भारतीय मानक

Indian Standard

IS 6271 : 2023

सैंडल और स्लिपर — विशिष्टि

(दूसरा पुनरीक्षण)

Sandal and Slippers — Specification

(Second Revision)

ICS 61.060

भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS
मानक भवन, 9 बहादुर शाह ज़फर मार्ग, नई दिल्ली - 110002
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI - 110002
www.bis.gov.in www.standardsbis.in

June 2023 **Price Group 8**

Footwear Sectional Committee, CHD 19

FOREWORD

This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Footwear Sectional Committee had been approved by the Chemical Division Council.

Sandal and slippers are open type of footwear widely used. Sandals are open type of footwear having an upper part not covering the entire foot and which has a back strap whereas slippers are open type of footwear having an upper part not covering the entire foot and which do not have a back strap but may have a back support.

This Indian Standard was originally published in 1972. The technical committee responsible for formulation of IS 6721 'Specification for PVC Sandal' and IS 11544 : 1986 'Specification for slipper, rubber' decide to amalgamate both the standard and publish it as second revision of IS 6721.

In this revision, the following changes have been incorporated:

a) Title of the standard has been modified to 'Sandal and Slippers — Specification'; and

b) Scope widened to include all varieties of sandal and slippers.

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

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*)'.

Indian Standard

SANDAL AND SLIPPERS — SPECIFICATION

(Second Revision)

1 SCOPE

This standard prescribes characteristics, requirements and methods of sampling and test for all varieties of sandals and slippers whether fully moulded or assembled.

2 REFERENCE

The standards listed in Annex A 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 agreement based on this Indian Standard are encouraged to investigate the possibility of applying the most recent editions of these standards.

3 TERMINOLOGY

For the purpose of this standard, the definitions of all terms as given in IS 2050 and the following shall apply.

3.1 Rigid Sole — The soles which are do not bend at ball girth and which do not loose shape after application of manual force.

3.2 Sandal — An open type of footwear having an upper part not covering the entire foot and which has a back strap. The upper part of sandal consists of one or more components such as back strap, vamp and the like and the same are aligned and assembled together by various methods. The bottom part of the sandal may consist of a number of components such as insole, sole, heel and the like and the same are aligned and assembled together by various methods. The assembled upper part may be attached to the assembled bottom part by various methods.

3.3 Slippers — An open type of footwear having an upperpart not covering the entire foot and which do not have a back strap but may have a back support. The upper part of slipper consists of one or more components such vamp and the like and the same are aligned and assembled together by various methods. The bottom part of the slipper may consist of a number of components such as insole, sole, heel and the like and the same are aligned and assembled together by various methods. The assembled upper part may be attached to the assembled bottom part by various methods.

4 SHAPE AND DESIGN

Shape and design of the sandal and slipper may be as agreed between manufacturer and purchaser.

5 SIZE AND FITTINGS

The recommended size and fittings of all types of sandal and slipper will be guided in accordance with IS 1638.

6 CONSTRUCTION

The footwear may be made in fully moulded construction or stitched or assembled or through lasting operation as required as per design and style. It may also have single or multiple layer at bottom sole.

7 MATERIAL

7.1 The upper and insole (top covering) may be made up of any type of natural or synthetic material or combinations thereof.

7.2 Lining, if used may be made up of any type of natural or synthetic material or combinations thereof. It may or may not be sandwiched with foam.

7.3 Bottom sole and mid sole (if used) may be made up of any type of natural or synthetic material or combinations thereof. It may be solid or cellular in structure.

7.4 Thickness of the upper/Insole and sole components of the sandal and slipper may be as agreed between manufacture and purchaser.

7.5 Insole foot covering, if used may be cushioned with foam to give comfort to the wearer.

7.6 Edge binding, if required may be used.

8 REQUIREMENTS

8.1 Upper

The raw material of upper of the sandal and slipper shall conform to the requirements as specified in Table 1.

Table 1 Upper (Raw Material Requirement) — All Materials

(*Clause* 8.1)

Sl No.	Characteristics	Requirements	Methods of Test
(1)	(2)	(3)	(4)
i)	a) Tear strength, N, *Min* (other than moulded upper material)	30	Method B of IS 7016 (Part 3/Sec 1) : 2017/ISO 4647-1 : 2016 or IS 8085 (Part 9)/ISO 17696 : 2004 (For non-leather), and
	b) For all moulded upper material	15	IS 5914 (Part 5/Sec 2)/ISO 3377-2 (For leather)
ii)	Flexing endurance	No crack at 75 000 flexes	IS 8085 (Part 20)/ISO 17694 : 2016

Table 2 Insole Covering (Raw Material Requirement) — Applicable to Textile, Coated Fabric, Leather and Micro-fibre

(*Clause* 8.2)

Sl No.	Characteristics	Requirements	Methods of Test
(1)	(2)	(3)	(4)
i)	Tear strength, N, *Min*	30	Method B of IS 7016 (Part 3/Sec 1) : 2017/ISO 4674-1 : 2016 or IS 8085 (Part 9)/ISO 17696 : 2004
ii)	Abrasion resistance		
	a) At dry condition	No hole formation at 12 800 cycles	IS 8085(Part 6) : 2021/ISO 17704 : 2004
	b) At wet condition	No hole formation at 3 200 cycles	

8.2 Insole Covering

The raw material of insole covering of the sandal and slipper shall conform to the requirements as specified in Table 2.

8.3 Lining

The raw material of lining of the sandal and slipper shall conform to the requirements as specified in Table 3.

8.4 Outsole

The outsole of sandal and slipper made of leather material shall conform to the requirements as specified in Table 4, whereas outsole of the sandal and slipper made with materials other than leather material shall conform to the requirements as specified in Table 5.

8.5 Requirements of Complete Sandal/Slipper (Physical Requirements)

The sandal and slipper shall conform to the physical requirements as specified in Table 6.

