भारतीय मानक
Indian Standard

IS 13713 : 2021

सामान्य प्रयोजनों के लिए प्लास्टिक की कुर्सियाँ — विशिष्ट

(पहला पुनरीक्षण)

Plastic Chairs for General Purposes — Specification

(First Revision)

ICS 97.140

भारतीय मानक ब्यूरो
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FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Furniture Sectional Committee had been approved by the Civil Engineering Division Council.

Plastic chairs, benches, stools, etc, are being manufactured in the country for the past four decades. The mechanical properties of plastic materials differ widely and this can be improved by the use of additives to make it suitable for furniture manufacturer. This standard was first published in 1993, to provide guidance to users and manufacturers with regard to dimensions, strength and stability of office chairs. This also provides testing the materials against fire. However, in case of fire, the plastic, like any other organic material that is wood, plywood, etc, get decomposed into toxic chemical gases. The standard earlier covered chairs for office purposes made up of plastic materials either in combination with other materials or one-piece plastic moulded chairs.

This revision has been brought out to update the standard keeping in view the large scale usage of plastic chairs for general purposes including for domestic and office use. The revision covers specification for plastic chairs for general purposes and accordingly in view of diverse usage of plastic chairs, more specific tests have been added relevant to behaviour of plastic chairs.

In this revision, the following major modifications have been incorporated:

a) Title of the standard has been revised to ‘Plastic chairs for general purpose’.
b) Scope of the standard has been revised to cover plastic chairs for general purposes.
c) Reference to the Indian Standard for steel tubes for furniture purposes has been included in the raw material clause.
d) Dimensional specifications have been given in the form of range for wider customer choice to suit various applications and usage of plastic chairs.
e) Provision for chairs both with arm and without arm have been included.
f) Requirement and tests like free fall test, vibration test, static load deflection on smooth surface, handle impact test have been included for one-piece plastic moulded chairs.
g) Reference to cross referred Indian standards has been updated.

The composition of the Committee responsible for the formulation of this standard is given in Annex F.

For the purpose of deciding whether a particularly 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 : 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.

Indian Standard

PLASTIC CHAIRS FOR GENERAL PURPOSES — SPECIFICATION

(First Revision)

1 SCOPE

This standard specifies materials, dimensions, methods of test and acceptance criteria for chairs made of plastic materials in combination with steel tubes or as one-piece plastic moulded chairs.

2 REFERENCES

The Indian 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 in below:

IS No.	*Title*
3663 : 2018	Dimensions of tables and chairs for office purposes (*third revision*)
5416	Methods of test for strength and stability of chairs and stools (*first revision*)
(Part 1) : 1988	Determination of strength
(Part 2) : 1988	Determination of stability
7138 : 1973	Specification for steel tubes for furniture purposes
13360 (Part 6/Sec 6) : 2019	Methods of testing for plastics: Part 6 Thermal properties, Section 6 Flammability by oxygen index — General requirements (*second revision*)
13360 (Part 8/Sec 13) : 2018	Plastics — Methods of testing: Part 8 Performance/ chemical properties, Section 13 Determination of changes in colour and variations in properties after exposure to daylight under glass, natural weathering or laboratory light sources (*first revision*)

3 TERMINOLOGY

For the purpose of this standard, the definitions given in IS 3663 shall apply.

4 MATERIAL

4.1 The plastic chairs shall be made of filled and unfilled reinforced thermoplastic and thermosetting plastics. The material used shall be virgin material. In case of chairs made of thermoplastic, the manufacturer may use not more than 5 percent of his own reworked material.

4.2 Steel Tubes

Steel tubes used shall conform to IS 7138.

5 DESIGN

Design shall be as desired/prescribed by the purchaser.

6 DIMENSIONS

The range of the dimensions of plastic chairs shall be as specified in Table 1.

NOTE — Any other dimensions as agreed to between the manufacturer and the purchaser may also be used.

7 MASS

Mass of one-piece plastic moulded chairs without arm shall not be less than 1.8 kg and for with arm chair not less than 2.1 kg.

8 WORKMANSHIP AND FINISH

8.1 Surface, Edges and Corners

The chair shall not have any moulding defects, any sharp edges or corners in seat area, back rest and arm rests which are in direct contact with the user when sitting on the chair. All corners and edges shall have smooth surface.

