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SPECIFICATION FOR CONCRETE VIBRATING TABLES

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

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SPECIFICATION FOR CONCRETE VIBRATING TABLES

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 15 October 1963, after the draft finalized by the Construction Plant and Machinery Sectional Committee had been approved by the Building Division Council.

0.2 With the advancement of concrete technology, use of precast concrete units has also increased because of their several advantages over the usual cast *in situ* units in certain situations of use. A variety of precast concrete products are already being manufactured and used in this country; and in the manufacture of these products, vibrating tables are generally used because of advantages gained from them in respect of uniformity of treatment given to the casting. With their use, vibration can start from the moment concrete is placed on the base of the mould, so that the expulsion of air is facilitated and compaction increases steadily with the addition of each batch of concrete. This standard has been prepared with a view to providing guidance both in the manufacture and purchase of vibrating tables capable of compacting concrete with good mechanical efficiency and rated output.

0.3 The Sectional Committee responsible for the preparation of this standard has taken into consideration the views of producers, consumers and technologists and has related the standard to the manufacturing and trade practices followed in the country in this field. Due weightage has also been given to the need for international co-ordination among standards prevailing in different countries of the world.

0.4 This standard is one of a series of Indian Standards covering concrete vibrators. Other standard in the series is *IS : 2505-1963 Specification for Concrete Vibrators, Immersion Type. Standard on screed board vibrators is under preparation†.

0.5 Wherever a reference to any Indian Standard appears in this specification, it shall be taken as a reference to its latest version.

0.6 Metric system has been adopted in India and all quantities and dimensions in this standard have been given in this system.

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*Since revised.

†Since printed as IS : 2506-1964.

0.7 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS : 2-1960 Rules for Rounding Off Numerical Values (*Revised*). The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

0.8 This standard is intended chiefly to cover the technical provisions relating to concrete vibrating tables, and it does not cover all the necessary provisions of a contract.

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1. SCOPE

1.1 This standard relates to vibrating tables used for compaction of concrete in moulds for the manufacture of precast products and structural elements. It lays down minimum requirements regarding materials, design, fabrication, criteria for performance and methods for testing the same.

1.2 Vibrating tables shall include all appliances creating rapidly alternating horizontal, vertical or circular vibrations and capable of transmitting these to moulds filled with concrete and placed or clamped on the table top. The vibrating tables do not include shock tables which pulsate at low frequency and operate on the principle of gravity fall with the help of rotating cams.

2. TERMINOLOGY

2.0 For the purpose of this standard, the following definitions shall apply.

2.1 Amplitude of Vibration — Maximum displacement of the table top from its mean position during vibration.

2.2 Frequency — Number of vibrations or cycles per minute of the table top.

2.3 Vibration Acceleration — The maximum acceleration per cycle of vibration. It is usually expressed as a multiple of acceleration due to gravity.

3. MATERIAL

3.1 Steel sections, plates and bars for construction of the vibrating table shall conform to *IS : 226-1962 Specification for Structural Steel (Standard Quality) (*Third Revision*).

3.2 Rivet bars shall conform to †IS : 1148-1957 Specification for Rivet Bars for Structural Purposes.

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*Fourth revision issued in 1969.
†Since revised.

3.3 Springs shall be manufactured from suitable grade of wire conforming to *IS : 727-1955 Specification for Hard Drawn Wire for Springs (*Tentative*).

3.4 V-belts for belt drives shall conform to †IS : 2494- Specification for V-Belts.

3.5 All other materials used in the construction of vibrating table shall orm to relevant Indian Standards.

4. SIZE AND CAPACITY

4.1 Size Designation — The size of the vibrating table shall be designated by the overall length and breadth of the table top expressed in metres as given in **4.2**, and its capacity in tonnes as given in **4.4.**

4.2 Length and Breadth — The vibrating tables shall be of the following dimensions:

Length	*Breadth*
m	m
1	1
2	1
3	1

4.3 Height — For all sizes of the vibrating table, the height of the table top from the ground level shall be sufficient to allow for easy placing and removal of the moulds and shall not exceed 0·75 metre.

4.4 Capacity — The capacity of the vibrating table shall be indicated by the maximum weight in tonnes of the mould plus the concrete in the mould, which can be effectively vibrated by operating the table at vibration characteristics specified in **7.**

4.4.1 Different sizes of the vibrating table shall have the following capacities:

Size	*Capacity*
m	tonnes
1 × 1	0·25, 1
2 × 1	0·5, 1
3 × 1	1·5

5. MOTIVE POWER

5.1 The vibrating table shall be capable of being operated either through an eccentric rotor driven by a prime mover, such as electric motor, internal combustion engine, pneumatic power, or directly by electromagnetic pulsators.

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*Since revised.

†Issued as IS : 2494-1964 Specification for V-belts for industrial purposes.