Table 3 Lining — Raw Material Requirement — All Materials

(*Clause* 8.3)

Sl No.	Characteristics	Requirements	Methods of Test
(1)	(2)	(3)	(4)
i)	Tear strength, N, *Min*	10	IS 5914 (Part 5/Sec 2)/ISO 3377-2 (For Leather) Method B of IS 7016 (Part 3/Sec 1) : 2017/ ISO 4674-1 : 2016 (For non-leather)
ii)	Abrasion resistance		
	a) At dry condition:	No hole formation at 12 800 cycles	IS 8085 (Part 6) : 2021/ISO 17704 : 2004
	b) At wet condition:	No hole formation at 3 200 cycles	

Table 4 Outsole (Leather) Requirement

(*Clause* 8.4)

Sl No.	Characteristics	Requirements	Methods of Test
(1)	(2)	(3)	(4)
i)	Grain crack index	≥ 16	IS 5914 (Part 7)/ISO 3378 : 2002
ii)	Density, g/cm^3, *Min*	0.90	IS 5914 (Part 4) /ISO 2420 : 2017
iii)	Abrasion resistance, mm/kcs	Good: < 3.0 Moderate: 3.1 - 7.0 Poor: > 7.0	Annex B

Table 5 Outsole (Materials other than Leather)

(*Clause* 8.4)

Sl No.	Characteristics	Specification		Methods of Test
		Sandal	Slipper	
(1)	(2)	(3)	(4)	(5)
i)	Density, g/cm^3, *Min*			IS 3400 (Part 9) : 2020/ISO 2781: 2018
	a) Cellular	< 0.90	< 0.90	
	b) Solid	≥ 0.90	≥ 0.90	
ii)	Abrasion resistance, Volume loss mm^3, *Max*			IS 3400 (Part 3) : 2021/ISO 4649: 2017
	a) Cellular (at 5N force)	600	600	
	b) Solid (at 10N force),	350	350	
iii)	Flexing resistance, At 30 000 flexes (Belt method at 90º diameter mandrel) (Not applicable on rigid sole)	No spontaneous crack	No spontaneous crack	IS 8085 (Part 4) : 2019/ISO 16177 : 2017

Table 6 Whole Footwear — Sandal and Slipper

(*Clause* 8.5)

Sl No.	Characteristics	Specification		Test Method
		Sandal	Slipper	
(1)	(2)	(3)	(4)	(5)
i)	Bond strength, N/mm, *Min* (Applicable when fore part is fully covered or strap width is more than 25 mm)[1]	2.5 1.5 for material tear	2.5 1.5 for material tear	IS 15298-1 : 2015
ii)	Toe post attachment strength, N, *Min* (Applicable if toe post is present)	100	100	Annex C
iii)	Toe ring attachment strength, *Min* (Applicable if toe ring is not integral part of upper)	80	80	Annex C
iv)	Strap to outsole strength, N[(2)], *Min*			
	a) More than 20 mm strap width; b) 10 mm to 20 mm strap width; c) Less than 10 mm strap width	200 150 100	200 150 100	IS 8085 (Part 11)/ ISO 24263
v)	Attachment strength of back strap and Buckle/D-ring N, *Min* (If, present)			
	a) More than 20 mm strap width; b) 10 mm to 20 mm strap width; and c) Less than 10 mm strap width	200 150 100	— — —	Annex D
vi)	Attachment strength of elastic, limit of useful extension, percent, *Min* (If present)	90	—	IS 8085 (Part 12)/ ISO 10765
vii)	Attachment strength of back strap and velcro, N, *Min* (If, present)	100	—	Annex D
viii)	Hydrolysis resistance, Cut growth after 150 000 flexes, mm, *Max* (Applicable for PU sole only)	6.0	6.0	Annex B and Annex E of IS 16645 : 2018/ISO 5423 : 1992
ix)	Heel pull off strength, N, *Min* (Applicable for heel height 40 mm and above attached separately to the sandal/slipper)	500	500	IS 8085 (Part 10)/ ISO 22650 : 2018
x)	Inter layer bond strength, N/mm, *Min* (Applicable for multi-layer sole), *Min*	2.5 1.5 for material tear	2.5 1.5 for material tear	IS 15298-1 : 2016
xi)	Slip Resistance, Coefficient of Friction (COF)[(3)] (Not applicable for leather sole) (To be carried out on quarry tiles)	0.3	0.3	Annex E of IS 15844 (Part 1)

NOTES

1 Strip material cut for bond strength shall be 25 mm.

2 This test shall be carried out for toe strap to outsole and rear strap to outsole, if present.

3 This test shall be carried out for both Condition A (Forward Heel slip) and Condition B: (Backward Forepart Slip) at both dry and wet condition and in all cases shall meet the values as prescribed in Sl No. (ix) of Table 6.

8.6 Requirement of Complete Sandal and Slipper (Chemical Requirements)

8.6.1 All the components of sandal and slipper shall comply with Table 1 of IS 17011 for critical substances Category I and Category II as specified under **3.6** of IS 17011.

8.6.2 If PVC is used in manufacturing of sandal/slipper, then the lead content shall not be more than 2 ppm when tested in accordance with IS 12240 (Part 5).

9 MARKING AND PACKING

9.1 Marking

The sandal and slipper shall be marked legibly and indelibly with the following:

a) Size; and

b) Identification of the source of manufacturer or brand name.

The straps shall also be marked with the side of foot, that is, right and left.

9.2 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.

9.3 Packing

The sandal and slipper shall be packed as agreed to between the purchaser and the manufacturer. Each individual package shall contain sandal/slipper of one size only and may be marked with the

a) name of the item;

b) size;

c) colour;

d) type;

e) identification of the source of manufacture;

e) batch number; and

f) any other marking if so desired.

10 SAMPLING

The methods of drawing representative samples of the material and the criteria for conformity shall be as prescribed in IS 6368.