8.2 Shear and Squeeze Points

The chair should be free of shear and squeeze points.

9 PERFORMANCE REQUIREMENTS

9.1 Testing and Requirements

9.1.1 *Strength Test*

The test sample shall be tested for static test, fatigue test and impact test in accordance with IS 5416 (Part 1). The test level depending upon usage shall be 2 or 3 as specified in Table 3 of IS 5416 (Part 1). After test, the sample shall not show any structural defects.

Table 1 Dimensions of Plastic Chairs

(*Clause* 6)

Sl No.	Items	Dimensions mm	
		Min	*Max*
(1)	(2)	(3)	(4)
i)	Seat:		
	a) Seat height	420	440
	b) Effective seat depth	380	430
	c) Seat width	380	450
ii)	Total height	780	900
iii)	Total width:		
	a) Total width (For chair with arms)	540	580
	b) Total width (For chair without arms)	450	580
iv)	Total depth:		
	a) Total depth (For chair with arms)	560	610
	b) Total depth (For chair without arms)	520	570

9.1.2 *Stability Test*

The test sample shall be tested for stability in accordance with IS 5416 (Part 2). The chair shall not overturn during testing.

9.1.3 *Free Fall Drop Test*

Chair shall be tested for straight drop, side drop, sack side drop and upside down free fall drop tests with fresh samples for each test as per Annex A. The chair shall not show cracks or breakage from any point.

9.1.4 *Static Load Test for Leg Slippage and Distortion*

Chair shall be tested for this test for checking performance of plastic chair on shiny glossy floors. The test shall be conducted in accordance with Annex B. The chair shall withstand and shall not move more than 40 mm from its original marked position.

9.1.5 *Handle Impact Test*

Chair shall be tested for handle impact test in accordance with Annex C. The chair shall not show cracks or breakage from handle joints.

9.1.6 *Vibration Test*

Chair shall be tested for vibration test in accordance with Annex D. The chair shall not show cracks or breakage from any points.

NOTE — The test mentioned in **9.1.3**, **9.1.4**, **9.1.5** and **9.1.6** are applicable only for one-piece plastic moulded chairs.

9.1.7 *Rigidity Test for Chair Shell*

When the backrest is tested in accordance with Annex E, the point of application of force shall not deviate by more than 75 mm from its original position. This test is applicable for plastic chairs manufactured in combination with steel tubes (as bottom frame).

9.1.8 *Colour Fastness to Daylight*

The plastic chair when tested in accordance with IS 13360 (Part 8/Sec 13) : 2018 shall be rated not less than standard 3.

9.1.9 *Determination of Flammability by Oxygen Index*

The oxygen index of the materials when tested in accordance with IS 13360 (Part 6/Sec 6) shall not be less than 17.

10 SAMPLING AND CRITERIA OF CONFORMITY

Sample shall be drawn at random from a lot in accordance with Table 2. All plastic chairs in the lot shall be subject to tests as per **9**. The samples selected shall be subject to all as per **10**.

Table 2 Sampling and Criteria of Conformity

(*Clause* 10)

Sl No.	Lot Size (No. of Samples in the Lot)	Sample Size (No. of Samples to be Selected)	Permissible No. of Defective Chairs
(1)	(2)	(3)	(4)
i)	Up to 50	5	0
ii)	51 to 150	8	0
iii)	151 to 300	13	0
iv)	301 to 500	20	0
v)	501 to 1 000	32	1
vi)	1 001 to 3 000	50	2
vii)	3 001 and above	80	3

11 PACKING

All components shall be packed in such a way that no damage is caused to the chairs during transit.

12 MARKING

12.1 Each chair shall be indelibly and legibly marked with the following particulars:

a) Manufacturer's name, brand name or his recognized trade-mark, if any;

b) Year of manufacture; and

c) Batch number.

12.2 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 products may be marked with the Standard Mark.

