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Preliminary Draft

Horizontal Bars Used in Gymnastic CS — Specification

(*Second Revision of* IS 2459)

जिम्नास्टिक में प्रयुक्त क्षैतिज बार – विशिष्टता

(IS 2459 *का दूसरा पुनरीक्षण*)

ICS 97.220.30

Sports Goods Sectional Committee, PGD 41	**Last Date for Comments 14 March 2023**

FOREWORD
(*Formal clauses will be added later*)

Horizontal bars are gymnastic equipment which are used both in physical training and in competitions. The gymnast performs on the bar by movements of swinging and vaulting.

This standard was first published in 1963 and subsequently revised in 1982. First revision was taken up to align the standards with ISO 379 Gymnastic equipment — Horizontal Bar issued by the International Organization for Standardization. In this revision requirements were altered to align the standard with, the latest international rules of the game and taken up to keep pace with the latest technological developments and international practices. In preparing of this standard, rules and regulations of the game accepted internationally have been adhered to while giving consideration to the manufacturing and testing practices prevalent in the country and abroad.

In this revision following major changes have been made:

a) Material specifications have been updated; and
b) BIS Certification Marking clause have been modified;

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*)’

Preliminary Draft

Horizontal Bars Used in Gymnastic CS — Specification

(*Second Revision of IS 2459*)

1 SCOPE

This standard covers the requirements for horizontal bars used in gymnastic competitions and training. It does not cover the specification for low horizontal bars used for learning.

2 REFERENCE

The standards listed below contain 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 standards indicated below:

IS No.	*Title*
IS 2365 : 2018	Steel Wire Suspension Ropes for Lifts, Elevators and Hoists — Specification (*second revision*)
IS 1239 (Part 2) : 2011	Steel tubes, tubulars and other steel fittings - Specification: Part 2 steel pipe fittings (*fifth revision*)

3 TERMINOLOGY

3.1 Cable Tension

The predetermined value of force (in N) exerted on the mounting cables of the completely-mounted unloaded horizontal bar.

3.2 Static Tractive Force

The predetermined value of force (in N) exerted on the midpoint of the bar, pulling the bar vertically downwards.

3.3 Starting Position

The position of the unloaded bar from which the total deflection in vertical and horizontal direction is determined. The midpoint of the bar shall serve as the point of reference for the measurements.

3.4 Deflection

The measured distance (in mm) between the starting position and the maximum displacement of the midpoint of the bar in vertical and horizontal direction respectively.

3.5 Pendulum

Tubular test body of given dimensions and mass with an additional low-friction falling weight inside. The test body is attached to the bar with the help of two inflexible grasping arms, each of which is at the same distance from the midpoint of the bar, guaranteeing a low-friction rotation of the test body about the longitudinal axis of the bar.

3.6 Maximum Force (Fmax)

The maximum value of the reaction force in the direction of the pendulum's centre of gravity measured as the sum of the forces exerted on both grasping arms during the pendulum swing, expressed in Newtons.

3.7 Hanging Position

Stable equilibrium position of the hanging pendulum under gravity conditions only.

3.8 Horizontal Position

Position of the attached pendulum rectangular to the hanging position.

3.9 Additional Falling Weight

Cylindrical test body of given dimensions and mass inside the pendulum producing an additional impact stress on the gymnastic apparatus during pendulum swing.

3.10 Internal Drop Height

Predetermined sliding distance of the additional falling weight inside the pendulum.

3.11 Initial Tension

Predetermined value of the force exerted on the bar, composed of the gravity of the attached pendulum and an additional tractive force pulling the bar-pendulum system vertically downwards.