ANNEX A

(*Clause* 2)

LIST OF REFERRED STANDARDS

IS No.	*Title*
IS 1638 : 1969	Specification for sizes and fitting of footwear (*first revision*)
IS 2050 : 1991	Glossary of terms relating to footwear (*first revision*)
IS 3400	Methods of test for vulcanized rubbers:
(Part 3) : 2021	Abrasion resistance using a rotating cylindrical drum device (*third revision*)
(Part 9) : 2020	Rubber, vulcanized or thermoplastic — Determination of density (*fourth revision*)
IS 6368 : 1971	Methods for sampling of rubber and rubber combination footwear
IS 7016 (Part 3/Sec 1) : 2022	Methods of test for rubber or plastics coated fabrics: Part 3 Determination of tear resistance, Section 1 constant rate of tear methods (*third revision*)
IS 8085	Methods of test for rubber or plastics coated fabrics:
(Part 4) : 2019	Resistance to crack initiation and growth belt flex method
(Part 6) : 2021	Abrasion resistance of uppers linings and insocks
IS 12240 (Part 5) : 1988	Methods of test for polyvinyl chloride boots: Part 5 Determination of lead content
IS 13360 (Part 5/Sec 11) : 2013	Plastics — Methods of testing: Part 5 Mechanical properties, Section 11 Determination of indentation hardness by means of durometer (shore hardness) (*first revision*)
IS 15298 (Part 1) : 2015	Personal protective equipment: Part 1 Test methods for footwear (*second revision*)
IS 15844 (Part 1)	Sports footwear: Part 1 General purpose (*first revision*) (*under preparation*)
IS 16645 : 2018	Moulded plastics footwear lined or unlined polyurethane boots for general industrial use specification
IS 17011 : 2018	Chemical requirements for footwear and footwear materials
IS 5914 (Part 6/Sec 1)/ ISO 5402-1 : 2022	Methods of physical testing of leather: Part 6 Determination of flex resistance, Section 1 Flexometer method (*under preparation*)
IS 5914 (Part 6/Sec 2)/ ISO 5402-2 : 2022	Methods of physical testing of leather: Part 6 Determination of flex resistance, Section 1 Vamp flex method (*under preparation*)
IS 8085 (Part 9)/ ISO 17696 : 2004	Methods of test for footwear: Part 9 Tear strength of uppers, linings and insocks (*under preparation*)
IS 8085 (Part 11)/ ISO 24263 : 2020	Method of test for footwear: Part 11 Attachment strength of straps, trims and accessories (*under preparation*)

ANNEX B

(*Table* 4)

ABRASION RESISTANCE — RECIPROCATING METHOD

B-1 SCOPE

This method is to determine the abrasion resistance of the sole leather. It is applicable to sole leather for footwear application.

B-2 PRINCIPLE

The wearing surface of two square test specimens are placed in contact with a standard abradent. The test specimens are then moved backwards and forwards over the abradent under a constant force. To maintain the abrasive action during the test a suction system is used to remove the dust as the abradent is gradually fed under the specimen. The average rate of reduction in thickness of each test specimen material per thousand cycles throughout most of its thickness, excluding approximately the last 1.0 mm, is then determined

B-3 EQUIPMENT

B-3.1 A rigid table with resin bonded abrasive paper of width 216 mm, coated with silicone carbide of grit size 80 X move across the width of the table.

B-3.2 A carriage fitted with two square that specimen holder to hold test specimen of 25.5 mm ± 0.5 mm × 25 mm ± 0.5 mm square.

B-3.3 The carriage moves with a speed of 30 cycles/min ± 5 cycles/min along the length of the table.

The force on each test specimen is 35.0 N ± 0.5 N and counter is attached to the machine, a vacuum suction system is used to remove dust particles.

B-4 MATERIALS

B-4.1 Two steel plates to which square specimens are to be bonded. Suitable adhesive or self-adhesive tape to be used to bond the soling material to the steel plate.

B-4.2 Thickness gauge shall be used with capable of measuring to the nearest 0.01 mm and the applied pressure of 49 kPa ± 5 kPa.

B-5 TEST SPECIMENS

B-5.1 Condition the test piece for 48 h at 23 °C ± 2 °C and (50 ± 5) percent relative humidity. Cut 25 mm ± 0.5 mm square test specimens, mark I on one side of the test specimen and II on one side of the other specimen.

B-5.2 Measure the thickness of the test specimen as TS_1 and TS_2.

B-5.3 Clean the metal plate and apply suitable adhesive to the steel plate, immediately bond with the side not to be abraded and record the thickness of test assembly $TA_1 - TA_2$

B-5.4 Calculate the combined thickness as: $CT_1 = TS_1 - TA_1$, $CT_2 = TS_2 - TA_2$

B-6 PROCEDURE

B-6.1 For each test specimen assembly determine the target end point thickness by adding 0.5 mm to the values of CT_1 and CT_2 respectively.

B-6.2 Targeted thickness as: $CT_1 = TS_1 - TA_1 +$ 1.0 mm, $CT_2 = TS_2 - TA_2 + 1.0$ mm

B-6.3 Place the test assembly in each holder of the carriage so that the marks I and II are in front and operate the machine with the force of 35.5 N ± 0.5 N acting on the specimen until it has completed 100 cycles. Remove the test assembly, measure the thickness gauge the centre of each test specimen and record the thickness of the test assemblies as FT_1 and FT_2. Record the No. of cycles of each test specimen as NC_1 and NC_2 respectively. Replace test specimen assemblies in the machine the same position as before with marked edge toward the front. Repeat the abrasion until the remaining thickness of the test assemblies is just below the targeted thickness.

B-7 Calcalutaion

B-7.1 Abrasion Rate

$$\text{Sample 1, mm/kcs} = TS_1 - FT_1 \times \frac{1\,000}{NC_1}$$

$$\text{Sample 2, mm/kcs} = TS_2 - FT_2 \times \frac{1\,000}{NC_2}$$

where

TS_1 and TS_2 = original thickness of the specimen assembly, in mm;

FT_1 and FT_2 = final thickness of the specimen assembly, in mm; and

NC_1 and NC_2 = No. cycles abrasion cycles corresponding to the thickness of FT_1 and FT_2.