ANNEX A

(*Clause* 9.1.3)

FREE FALL DROP TESTS FOR PLASTIC CHAIR

A-1 FREE FALL DROP TESTS

This test is to check strength of chair in terms of rough and tough use and handling of the plastic chairs. The test covers free fall of the chair in different positions, such as straight drop, side drop, back-side down drop and upside down drop. All samples shall be taken after 24 h of production. The sample used for testing shall be free from all moulding defects and not used for any test earlier. The each chair shall be dropped 5 times on flat and hard surface by the methods as given in Table 3. For guidance purpose, refer Fig. 1 to Fig. 4.

Table 3 Free Fall Drop Test Methods

(*Clauses* 9.1.3 *and* A-1)

Sl No.	Method of Drop	Height for Drop m
(1)	(2)	(3)
i)	Free fall straight drop, straight impact on all four legs (*see* Fig. 1)	2
ii)	Free fall side drop, impact on handles (*see* Fig. 2)	1
iii)	Free fall back side down drop, impact on back rest and back legs (*see* Fig. 3)	1
iv)	Free fall upside down drop, impact on top edge of the chair (*see* Fig. 4)	1

NOTE — Height is the distance between lower most part of chair at the time of drop and flat ground surface.

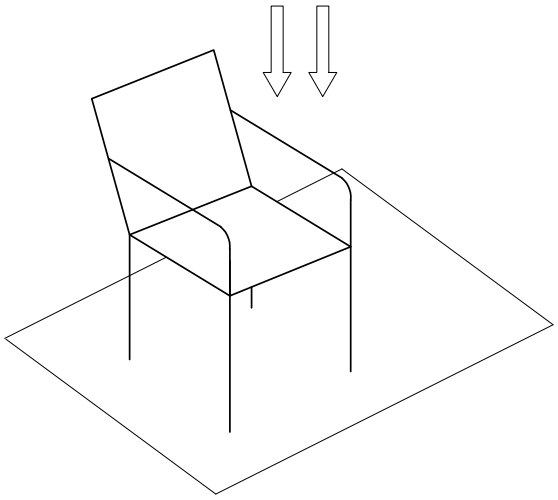

FIG. 1 FREE FALL STRAIGHT DROP TEST

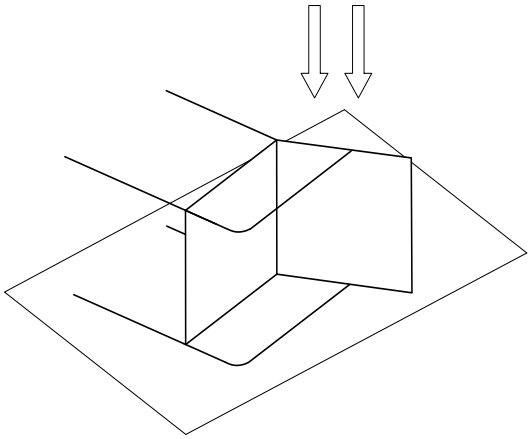

FIG. 2 FREE FALL SIDE DROP TEST

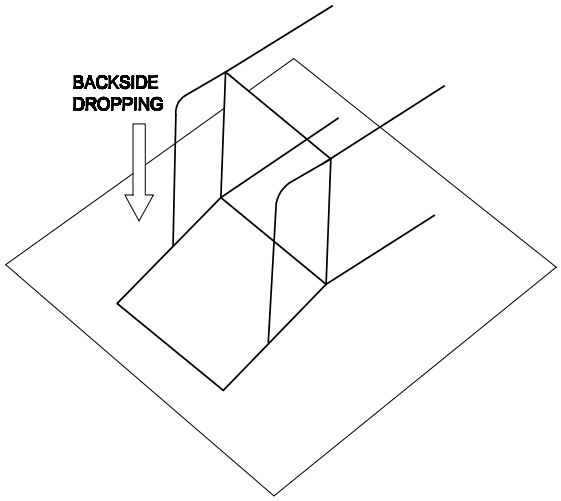

FIG. 3 FREE FALL BACK SIDE DOWN TEST

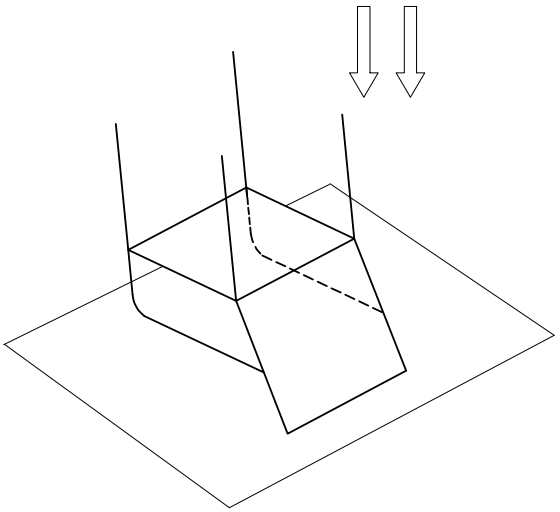

FIG. 4 FREE FALL UPSIDE DOWN DROP TEST

ANNEX B

(*Clause* 9.1.4)

