsequent weighing.

NOTE (ii).—If it is required to determine the moisture content of a specimen of timber, apart from its mechanical properties, a sample should be taken as a cross section of the piece at a distance b + h from one end, where b × h represents the cross sectional area of the specimen.

Compression Tests.

2. The resistance to compression shall be determined both—

(*a*) Parallel to the grain, and

(*b*) Perpendicular to the grain, the pressure being applied to a radial face of the test piece (See Fig. 1).

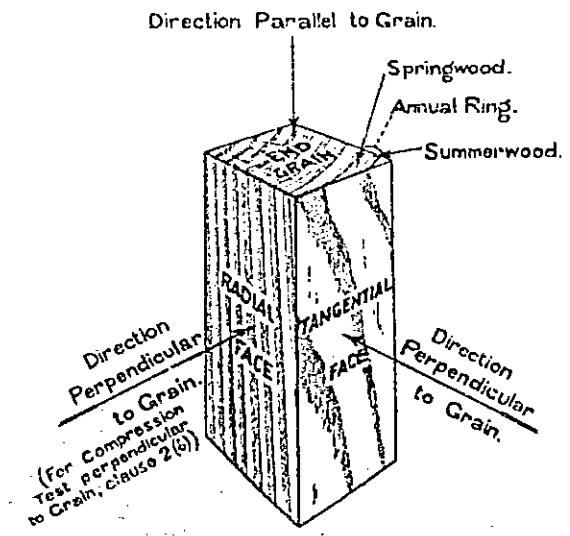

Fig. 1. Directions of Testing Timber Specimens.

(*a*) *Compression Parallel to Grain.*—The form and dimensions of the test piece to be employed shall be preferably as given in Fig. 2. Smaller test pieces may, however, be employed, in which case the form and dimensions should be as given in Fig. 3, or, alternatively, one inch square and four inches long.

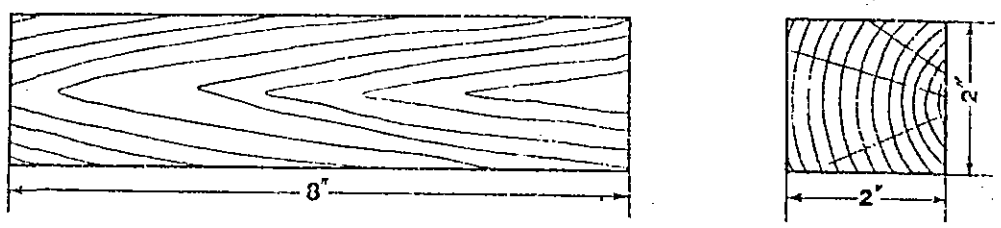

Fig. 2. Test Piece for Compression Parallel to Grain.

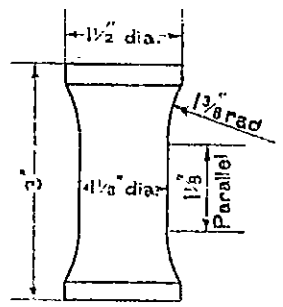

Fig. 3. Alternative Form of Test Piece for Compression Parallel to Grain.

The method by which the test shall be carried out is shown diagrammatically in Fig. 4.

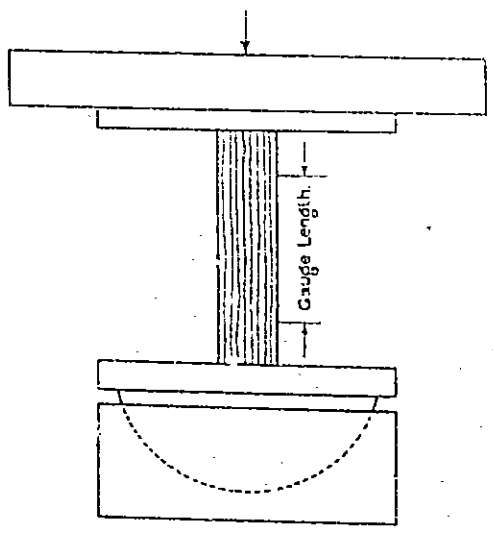

Fig. 4. Compression Test Parallel to Grain.

The load shall be applied to the test piece in such a way as to produce a constant rate of strain of 0·003 ± 20 per cent. inch per minute per inch length of test piece, except for the turned test piece (Fig. 3), for which the load shall be applied at a constant head speed of 0·008 ± 20 per cent. inch per minute.

NOTE.—It is essential that the ends of the test piece be smooth and parallel, and normal to the axis, and that the testing machine be of such constuction that the plates between which the test piece is placed are parallel to each other and remain so during the whole period of test. Unless these precautions are taken, values may be obtained which are considerably below the true values.

The results obtained shall be evaluated as follows :—

(I) Data :—

(i) Dimensions of the test piece,

A = Cross Sectional Area in square inches.

NOTE.—In the case of the turned test piece A is the area of the parallel portion.

L = Gauge Length in inches between extensometer points.

NOTE.—The maximum values of L shall be 6 inches for the test piece 8 inches long, 3 inches for the test piece 4 inches long, and 1 inch for the turned test piece.

(ii) Load-Compression curve, from which are derived :—

P′ = Load in lb. at Limit of Proportionality.*

P = Maximum Crushing Load in lb.

Δ' = Deformation in inches at Limit of Proportionality.

(II) Properties to be computed :—

(i) Compressive Stress at Limit of Proportionality (C.S. at L.P.).

$$= \frac{P'}{A} \text{ lb. per sq. in.}$$

(ii) Crushing Strength at Maximum Load (C.S. at M.L.).

$$= \frac{P}{A} \text{ lb. per sq. in.}$$

(iii) Modulus of Elasticity (E).

$$= \frac{LP'}{\Delta' A} \text{ lb. per sq. in.}$$

* The Limit of Proportionality shall be taken as that point in the Stress Strain diagram above which the graph deviates from the straight line.

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