B-8 TEST REPORT

Report the average abrasion rate in mm/kcs.

ANNEX C

(*Table* 6)

ATTACHMENT STRENGTH OF TOE POST AND REAR STRAP

C-1 SCOPE

This method is intended to determine the attachment strength of a toe post and rear strap.

C-2 PRINCIPLE

A thin rigid square template with a hole close to each corner and a key hole shaped slot to accommodate the toe post and rear strap is placed around the toe post and rear strap on the top surface of bottom sole of the test sandal or slipper. Four holes, which match the holes in the template, are drilled in the bottom sole. Two loops of thick wire or lace are threaded through both the template and sole. The assembly is then fitted between the jaws of a tensile testing machine and the force required to pull the toe post and rear strap from the bottom sole is measured.

C-3 APPARATUS AND MATERIAL

C-3.1 A tensile testing machine capability ofmeasuring force of 2 kN to an accuracy of 2 percent and with jaw separation 100 mm/min ± 10 mm/min.

C-3.2 A press knife or other means of cutting test specimens to require size.

C-3.3 A pneumatic jaw with lower jaw capable of clamping all four free ends of the wire loops or suitable lace and at the same time an upper jaw capable of clamping the side straps attached to the top of the toe post and top of rear strap of the test sandal or slipper.

C-3.4 A rigid template produced from thin metal or fibre board with the dimensions. Two loops of wire diameter 3.0 ± 0.2 mm, or suitable lace may be used of the dimensions shown in Fig. 1.

C-3.5 A twist drill bit of diameter 4.0 mm ± 0.5 mm

C-3.6 A hand or electric drill

C-4 PREPARATION OF THE TEST SPECIMEN

Two pair of complete product of sandal or slipper required for testing.

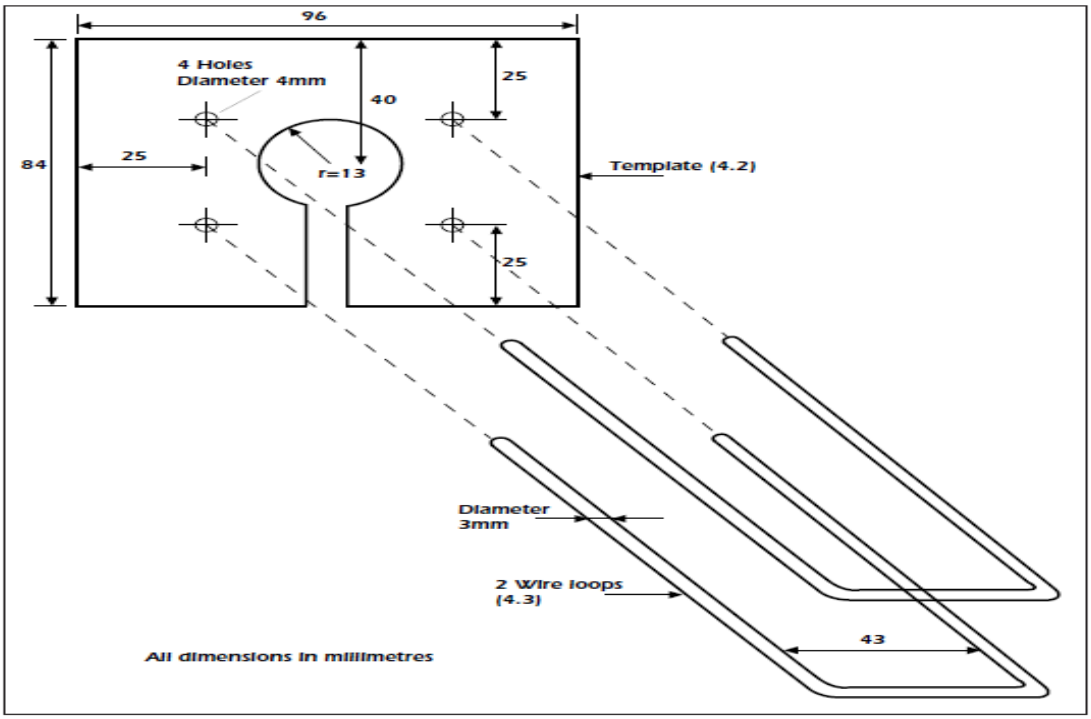

Figure 1 Template and wire loops

FIG. 1 STEEL TEMPLATE AND WIRE LOOP

C-5 PROCEDURE

C-5.1 Store the sandal or slipper to be tested in a standard controlled environment of 23 °C ± 2 °C and (50 ± 4) percent relative humidity for at least 48 h before testing and carryout the test at room temperature. Cut away any side straps from the sole while leaving a sufficient length attached to the top of the toe post and rear strap to be firmly secured in the upper jaw of the tensile testing machine. Place the template on the top surface of the bottom sole of the sandal or slipper so that the toe post and the rear strap is in the center of the key hole slot. The template should be positioned so that it does not cover any area where the toe post and rear strap is lying between the bottom sole. Without moving, the template mark the top surface of bottom sole at the centers of the four holes in the template. Then remove the template from the bottom sole. Use the drill and drill bit to four holes through the bottom sole of the sandal/slipper in the positions marked. Replace the template on the top surface of the bottom sole of sandal/slipper in the position marked so that all four holes in the template are aligned with the four holes in the bottom sole. Thread the two wire loops through the holes in the template to bottom sole of sandal or slipper from the template side of the assembly. Clamp the four free ends of the two wire loops or lace in the lower jaw of the tensile testing machine, and the free ends of the side straps attached to the toe post and rear strap in the upper jaw as shown in the Fig. 2 and Fig. 3.