4 REQUIREMNETS

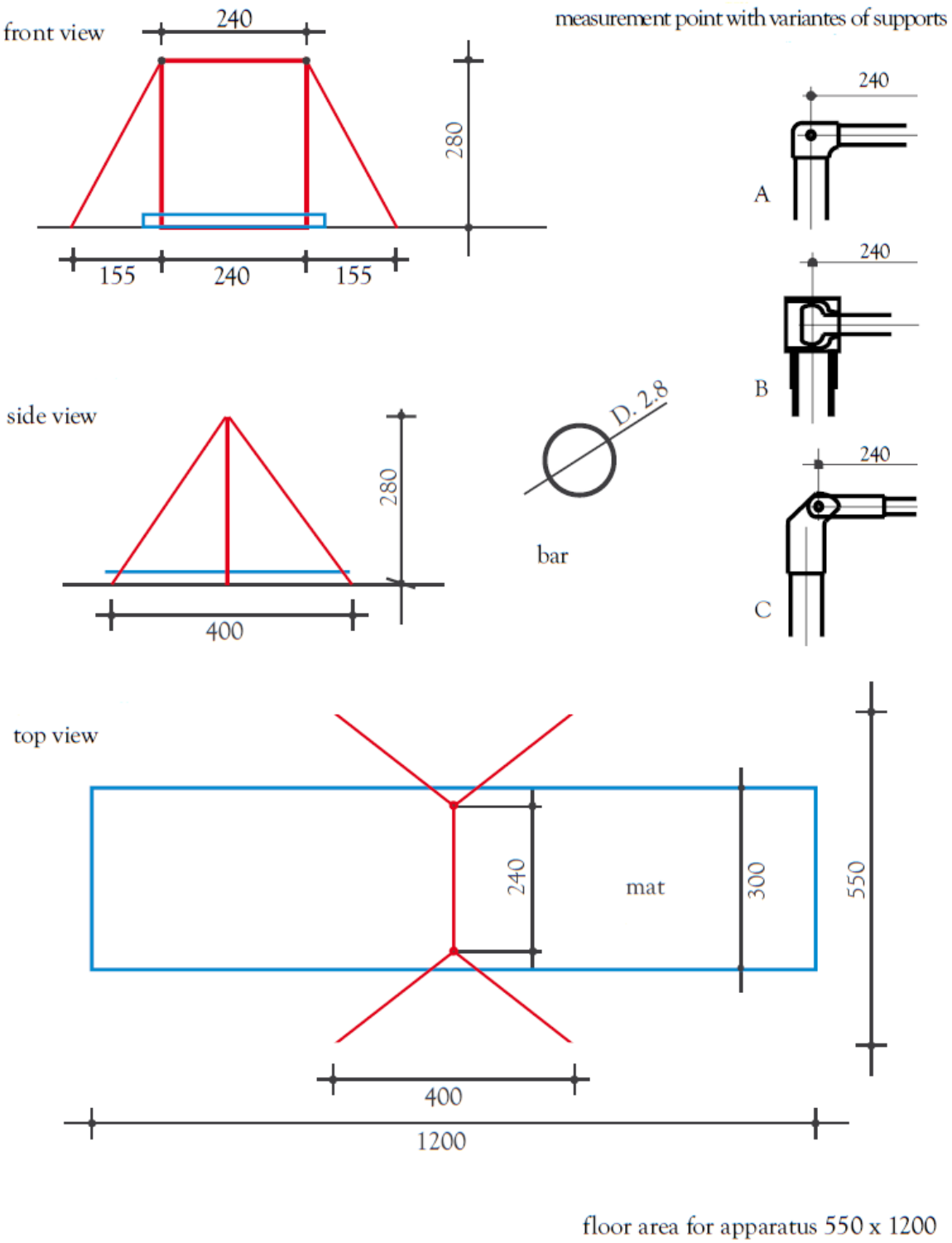
4.1 Materials

The bar shall be made of stainless steel of tensile strength not less than 1200 N/ mm^2. The tension rope used shall be steel wire rope, 6 mm in diameter and of tensile strength 1100 N/mm^2 to 1250 N/mm^2, conforming to IS 2365. The tubular used for supports shall be heavy grade galvanized mild steel tubing of 40 mm nominal diameter complying with IS 1239 (Part 2).

4.2 Shape and Dimension

4.2.1 The Horizontal bar shall consist of a round bar with a constant diameter, which shall held horizontally by two supports. The supports shall stand erect on the floor and have additional floor plates for displacing force. They shall be held upright by tension cables of diameter 10 mm connected to four floor anchors.

4.2.2 A typical shape of horizontal bar is shown in Fig. 1. The dimension of the horizontal bar shall be as indicated in Fig. 1. The dimensions not specified are left to the discretion of the manufacturer.



(All Dimensions are in cm)

FIG 1 HORIZONTAL BAR

5 CONSTRUCTION, WORKMANSHIP AND FINISH

5.1 The height of the horizontal bar shall be adjustable for additional 10 cm to the standard height (280+10 cm * 1 cm). Height changes to 280+10 cm shall be possible by devices at the supports above the upper surface of the landing mat (20 cm). Wires and chains shall be long enough to increment the height.

5.2 The bar pins shall not project, in order to avoid all possibility of injury by contact with them. The upright, the turnbuckle meter, the turnbuckle nut and the chain shall be suitably treated for protection against corrosion. The seating of the bar on the supports shall be designed in such a way that the bar may swing freely and without noise in all directions. The bar shall be secured against rotation around its longitudinal axis.

5.3 The bar shall allow turn and glide movements without slipping. The apparatus shall be stable. The supports shall not move or away during use. Preferably such materials should be used which guarantee a slim form and should not block the view. Neither the bar nor the tension cable shall produce disturbing sounds during use.

5.4 The bar retains the colour of natural polished steel. Colours or designs of the remaining parts are left to the discretion of the manufacturer.

6. PERFORMANCE TEST REQUIREMENT

6.1 Static Traction Stress Test

When tested according to the procedures described in annex A, the measured value of static traction stress shall be as given in Table 1.

