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भारतीय मानक मसौदा

यांत्रिक कंपन स्क्रीन के लिए कोड

(आई एस 12213 का पहला पुनरीक्षण)

Draft Indian Standard

CODE FOR MECHANICAL VIBRATING SCREENS

(First Revision of IS 12213)

ICS 17.160

Chemical Engineering Plants and Related Equipment Sectional
Committee, MED 17

Last date of recipient of comments
is **29 November 2023**

FOREWORD

(Formal clause to be added later)

Mechanical vibrating screens are generally used for screening the material of various grain sizes. This standard covers the nomenclature, classification, details of construction, recommended material of construction and safety requirements for mechanical vibrating screens for use in non-hazardous areas.

This standard was originally issued in 1987. The present revision has been taken up with a view incorporating the modification found necessary as a result of experience gained in the use of this standard. Also, in this revision, the standard has been brought into the latest style and format of Indian Standards, and references to Indian Standards, wherever applicable have been updated.

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 or analysis, shall be rounded off in accordance with IS 2 : 2022 'Rules for rounding off numerical values (*second revision*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1 SCOPE

1.1 This standard covers the mechanical vibrating screens used for screening the material of various grain sizes.

1.2 The standard screen sizes shall be in accordance with IS 2405.

2 REFERENCES

The standard listed below contains provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standard given below.

<i>IS No.</i>	<i>Title</i>
IS 200 : 1989	Textiles — Determination of copper number of cotton textile materials (<i>second revision</i>)
IS 210 : 2009	Grey iron castings — Specification (<i>fifth revision</i>)
IS 2062 : 2011	Hot rolled medium and high tensile structural steel — Specification (<i>seventh revision</i>)
IS 1030 : 1998	Engineering purposes — Specification (<i>fifth revision</i>)
IS 1570 (Part 2) : 1979	Schedules for wrought steels: Part 2 Carbon steels (unalloyed steels) (<i>first revision</i>)
IS 2405 (Part 1) : 2023	Industrial sieves — Specification Part 1 Wire cloth sieves
IS 2405 (Part 2) : 2023	Industrial sieves — Specification Part 2 Wire sieves (<i>second revision</i>)
IS 2405 (Part 3) : 2023	Industrial sieves — Specification Part 3 Perforated plates sieves

3 NOMENCLATURE

For the purpose of this standard, the various components of mechanical vibrating screens shall be designated as in Fig. 1 and Fig. 2.

4 CLASSIFICATION

4.1 Application of Machine

A machine for screening, grading, dewaterizing, or scalping the material of various sizes. Vibrating screen may be with dust cover for air pollution control environment.

4.2 Types of Vibration

4.2.1 Circular Motion Vibration

Eccentric mass and/or eccentric shaft gives centrifugal force for vibration of basket/live frame. Concentric shaft with eccentric weights may also be used.

4.2.2 Straight Line Motion Vibration

Eccentric masses are set on two rotating shafts rotating in counter direction to give straight line vibration to the basket/live frame.

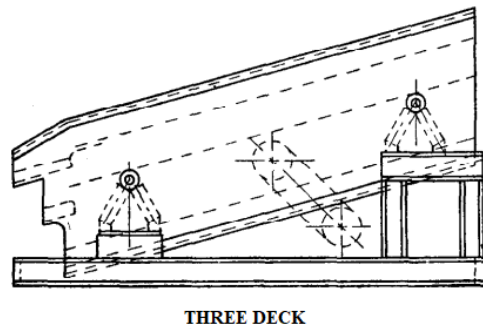
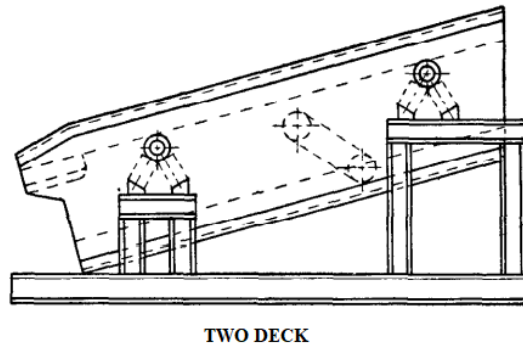
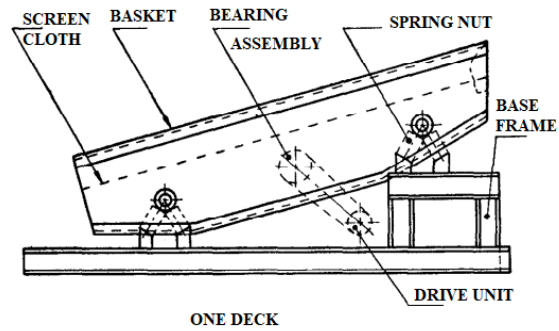
4.2.3 Gyrotory Motion Vibration

Eccentric mass attached to vertical shaft gives centrifugal force for horizontal vibratory motion of basket/live frame. This type of motion shall be considered in special cases.