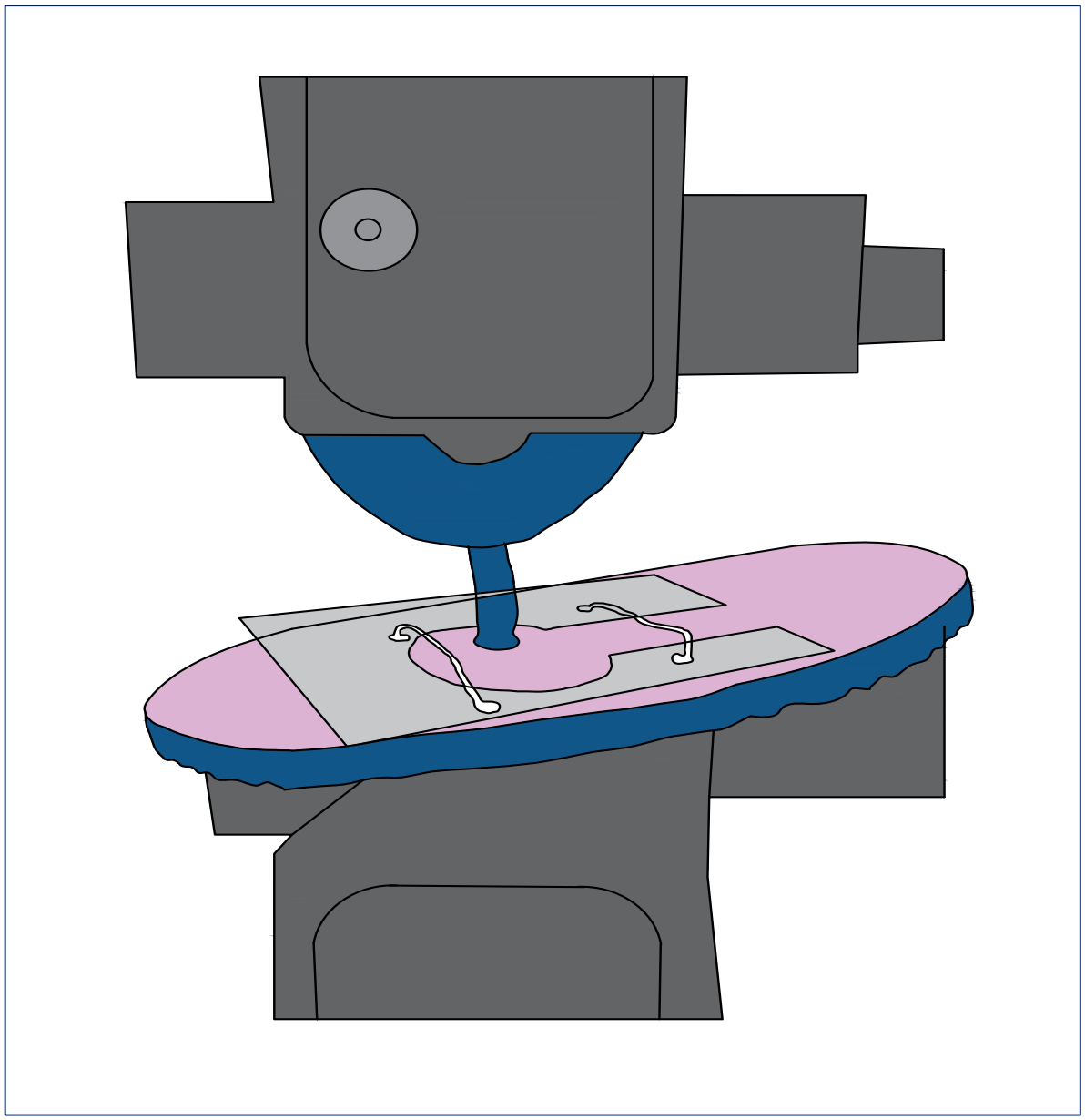

FIG. 2 ILLUSTRATION DIAGRAM FOR CLAMPING OF TOE POST STRAP IN THE TENSILE MACHINE

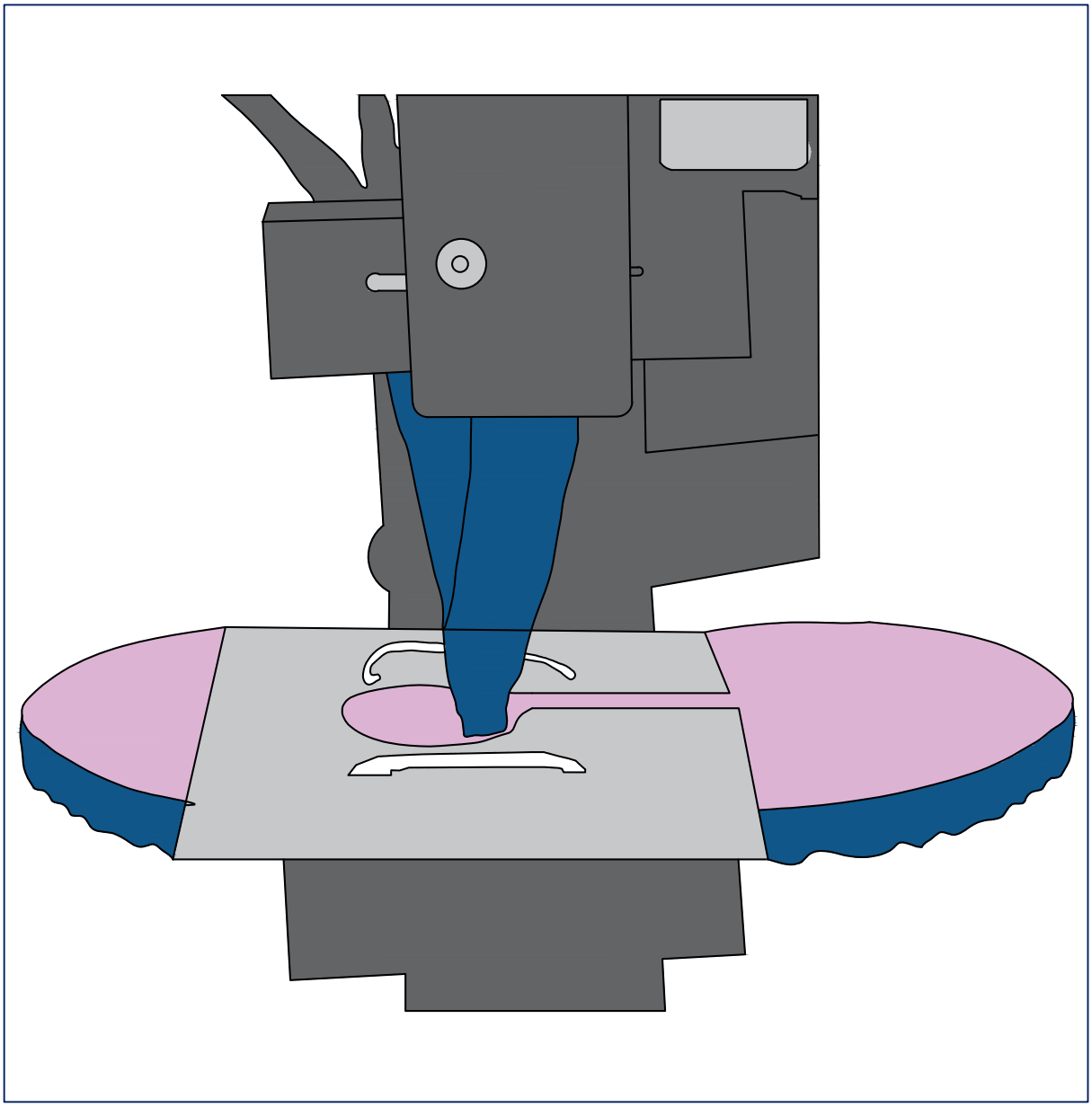

FIG. 3 ILLUSTRATION DIAGRAM FOR CLAMPING OF REAR STRAP IN THE TENSILE MACHINE

C-5.2 Operate the tensile testing machine so that the jaws separate at a rate of 100 mm/min ± 10 mm/min until either the toe post breaks/rear strap break, or pulls out of the bottom sole.

C-5.3 Record the maximum force obtained in newton, record the type of failure.

C-5.4 Repeat the procedure on remaining tests for the toe post attachment and rears trap attachment strength for sandal or slipper.

C-6 TEST REPORT

C-6.1 A full description of the tested sample.

C-6.2 The maximum force(s) recorded and the type(s) of failure.

C-6.3 Any deviations from this standard test method.

ANNEX D

(*Table* 6)

ATTACHMENT STRENGTH OF STRAP AND BUCKLE, D-RING, VELCRO

D-1 SCOPE

This method is intended to determine the strength of buckle and strap attachments in footwear sandal. The method is applicable to all footwear containing buckle, D-ring, velcro and/or strap fastenings.

D-2 PRINCIPLE

D-2.1 A test specimen containing a buckle, D-ring, velcro and/or strap as shown in Fig. 4 is gradually stretched by a tensile machine until failure occurs. The breaking force and the type and position of failure are determined.

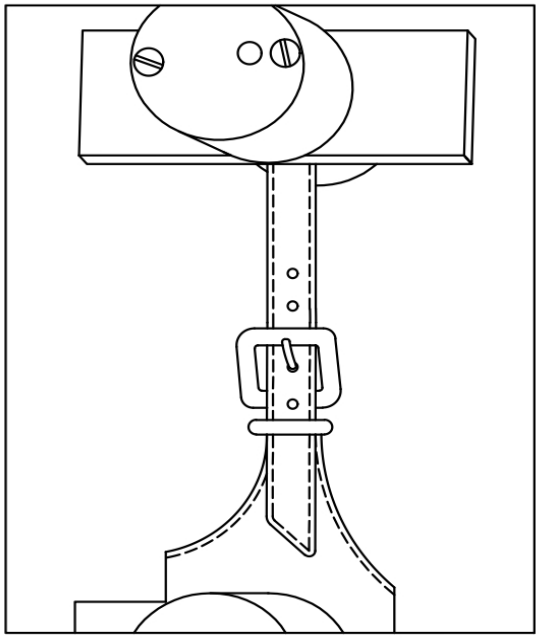

FIG. 4 ILLUSTRATION DIAGRAM FOR ATTACHMENT STRENGTH OF STRAP, BUCKLE, D-RING, VELCRO

D-2.2 Strength of the strap, or the strength of the whole assembly (Buckle/D-Ring/Velcro attachment) as following types buckle attachment to strap in the sandal upper.

