भारतीय मानक

Indian Standard

IS 8085 (Part 18) : 2023
ISO 22777 : 2004

फुटवियर की परीक्षण पद्धतियाँ

भाग 18 स्पर्श करें और बंद करें फास्टनर के पील ताकत पहले और बार-बार बंद करने के बाद

Methods of Test for Footwear

Part 18 Peel Strength Before and After Repeated Closing for Accessories Touch and Close Fasteners

ICS 61.060

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May 2023 **Price Group 7**

Footwear Sectional Committee, CHD 19

NATIONAL FOREWORD

This Indian Standard (Part 18) which is identical with ISO 22777 : 2004 ‘Footwear — Test methods for accessories: Touch and close fasteners — Peel strength before and after repeated closing’ issued by the International Organization for Standardization (ISO), was adopted by the Bureau of Indian Standards on the recommendation of the Footwear Sectional Committee and approval of the Chemical Division Council.

Under the general title ‘Method of test for footwear’, this standard is being published in several other parts. This part is an adoption of ISO 22777 : 2004 which specifies a test method for determining the peel strength of touch and close fasteners before and after repeated use.

The other parts of this Indian Standard are:

IS No.	*Title*
IS 8085	Method of test for footwear
(Part 1) : 1986	Dimensions, fitting, adhesion test, peel test, heat resistance test and ageing test (*first revision*)
(Part 2) : 1999	Footwear performance test, stiffness test for shanks, lastometer test for cracking of uppers; and performance test for upper fabrics, coated fabrics, sock lining and other lining materials.
(Part 3) : 2021	Upper sole adhesion
(Part 4) : 2019	Resistance to crack initiation and growth belt flex method
(Part 5) : 2019	Longitudinal stiffness of shanks
(Part 6) : 2021	Abrasion resistance of uppers, linings and insocks
(Part 7) : 2021	Deformability of upper
(Part 8) : 2019	Delamination resistance of uppers
(Part 9)	Tear strength of uppers linings and insocks (*under preparation*)
(Part 10)	Heel attachment for whole shoe (*under preparation*)
(Part 11)	Attachment strength of straps, trims and accessories (*under preparation*)
(Part 12)	Tensile performance of elastic materials (*under preparation*)
(Part 13)	Seam strength for uppers, lining and insocks (*under preparation*)
(Part 14)	Water vapour permeability and absorption for uppers and lining (*under preparation*)

(*Continued on third cover*)

Contents

Indian Standard

METHODS OF TEST FOR FOOTWEAR

PART 18 PEEL STRENGTH BEFORE AND AFTER REPEATED CLOSING FOR ACCESSORIES TOUCH AND CLOSE FASTENERS

1 Scope

This document specifies a test method for determining the peel strength of touch and close fasteners before and after repeated use.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 12222, *Footwear - Standard atmospheres for conditioning and testing of footwear and components for footwear*

EN 12240, *Touch and close fasteners — Determination of the overall and effective widths of tapes and the effective width of a closure*

EN ISO 7500-1, *Metallic materials — Verification of static uniaxial testing machines — Part 1: Tension/compression testing machines — Verification and calibration of the force-measuring system (ISO 7500-1:2004)*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
peel strength
force per unit effective width required to separate the two tapes forming the specified closure from an open edge under the specified conditions of test

3.2
effective width
width of the pile at 90° to the length of the tape and which does not include the selvedge

4 Principle

4.1 Peel strength

Both parts of a touch and close fastener are pressed together under controlled conditions, and the average force required to peel them apart along their length from either end is measured with a tensile testing machine. This procedure is then repeated with one of the parts of the fastener turned through 180°.

4.2 Peel strength after repeated opening and closing

A touch and close fastener is repeatedly opened and closed a standard number of times by a machine. The peel strength is then measured by repeating the test described in 4.1.