4.3 Type of Enclosure

4.3.1 *Vibrating Screen with Dust Cover*

The vibrating screens are to be provided with dust cover, in case dust containment or extraction is envisaged. Vent hood may be provided to connect with dust collection system.



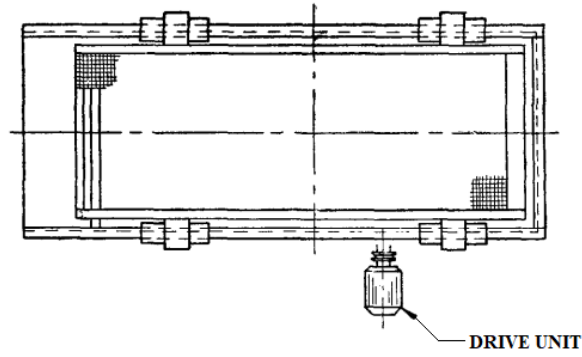
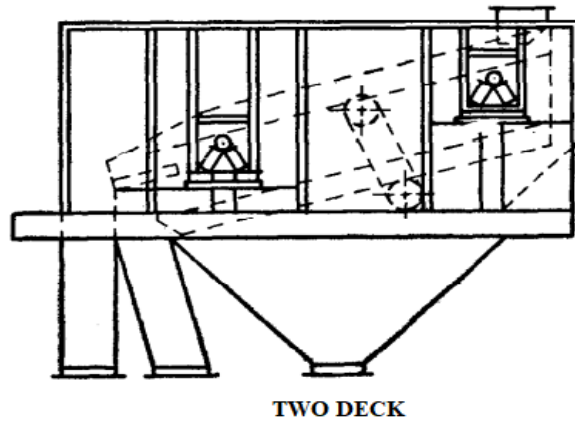
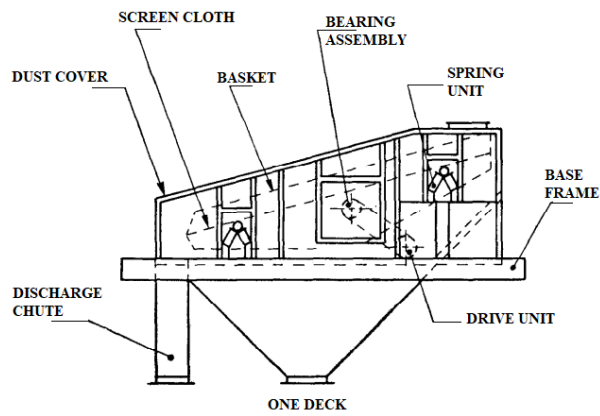