D-2.2.1 Buckle attached directly to sandal upper as shown in Fig. 5.

D-2.2.2 Buckle attached to sandal upper via separate buckle loop as shown in Fig. 6.

D-2.2.3 Buckle strap attached to sling-back strap (narrow strap) as shown in Fig. 7.

D-3 APPARATUS AND MATERIALS

A tensile testing machine with a jaw separation rate of 100 mm/min ± 10 mm/min, with a force 2 kN approximate to the specimen under test. The accuracy of measuring the force to the nearest better than 2 percent.

D-4 PREPARATION OF TEST SPECIMEN

Where possible, for each type of sandal to be tested, prepare at least two test specimens using one of the following procedures.

Samples where the part of the upper to which the buckle is attached is large enough to be gripped in the jaws of the tensile testing machine.

D-4.1 Cutting-Whole Test Assembly from Sandal Upper

D-4.1.1 Buckle attached directly to sandal upper as shown in Fig. 5.

D-4.1.2 Buckle attached to sandal upper via separate buckle loop as shown in Fig. 6.

D-4.1.3 Cut through the upper including lining material along the feather edge to remove panels to which the buckle and strap are attached, Insert the

fastening strap in the buckle with the prong through the second hole. Flatten the cut out test assembly and mark the longitudinal axis lines more accurately

D-4.1.4 Draw further lines across the cut out panels, perpendicular to the longitudinal axis and 15 mm behind the rear point of attachment of the buckle and strap, as shown in Fig. 5 and Fig. 6. These are the clamping lines which are aligned with the front edge of the jaw during tensile testing. If a clamping line passes over an underlay it should be redrawn immediately behind the end of the underlay.