STATIC LOAD TEST FOR LEG SLIPPAGE AND DISTORTION

B-1 STATIC LOAD TEST

Test shall be carried out after 24 h of production. Chair shall be free from all moulding defects. Prepare a granite platform or high gloss tiles platform which is free from oil/dirt etc and place the chair in the middle of the platform properly. Apply one by one three bags (25 kg each) 75 kg load on the seat area of the chair without disturbing the handles of the chair. Mark the leg positions (footprints) on the granite surface with the help of permanent marker. Apply another 50 kg load (2 bags of each 25 kg load) above already placed load for 24 h in ambient conditions. Typical test setup arrangement is given in Fig. 5 .

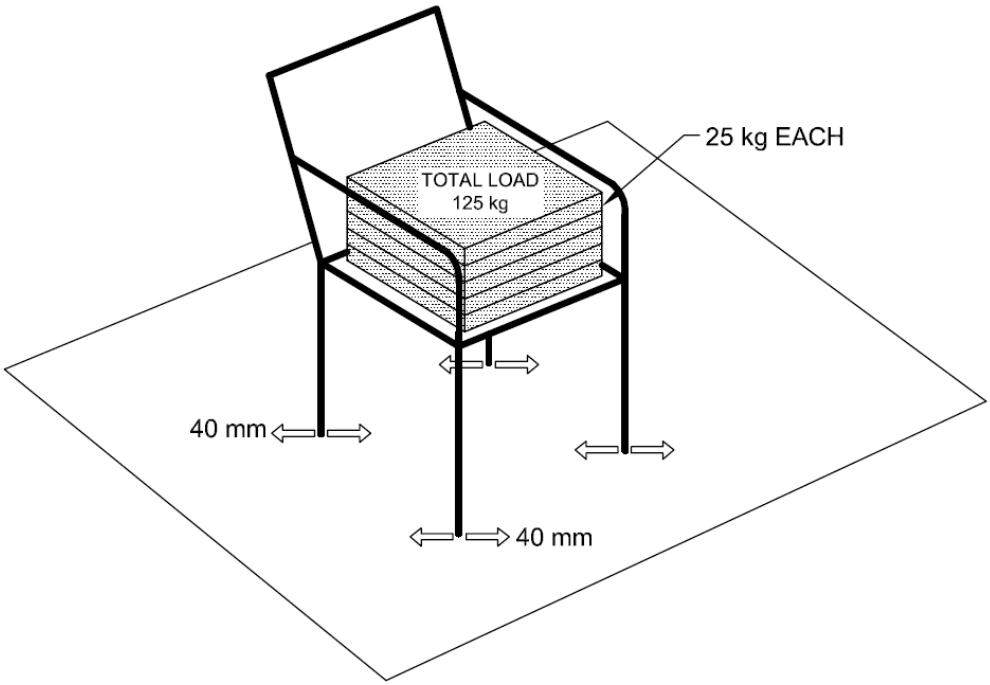

FIG 5 STATIC LOAD TEST ARRANGMENT FOR LEG SLIPPAGE AND DISTORTION

ANNEX C

(*Clause* 9.1.5)

HANDLE IMPACT TEST

C-1 HANDLE IMPACT TEST

Take a chair free from all moulding defects. Test shall be carried out after 24 h of production. Place the chair on the middle of the impact platform arrangement. Check the bag position manually (by moving up and down rope tied sand bag above the chair) that bag shall be dropped at middle of the handle of the chair. The rope tied sand bag (15 kg) load drop manually on the handle area of the chair. The bag shall be dropped 1 times form 1 m height on each handle. The chair shall be tied by ropes is such way that no movement of the chair during drop of the sand bag. Typical test setup arrangement is given in Fig. 6 .