5 Apparatus

5.1 A **tensile testing machine** complying with the requirements of EN ISO 7500-1 to an accuracy corresponding to class 2, and with the following:

5.1.1 A jaw separation rate of 100 mm/min ± 10 mm/min.

5.1.2 The means of producing a continuous record of force throughout the test.

5.2 A **roller device** with a roller (see Figure 1) of diameter 100 mm ± 5 mm capable of applying a force of 1,0 N ± 0,1 N per millimetre width of the test specimen. This is to close the fastener under a standard pressure.

5.3 **Fork** with a handle (see Figure 2) which engages the roller (5.2) and allows it to be moved without any extra down force being applied (see Figure 3).

Dimensions in mm

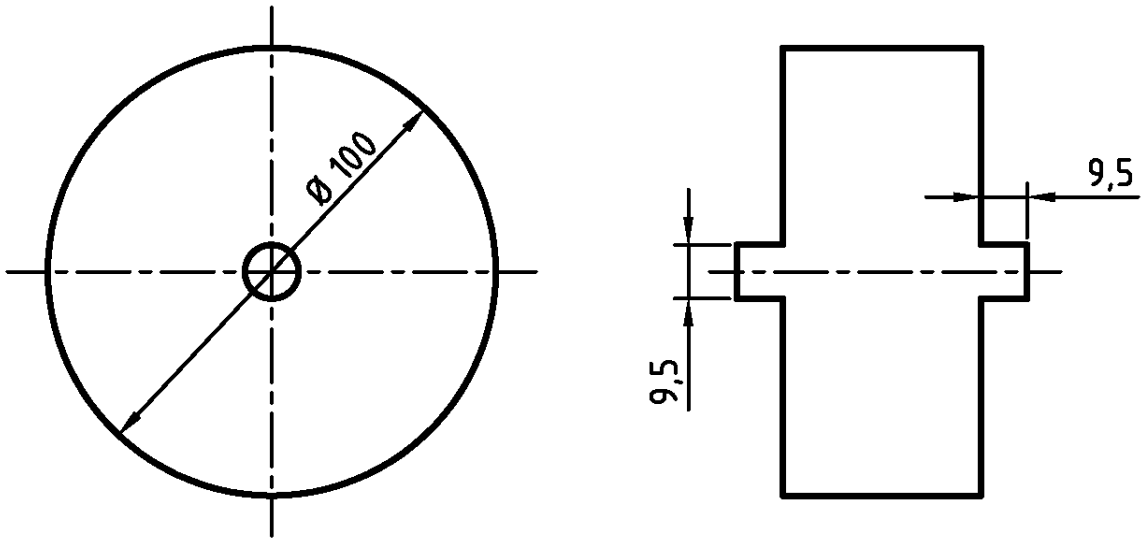
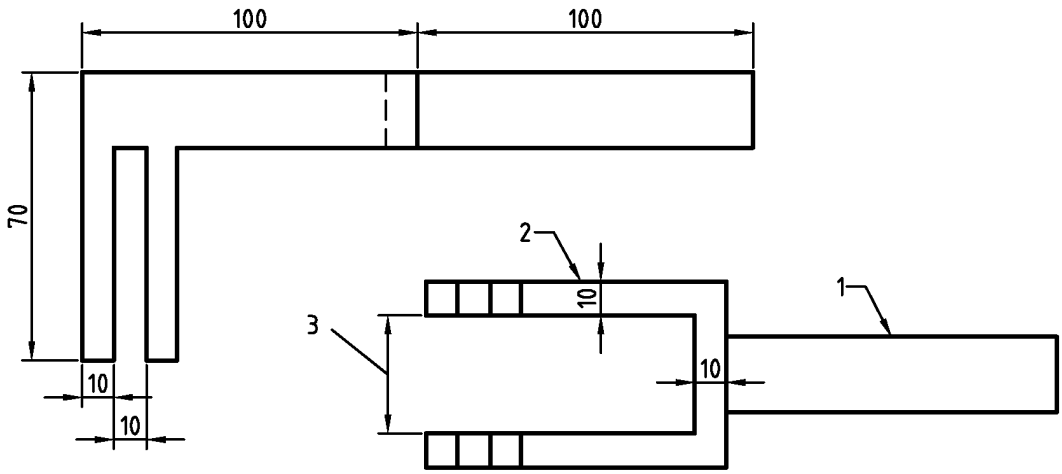