D-4.1.5 Cut along the parallel lines marked on each panel, then follow the same as said procedure.

D-4.2 Cutting-Whole Test Assembly Sandal Upper with Narrow Main Stap (Sling Back) Buckle Strap Attached to Sling-Back Strap Fig. 7.

D-4.2.1 Samples where the buckle is attached to a narrow main strap, for example a sling-back strap, which is not large enough to be gripped in the jaws of the tensile testing machine.

D-4.2.2 Cut through the main strap at the back of the heel and at the feather edge on each side of the sandal upper, as shown in Fig. 7, Insert the fastening strap in the buckle with the prong through the second hole.

D-4.2.3 Flatten the cut out test assembly, for each test specimen, cut four strips of upper leather, for example side leather of thickness 1.75 mm ± 0.25 mm, dimensions 80 mm × 25 mm. Sew these to the main strap on each side of the buckle and strap, so that the edge of each strip is 7 mm from the edge of the buckle strap or fastening strap, *see* Fig. 8 as required. Draw a line across each strip 15 mm from the main strap, as shown in Fig. 8. These are the clamping lines which are aligned with the front edge of the jaw during tensile testing.

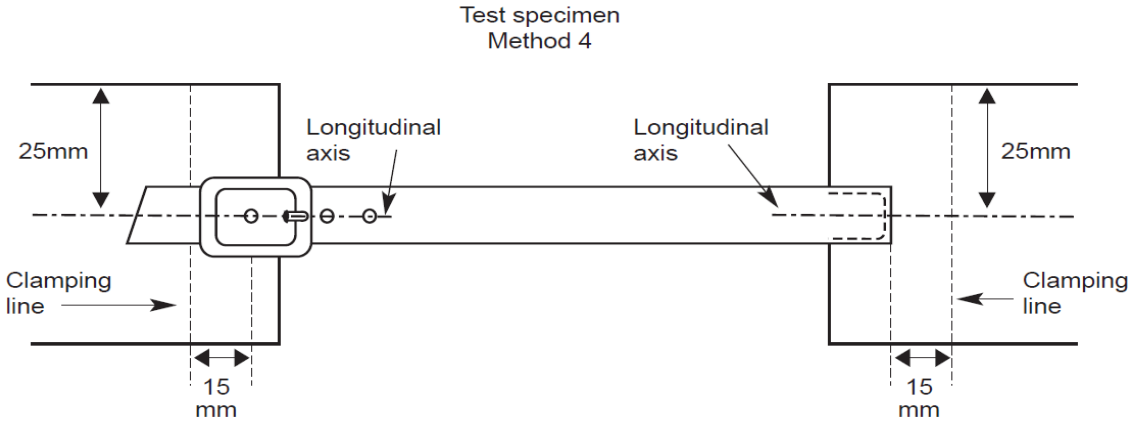

FIG. 5 CUTTING OF WHOLE TEST ASSEMBLY-BUCKLE ATTACHED DIRECTLY TO SANDAL UPPER

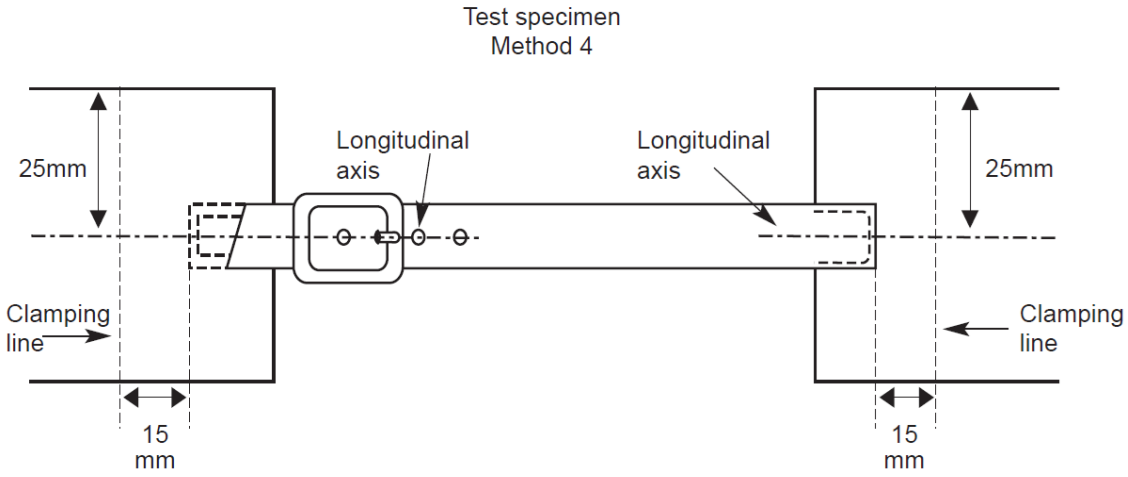

FIG. 6 CUTTING OF WHOLE TEST ASSEMBLY–BUCKLE ATTACHED TO SANDAL UPPER VIA SEPARATE BUCKLE LOOP

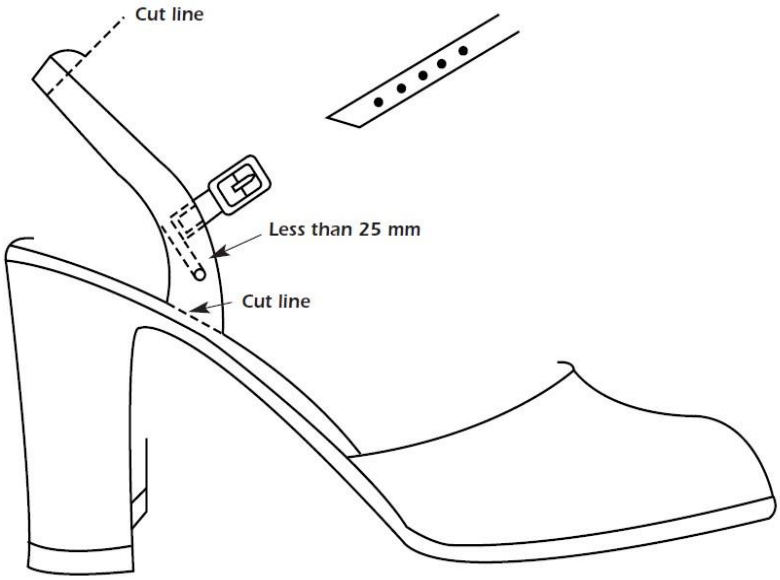

FIG. 7 CUTTING OF TEST ASSEMBLY–BUCKLE STRAP ATTACHED TO SLING-BACK STRAP

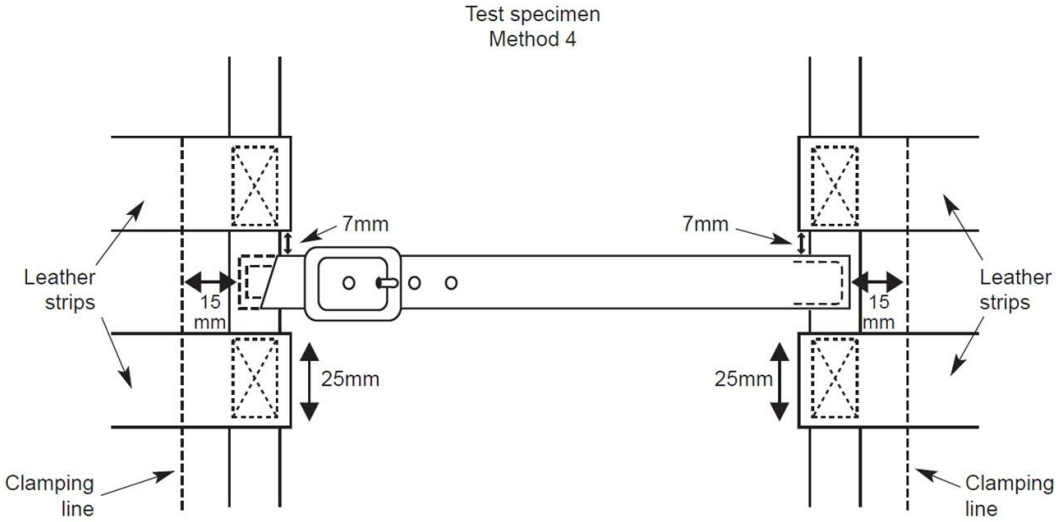

FIG. 8 CUTTING OF TEST SPECIMEN–WHOLE ASSEMBLY WITH SEWN ON STRIPS-BUCKLE STRAP ATTACHED TO SLING BACK STRAP

D-5 PROCEDURE

D-5.1 Whole Assembly

D-5.1.1 Buckle attached directly to sandal upper as shown in Fig. 5.

D-5.1.2 Buckle attached to sandal upper via separate buckle loop as shown in Fig. 6.

D-5.1.3 Buckle strap attached to sling back strap as shown in Fig. 7.

D-5.1.4 Clamp the one end of the test specimen (as shown in Fig. 5, Fig. 6 and Fig. 7) containing the buckle centrally in one jaw such that the edge of the jaw aligns with the clamping line marked on the test specimen. Take care that the end of the strap is not clamped.

D-5.1.5 Clamp the other end of the test specimen (as shown in Fig. 5, Fig.6 and Fig. 7) containing the strap attachment centrally in the other jaw such that the edge of the jaw aligns with the clamping line marked on the test specimen..