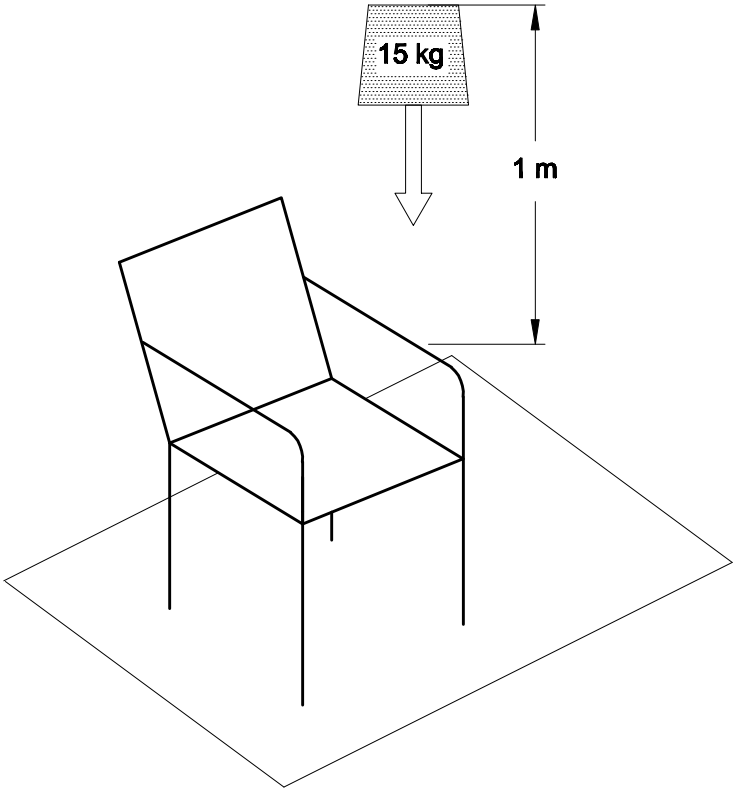

FIG. 6 HANDLE IMPACT TEST

ANNEX D

(*Clause* 9.1.6)

VIBRATION TEST

D-1 VIBRATION TEST

Take a chair which is free from all moulding defects. Test shall be carried out after 24 h of production. Place the chair on the middle of the vibration machine platform. Put 3 bags (25 kg each) on the seat of the chair and rope should be tied all four sides with the vibration testing machine. Run the machine in ‘to and fro’ movement and ‘up and down’ side movement at std. speed of 30 ± 5 rpm for 8 h each. Typical test setup arrangement is given in Fig. 7.