FIG. 1 VIBRATION SCREEN WITHOUT DUST COVER AND CHUTE



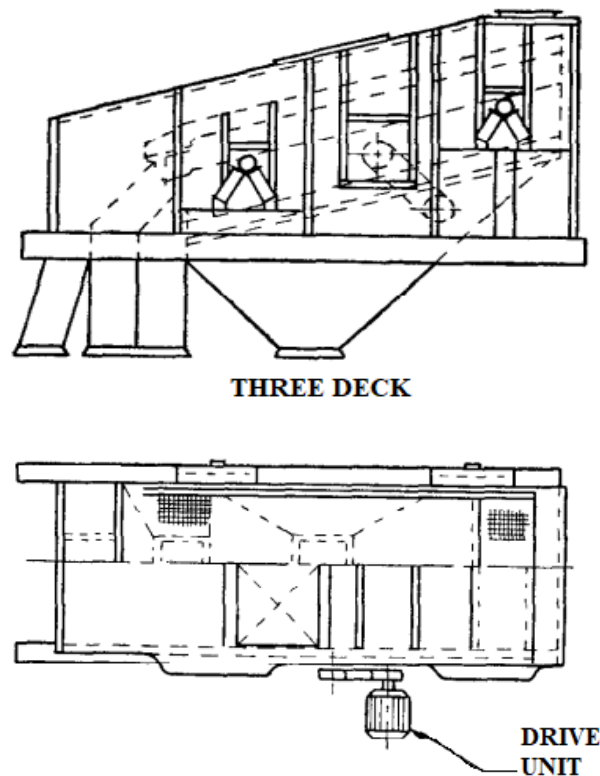


FIG. 2 VIBRATION SCREEN WITH DUST COVER AND DISCHARGE CHUTE

4.3.2 *Vibrating Screen without Dust Cover*

These vibrating screens are without dust cover. The screen is fitted with open basket/live frame where dust generation is not envisaged.

4.4 **Number of Decks**

4.4.1 *Single Deck*

The screens are provided with one deck vibrating basket/live frame.

4.4.2 *Double Deck*

The screens are provided with two decks.

4.4.3 *Triple Deck*

The screens are provided with three decks.

4.4.4 *Four Deck*

The screens are provided with four decks.

4.5 **Type of Cloth Fixing**

4.5.1 *Longitudinal Tensioning Arrangement*

Where cloth is fitted with vibrating screen, fixing, and tensioning is done at the end of the screen.

4.5.2 *Side Tensioning Arrangement*

Screens are provided with cross tensioning arrangement. Fixing and tensioning is done from the side of screen basket/live frame.

4.6 Type of Screening

4.6.1 *Vibrating Screen*

The screens are used for gradation of sizing purpose. The openings of deck are fine, medium, and large.

4.6.2 *Grizzly Scalper*

The screens with comparatively large opening. The screens are used where percentage of undersize particles are less.

4.6.2.1 *Vibrating type*

This is similar to vibrating screens.

4.6.2.2 *Roller grizzle*

Material rolls over the rollers which are rotated along its axis.

4.7 Basket Mounting

4.7.1 *V-Spring*

Supported on base frame.

4.7.2 *Vertical Spring*

Supported on base frame.

4.7.3 *Vertical Spring*

Suspended from top support.

4.8 Screen Inclination

4.8.1 *Horizontal Type*

Screen almost horizontal with downslope 0° to 5°.

4.8.2 *Inclined Type*

Screen downslope shall be decided, based on screening capacity and material characteristics and shall normally be between 15° to 25° from horizontal.

5 PRINCIPLE OF OPERATION

The vibrations are given to basket/live frame by unbalanced masses. The vibration may be of either circular motion or straight motion. Material is fed from feed end on vibrating basket/live frame. Undersize material flows down the deck and oversize material flows ahead on separate zone. The zone may be divided in different chutes connected down below.

6 CONSTRUCTION

6.1 Vibrating screens/grizzly shall consist mainly of:

- a) Vibrating basket/live frame;
- b) Vibrating unit;
- c) Screen cloth, or perforated plate/grizzly bars;
- d) Supporting frame or dust cover; and
- e) Drive unit.

6.2 Vibrating Basket/Live Frame

It shall be of bolted or welded construction. It shall consist of two side plates and cross members. Cross members shall either be of standard rolled section or frame section with adequate strength.

6.3 Vibrator Unit

6.3.1 *Circular Motion Vibration*

It shall consist of concentric/eccentric shaft mounting in spherical/cylindrical roller bearing. The bearing shall be of vibration duty with special clearance. Unbalanced masses are provided at either end of bearings. Adjustment arrangement for unbalanced masses shall be provided. Bearing unit shall be properly lubricated by grease/oil. Circular motion vibration shall normally be applied to inclined screen.

6.3.2 *Straight Line Motion Vibration*

It shall consist of two shafts with unbalanced masses rotating in opposite directions and mounted so that the line of action between them passes through the centre of gravity of screen assembly resulting in near straight line or little elliptical motion at an angle of approximately 45° with screen surface in the direction of material flow. Vibrating duty bearing shall be used. Bearing unit shall be properly lubricated, either by oil or grease. Unbalanced mass direction shall be adjusted to give required angle of throw in straight line direction. Straight line motion vibration shall normally be applied to horizontal screen.

6.4 Bearing Arrangement

The circular motion screens may have the following bearing arrangement.

6.4.1 *Two-Bearing System*

The vibrator unit shall consist of an eccentric shaft mounted on two bearings each bearing being supported by one of the side plates.