D-5.1.6 Operate the tensile tester so that the jaws separate at a speed of 100 mm/min ± 10 mm/min.

Record the maximum force in newtons, to the nearest 1 N at which first signs of failure occurs as follow.

D-5.1.7 Record the types of failures if require (Additional Information for manufacture for improvement)

a) Failure of the buckle attachment;
b) Failure of any part of the buckle;
c) Breaking of the fastening strap across its width;
d) Tearing of the fastening strap along the line of the buckle holes;
e) Partial tearing of the strap; and
f) Failure of strap attachment.

The said types of failure will be useful for the manufacture, when value is less than requirement, this will give lead for improvement of the product to get optimum requirement of strap attachment strength of sandal upper.

D-5.1.8 Repeat the procedure for remaining test specimen(s).

D-6 TEST REPORT

A description of the buckle fastening assembly, including the type of upper material.

The force at failure for each test specimen as recorded.

The type of failure for each test specimen as recorded if required for improvement.

ANNEX E

(*Foreword*)

COMMITTEE COMPOSITION

Footwear Sectional Committee, CHD 19

Organization	*Representative(s)*
In personal capacity (*Flat F1, Bhoopathy Apartment, 10, Ethiraj Street, Palipattu, Chennai-600113*)	DR B. N. DAS **(*Chairperson*)**
Atharva Labs, Noida	APARNA PARVATIKAR SHRI V. B. PARVATIKAR (*Alternate*)
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Council for Footwear Leather and Accessories	(CFLA) EXECUTIVE DIRECTOR SHRI RAJEEV SHARMA (*Alternate*)
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M B Rubber Private Limited	SHRI VIPAN MEHTA
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Pinza Footwear, New Delhi	SHRI PREM MEHANI

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XO Footwear, Delhi	SHRI NALIN GUPTA SHRI MANOJ KUMAR (*Alternate*)
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Member Secretary
MS PREETI PRABHA
SCIENTIST 'C'/DEPUTY DIRECTOR
(CHEMICAL), BIS

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Central : 601/A, Konnectus Tower -1, 6th Floor, DMRC Building, Bhavbhuti Marg, New Delhi 110002 { 2323 7617

Eastern : 8th Floor, Plot No 7/7 & 7/8, CP Block, Sector V, Salt Lake, Kolkata, West Bengal 700091 { 2367 0012 2320 9474

Northern : Plot No. 4-A, Sector 27-B, Madhya Marg, Chandigarh 160019 { 265 9930

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