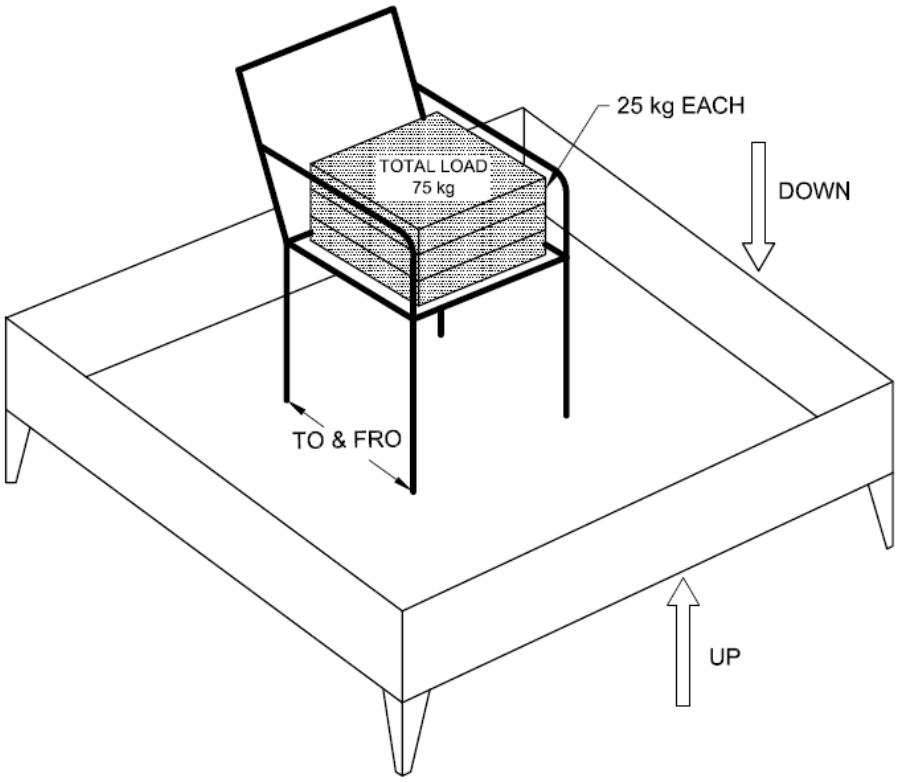

FIG. 7 TEST SETUP FOR HANDLE IMPACT TEST

ANNEX E

(*Clause* 9.1.7)

TEST FOR RIGIDITY OF SHELL

E-1 RIGIDITY OF SHELL

The test is conducted on one test specimen from a lot. The test specimen is secured to a plane, rigid mounting surface (*see* Fig. 8). The point of inter section of a plane passing at a distance of 300 mm (measured from the lowest point of the seat) and parallel to the mounting surface with the axis of symmetry of the backrest is marked (Point A). A force F, of 300 N is applied to the backrest at Point A in a backward direction acting parallel to the mounting surface via a rigid bow (*see* Fig. 8). A sheet of rubber, projecting on all sides by at least 10 mm, of thickness 6 mm is placed between the bow and the backrest.

After stressing for 4 h, the change in the position of Point A under the action of the force is measured.

