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IS 2380-23 (1981): Method of test for wood particle boards and boards from other lignocellulosic materials, Part 23: Vibration tests for particle boards [CED 20: Wood and other Lignocellulosic products]



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IS : 2380 (Part XXIII) - 1981

Indian Standard

**METHODS OF TEST FOR WOOD PARTICLE
BOARDS AND BOARDS FROM OTHER
LIGNOCELLULOSIC MATERIALS**

PART XXIII VIBRATION TEST FOR PARTICLE BOARDS

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**BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002**

Indian Standard

METHODS OF TEST FOR WOOD PARTICLE
BOARDS AND BOARDS FROM OTHER
LIGNOCELLULOSIC MATERIALS

PART XXIII VIBRATION TEST FOR PARTICLE BOARDS

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Indian Standard

METHODS OF TEST FOR WOOD PARTICLE BOARDS AND BOARDS FROM OTHER LIGNOCELLULOSIC MATERIALS

PART XXIII VIBRATION TEST FOR PARTICLE BOARDS

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 30 June 1981 after the draft finalized by the Wood Products Sectional Committee had been approved by the Civil Engineering Division Council.

0.2 IS : 2380 (Parts I to XXI)-1977* have been formulated to specify various methods of tests for evaluating the important characteristics of boards composed of wood particles or other lignocellulosic materials. This standard (Part XXIII) covers vibration test for particle boards.

0.3 In the formulation of this standard, due weightage has been given to international co-ordination among the standards and practices prevailing in different countries in addition to relating it to the practices in the field in this country.

0.4 In reporting the results of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS : 2-1960†.

1. SCOPE

1.1 This standard (Part XXIII) covers vibration test for particle boards.

2. OBJECT

2.1 The test provides a non-destructive method of estimating the resonant characteristics of the material and the stiffness of a particle board under dynamic conditions.

*Methods of test for wood particle boards and boards from other lignocellulosic materials (Parts I to XXI) (*first revision*).

†Rules for rounding off numerical values (*revised*).

3. METHOD 'A'

3.1 Test Specimen — The test specimen shall be of a square shape with sides not less than 25 times and not more than 40 times its thickness. The thickness (h) and the sides (a) shall be measured to an accuracy up to 0.1 mm. The test specimen shall be conditioned to a constant mass in a humidity chamber maintained at a humidity of 65 ± 5 percent and at a temperature of $27 \pm 2^\circ\text{C}$. The weight shall be determined to an accuracy of 0.01 g.

3.2 Procedure — A small thin soft iron piece shall be attached firmly at the centre of the specimen plate by means of suitable glue or lac. The specimen shall then be held in the frame, which will be held rigidly in any rig. An electromagnetic driver shall be placed just below the centre of the sample under the soft iron piece fixed to the sample. The distance between the soft iron piece and the electromagnet shall be suitably adjusted to get free vibrations. The electromagnet shall be energized by a calibrated oscillator and the sample shall be made to vibrate. The vibrations shall be picked up by means of an electromagnetic or piezoelectric pick up and then fed to a cathode ray oscillograph or ac multi voltmeter. By varying the frequency of the oscillator, the specimen plate shall be made to vibrate to resonance, as may be indicated either in the input or in the output circuits. A schematic diagram showing the arrangement for carrying out vibration test on a particle board is shown in Fig. 1.

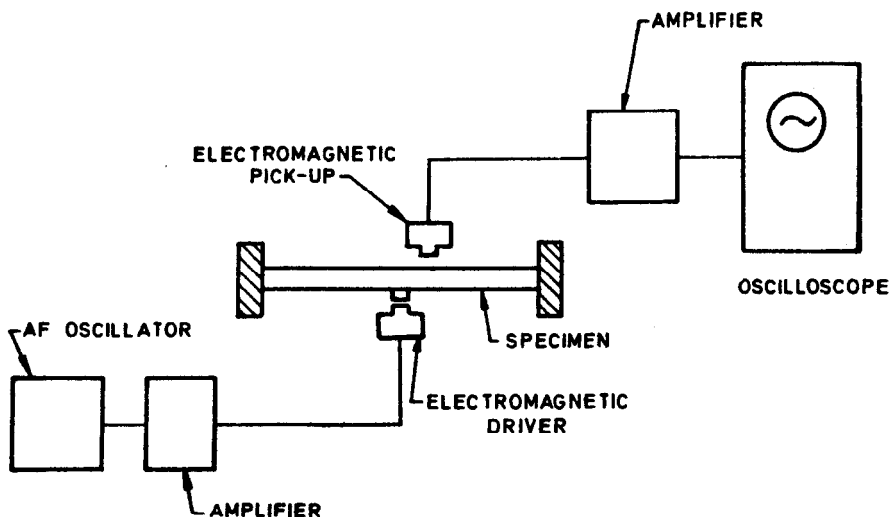


FIG. 1 SCHEMATIC DIAGRAM FOR VIBRATION TEST FOR PARTICLE BOARDS

3.3 Report — The resonant frequency N shall be reported along with the other details of particle board under the sub-heads indicated below and the stiffness calculated as per (h) below.

- a) Name of the manufacturer/source from whom the particle board is procured;
- b) Type and grade of particle board;
- c) Adhesive used;
- d) End use of particle board;
- e) Specimen No./reference;
- f) Size of the specimen,
 - i) Side a , and
 - ii) Thickness h ;
- g) Weight of the specimen at 65 ± 5 percent humidity and at a temperature of $27 \pm 2^\circ\text{C}$;
- h) Stiffness of particle board plate $S = \frac{Na^2}{h}$; and
- k) Moisture content of particle board.

4. METHOD 'B'

4.1 Procedure — A rectangular test specimen of size 70×30 cm shall be supported at two points located at a distance from each end equal to 0.224 times its length with suitable end fixtures to simulate zero displacement conditions and these shall be excited to a known frequency through a variable frequency oscillator and a loud speaker, placed below the specimen at the middle or at one end. A suitable pick up shall be used above the surface or at the other end. The resonant frequency shall be obtained by using an oscilloscope and care shall be taken to see that only the fundamental and not the higher harmonics are recorded.

4.2 Calculation — The Young's modulus of the specimen shall be determined from the observed values of the fundamental frequency by the following formula:

$$E = \frac{f^2 w l^3}{1036 b d^3}$$

where

E = dynamic modulus of elasticity in bending in kg/cm^2 ;

f = fundamental resonant frequency in cycles per second (Hertz);

w = specimen weight in kg; and

l, b, d = length, width and the thickness of the specimen in cm.

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