6.2 Pendulum Swing Stress Test

When tested according to the procedures described in annex B, the mean values of the measured variables shall be within the figures of Table 2.

7. PACKINGING AND MARKING

7.1 Packing

The horizontal bar shall be packed as agreed to between the purchaser and the supplier.

7.2 Marking

7.2.1 The horizontal bar shall be marked with the followings:

a) Manufacturer’s name and trade-mark
b) Month and year of manufacture.

7.3 BIS Certification Marking

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations framed thereunder, and the product(s) may be marked with the standard mark.

ANNEX A

STATIC TRACTION STRESS TEST

(*Clause* 6.1)

A-1 TEST SPECIMEN

The test specimen submitted for testing shall consist of a complete horizontal bar as it is intended to be used during training and/or competition.

A-2 TEST APPARATUS

Any type of test set-up is acceptable that is capable to stress the test specimen under prescribed conditions and monitoring and recording the displacement - time history of the midpoint of the bar.

A-2.1 Displacement-Time

The selection of the specific displacement - time recording equipment, including transducers and recorders, is at the discretion of the test laboratory. However, the transducers shall provide linear signals proportional to the two-dimensional displacement of the midpoint of the bar. If displacement is recorded, the test equipment shall have means to determine and record the starting position of the bar from which the total deflections are determined. The total system, detection and recording, shall be capable of measuring displacements of up to 200 mm at frequencies from 2 Hz to 200 Hz to an accuracy of ± 1 percent. The minimum sampling rate of the data acquisition system shall be 500 Hz.

A-3 TEST PROCUDRE

A-3.1 Mount the horizontal bar to a height as prescribed for competitions. The default cable tension shall be 1500 N ± 50 N provided that there is no other specific cable tension suggested by the manufacturer. If a specific cable tension is suggested by the manufacturer, then this suggested cable tension shall be used.

A-3.2 Install the displacement measuring device on the unloaded bar and determine the starting position.

A-3.3 Pull the midpoint of the bar vertically downwards with a static tractive force of 2200 N ± 20 N and capture, then record the resulting maximum deflection (mm) using recording equipment described in 6.5.

A-3.4 After the release of the static tractive force verify whether the bar returns into the starting position.

ANNEX B

PENDULUM SWING STRESS TEST

(*Clause* 6.2)

B-1 TEST SPECIMEN

The test specimen submitted for testing shall consist of a complete horizontal bar as it is intended to be used during training and/or competition.

B-2 TEST APPARATUS

Any type of test set-up is acceptable that is capable of stressing the test specimen with a pendulum swing under prescribed conditions and monitoring and recording the displacement - time history of the midpoint of the bar and the reaction force - time history of the pendulum. It is optional, but desirable, that the pendulum is released from a magnet in the horizontal position.

B-2.1 Displacement-Time

The selection of the specific displacement - time recording equipment, including transducers and recorders, is at the discretion of the test laboratory. However, the transducers shall provide linear signals proportional to the two-dimensional displacement of the midpoint of the bar. If displacement is recorded, the test equipment shall have means to determine and record the starting position of the bar from which the total deflections are determined. The total system, detection and recording, shall be capable of measuring displacements of up to 200 mm at frequencies from 2 Hz to 200 Hz to an accuracy of ± 1 percent. The minimum sampling rate of the data acquisition system shall be 500 Hz.

B-2.2 Reaction Force Time

Any reaction force - time recording equipment, including load cells and recorders, which can monitor the reaction force exerted on the pendulum simultaneously with the displacement - time trace is acceptable. The total system, detection and recording, shall be capable of measuring reaction forces of up to 5000 N at frequencies from 2 Hz to 200 Hz to an accuracy of ± 1 percent. The minimum sampling rate of the data acquisition system shall be 500 Hz.

B-3 TEST PROCEDURE

B-3.1 Mount the horizontal bar to a height as prescribed for competitions. The default cable tension shall be 1500 N ± 50 N provided that there is no other specific cable tension suggested by the manufacturer. If a specific cable tension is suggested by the manufacturer, then this suggested cable tension shall be used.

B-3.2 Install the displacement measuring device on the unloaded bar and determine the starting position.

B-3.3 Attach the pendulum (80 kg: 40 kg pendulum with additional 20 kg falling weight and 20 kg added weights) to the bar in hanging position.

B-3.4 Move the pendulum from hanging position into horizontal position and move the additional falling weight inside the pendulum to the 90 cm ± 1 cm internal drop height position.

B-3.5 Release the pendulum and capture the two-dimensional displacement - time history of the midpoint of the bar and the reaction force - time history of the pendulum, using recording equipment described in **6.5**.

B-3.6 Stress the horizontal bar by repeating the pendulum swing five times.

B-3.7 Immediately following each test, record the following measurements: Fmax (N), positive vertical deflection (mm), as well as positive and negative horizontal deflection (mm).

B-3.8 All five tests shall be used to determine the arithmetic mean value of each measured variable.