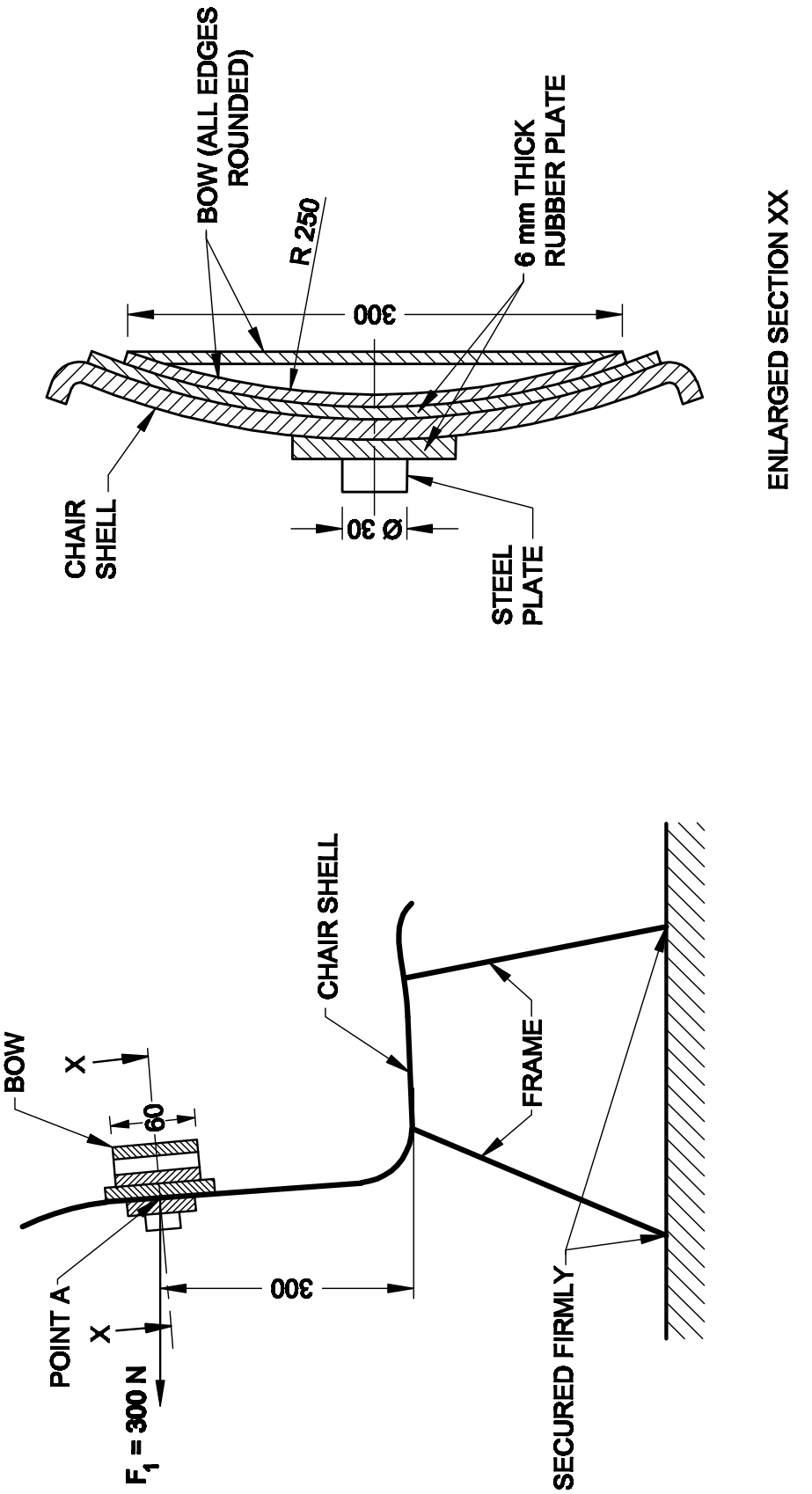

FIG. 8 TESTING OF RIGIDITY

ANNEX F

(*Foreword*)

COMMITTEE COMPOSITION

Furniture Sectional Committee, CED 35

Organization	*Representative(s)*
In Personal Capacity (*Past President, IIA, K-11, Ground Floor, Kailash Colony, New Delhi 110 048*)	Shri Balbir Verma (***Chairman***)
Association of Furniture Manufacturers and Traders (I), Mumbai	Representative
Blowplast (BP) Ergonomics Ltd, Mumbai	Dr Nitin Sudame Dr Gita Piramal (*Alternate*)
Central Public Works Department, New Delhi	Shri Rajesh Kumar Dhiman Shri Arun Kumar Tyagi (*Alternate*)
Centre for Environmental Planning and Technology (CEPT) University, Ahmedabad	Prof Shrutie Tamboli Prof Snehal Nagarsheth (*Alternate*)
CSIR – Central Building Research Institute, Roorkee	Shri S. K. Negi Shri Ashok Kumar (*Alternate*)
Directorate of Education, Delhi	Representative
Forest Research Institute, Dehradun	Dr Sadhna Tripathi Dr Kishna Kumar (*Alternate*)
Godrej & Boyce Mfg. Co Ltd, Mumbai	Shri E. Venkateswaralu Shri Nirav Shah (*Alternate* I) Shri Lalitesh Mandrekar (*Alternate* II)
Indian Furniture Products Ltd (Zuari), Tiruvallur	Shri C. M. Satheesh Kumar Shri S. Saravanan (*Alternate*)
Indian Stainless Steel Development Association, Gurugram	Shri Rohit Kumar Shri Jousline George (*Alternate*)
Institute of Indian Interior Designers, Mumbai	Shrimati Chirashree Thakkar
Kendriya Bhandar, New Delhi	Representative
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The Indian Institute of Architects, Mumbai	Ar Vikramray Pramodray Pandya

Organization	*Representative(s)*
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In personal capacity (*Pratap Nursery Lane, Near Gurudwara Sahib, Panditwari, Dehradun*)	Shri K. S. Pruthi
BIS Directorate General	Shri Sanjay Pant, Scientist 'F' and Head (Civil Engineering) [Representing Director General (*Ex-officio*)]

Member Secretary

Shri Pradeep Singh Shekhawat
Scientist 'C' (Civil Engineering), BIS

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Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards: Monthly Additions'.

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Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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