6.4.2 Four-Bearing System

The vibrator unit shall consist of an eccentric shaft mounted on the outboard bearings attached to the stationary main frame in addition to the bearing arrangement as in case of two-bearing system. The side plate bearings being eccentric to the outboard bearings, the eccentric shaft serves as both a crank arm and a counterbalance and produces positive action.

6.5 Mounting of Vibrator Unit

The vibrator unit shall be attached to the side plates through or near the centre of gravity of the screen to generate uniform vibration throughout the entire screen.

6.6 Screen Cloth

Screen cloth shall be fitted with edge binding plate in case of smaller opening and thin wire size. Large opening and bigger size with cloth are fitted with straight plates only. Cloth may be provided with middle fixing arrangement in case of bigger size cloth.

6.7 Base Frame, Dust Cover and Feed Box (Optional)

Sturdy base frame may be provided to support vibrating units. The natural frequency of base frame shall not be near or equal to the operating frequency of screen. This shall preferably be higher than the screen operating frequency. Dust cover may be provided with inspection and maintenance door for spare part replacement. Dust hood vent may be provided for connecting to the dust collection system. Hinge door may be provided for spring unit and unbalanced mass inspection. Width of dust cover may be selected such that proper clearance is available during vibrating motion. Necessary feed box may be provided in such a way that the material is fed to the screen across its entire width in the direction of flow.

6.8 Drive Unit

V-belt drive shall normally be provided for all types of vibrating screen drive. However, drive motor with universal coupling may also be used for drive. Drive motor may be provided with pivoted motor/sliding base for proper tensioning as well as to take up V-belt stretch due to start/stop bounces.

7 MATERIAL OF CONSTRUCTION

7.1 Shaft

The material of the shaft shall be 45C8 of IS 1570 (Part 2) equivalent or as per designer's recommendation depending upon duty condition.

7.2 Bearing Housing

Cast iron conforming to IS 210 or cast steel conforming to IS 1030 or fabricated type depending upon designer's recommendation.

7.3 Side Plate

Grade E250 A conforming to IS 2062 or flow alloy steel or boiler quality conforming to IS 200 or low alloy steel.

7.4 Pulleys/Sheave

Cast iron conforming to Gr 20 of IS 210 or fabricated.

7.5 Screen Cloth

Screen cloth 0.5 percent carbon steel (high carbon steel) or purchaser's requirements depending upon duty condition.

7.6 Hardware

High tensile hardware shall be used for connecting the live frame and cross members.

7.7 Dust Cover/Base Frame (Optional)

Grade E250 A conforming to IS 2062.

8 GENERAL REQUIREMENTS

8.1 Safety Requirement

The design of the screen shall minimize hazards to the operator. The pulleys, belts and unbalanced mass which are rotating at high speed shall be well protected with a guard. The screen shall be provided with dust covers for dust containment and/or dust extraction. The screen may be supplied with a screen base frame.

8.2 Maintenance Accessibility

The design of the vibrating screen shall provide accessibility to all component sub-assemblies and parts for maintenance and repairs.

8.3 Lubrication

Lubrication means shall be provided for the bearings. All lubricated nipples should be located at approachable distances. The lubrications may be with grease arrangement or oil type. Lubrication shall be selected as per duty condition.

8.4 Designation

The designations of vibrating screens shall include the following:

- a) Horizontal or inclined screens;
- b) Grading or scalping or dewaterizing;
- c) Width and length;
- d) Number of decks provided;
- e) Dust cover or base frame; and
- f) Type of vibration.

8.5 Supply

The manufacturer shall supply certificate to the purchaser for main components. The supplier shall give the certificate of the test run items to be covered under this certificate as given in Annex A.

ANNEX A *(Clause 8.5)*

INFORMATION TO BE GIVEN IN THE CERTIFICATE BY THE MANUFACTURER TO THE PURCHASER AT THE TIME OF SUPPLYING THE MACHINE

A-1 The inspection report shall state that the each part of the mechanical vibrating screen has been inspected before assembly to ensure that it is free-from visible defect in casting, machining, etc. The report shall include overall dimensions and specifications as per order.

A-2 TEST RUN

Test run report shall include the following:

- a) Number of hours the equipment has been run continuously under no load after completion of assembly.
- b) In the test run, the following points shall be observed:
 - 1) Bearing temperature;
 - 2) Amplitude of the vibrations;
 - 3) If the construction of the machine is satisfactory; and
 - 4) If the lubrication condition is satisfactory.