5.2 The output rating of the power unit will be related to the capacity of the vibrating table and it shall be sufficient to prevent the reduction in amplitude from 'no load' to 'full load' condition by more than 25 percent (*see* **7.3**). Recommendations for the minimum output rating of the power unit are given below for general guidance:

Capacity	*Output Rating*
tonnes	kW
0·25	0·75
0·5	0·75
1	1·5
1·5	2·2

5.3 The electric motors and other electrical equipment shall conform to the requirements of relevant Indian Standards.

5.4 The internal combustion engines shall conform to the requirements of relevant Indian Standards.

6. CONSTRUCTION

6.1 The table top shall be constructed from steel plate of not less than 10 mm thickness or equivalent material and shall be suitably braced and stiffened to vibrate evenly so that there is no significant variation in the vibration characteristics of the table top as measured at different points at its surface in accordance with **7.4**. The table top shall also be designed to be adoptable for reasonably simple clamping arrangements for fixation of the moulds. The sides of the table shall be designed to take suitable clamps with which the moulds can be fixed and detached easily and quickly without undue loss of time.

6.2 The bearings of the mechanical vibrators shall conform to the relevant Indian Standards, and they shall be sufficiently strong to withstand wide variations of the load and the full force required to accelerate the table loaded to its maximum capacity to the full frequency, and acceleration of vibration within a short time. The bearings as well as the driving motor shall be fully enclosed so as to be dust-proof.

6.3 The stiffness of the springs on which the vibrating table is mounted shall be designed either to make the natural frequency of the spring-supported system very low compared with the frequency of vibration or to allow the vibration of table at the natural frequency of spring-supported system.

The design of mounting shall permit effective control and adjustment of spring tension from time to time, if needed.

6.4 Where the vibrating unit is pulsated by electromagnetic action, the electromagnet shall be mounted below the table and shall be sufficiently

powerful to vibrate the table under full load at the required vibration characteristics as specified in **7.**

6.5 Where the amplitude and the frequency of vibration can be varied, the efficiency of the device provided for varying the amplitude and frequency shall be such that constantly uniform performance of the machine is assured under the entire range of operating conditions.

6.6 Where the driving unit is not directly connected with the eccentric rotor, the efficiency of the drive shall be such that there is no significant slippage under full operating loads. In case of belt drives, multiple V-belt drives should preferably be used, which shall conform to the requirements of relevant Indian Standards, and the driving unit shall be so located that the vibrations of the table are not transferred to it thereby affecting its life and performance.

6.7 All exposed parts of the table shall be given protective anti-corrosive treatment to prevent them from rusting or deterioration.

6.8 Greasing nipples or closed type of lubricant points shall be provided and conspicuously marked.

6.9 Unless otherwise necessary, the base of the table shall be provided with arrangements for fixing it rigidly to the floor.

7. VIBRATION CHARACTERISTICS

7.1 Frequency — The frequency of vibration for the table operating at its maximum load capacity shall be between 3 000 to 6 000 cycles per minute.

7.2 Acceleration — The vibration acceleration of the table operating at its maximum load capacity shall not be less than four times the acceleration due to gravity.

7.2.1 The minimum frequency of the table under the loaded state for determining this acceleration shall be not less than 3 000 cycles per minute.

7.3 The reduction in the amplitude of the table while operating from 'no load' to 'full load' condition shall not exceed 25 percent.

7.4 Measurement of Vibration Characteristics — The vibration characteristics shall be observed (by actual measurements or by calculations) at different points of the table top by operating the table at its maximum load capacity, and the least of the observed values shall be taken into account to decide whether the limits specified in **7.1** to **7.3** are satisfied.

7.4.1 The measurements of frequency and amplitude shall be carried out with the help of a vibrometer or vibrograph, or any other equally suitable instrument.

7.4.2 The acceleration shall be either measured with the help of piezo-electric accelerometer, or calculated from the following formula:

$$A_g = 5{\cdot}59 \cdot 2a \cdot n^2 \cdot 10^{-6}$$

where

$$A_g = \frac{\text{Vibration acceleration}}{\text{Acceleration due to gravity}};$$

a = amplitude of vibration in centimetre as defined in 2.1; and

n = measured frequency of vibration in cycles per minute.

NOTE — $2a$ is the measured peak to peak amplitude of vibration in centimetre.

8. MARKING

8.1 Each vibrating table shall have a plate firmly attached to some part not easily removable. The plate shall have clearly marked on it the following information:

a) Size of the table;

b) Vibration characteristics:

1) Minimum amplitude at full load (range, if any), and

2) Minimum frequency at full load (range, if any);

c) Characteristics of driving unit, that is, electric motor, internal combustion engine, pneumatic motor or electromagnetic pulsator regarding:

1) Output power rating,

2) Voltage, phase and cycle current, and

3) Revolutions or pulsations per minute;

d) Manufacturer's name;

e) Machine reference number; and

f) Year of manufacture.

8.1.1 The vibrating table may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, NEW DELHI 110002

Telephones: 331 01 31, 331 13 75 Telegrams: Manaksanstha (Common to all Offices)

Regional Offices:	*Telephone*
Central : Manak Bhavan, 9 Bahadur Shah Zafar Marg, NEW DELHI 110002	331 01 31 331 13 75
*Eastern : 1/14 C. I. T. Scheme VII M, V. I. P. Road, Maniktola, CALCUTTA 700054	36 24 99
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*Sales Office in Calcutta is at 5 Chowringhee Approach, P. O. Princep Street, Calcutta 700072 — 27 68 00

†Sales Office in Bombay is at Novelty Chambers, Grant Road, Bombay 400007 — 89 65 28

‡Sales Office in Bangalore is at Unity Building, Narasimharaja Square, Bangalore 560002 — 22 36 71

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