Figure 1 — Roller

Dimensions in mm



Key

1 Handle
2 Forks
3 Space between the forks to be 2 mm greater than the roller width

Figure 2 — Fork with a handle

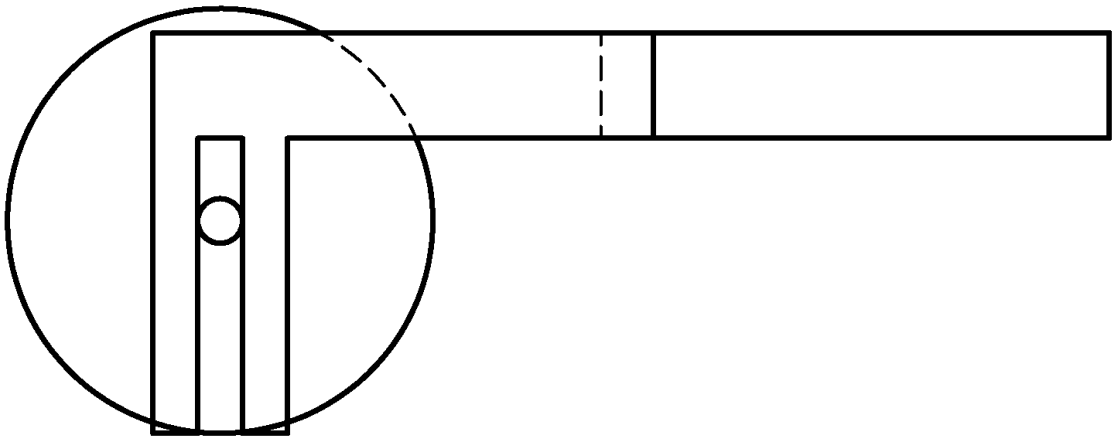


Figure 3 — Rolling mechanism for touch and close fasteners

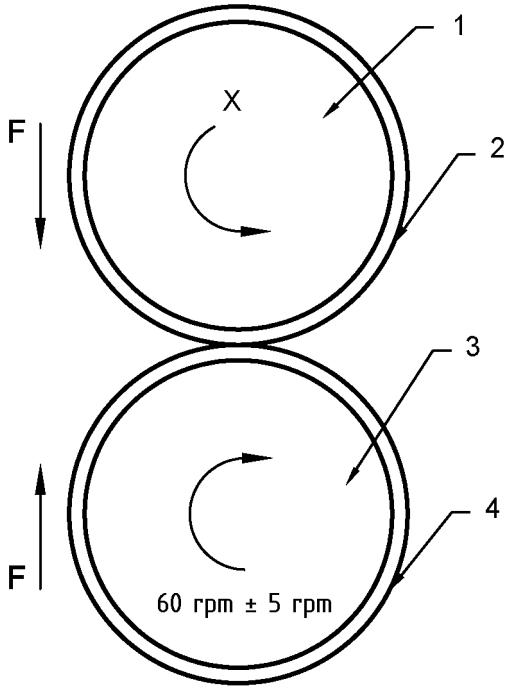
5.4 A **touch and close cycling machine** (see Figure 4) with:

5.4.1 Two circular drums of minimum width 70 mm, one of diameter 160,0 mm ± 0,5 mm and the other diameter 162,5 mm ± 0,5 mm. Each drum has a single slot of length 55 mm ± 2 mm across its width to hold the free ends of the specimen fastener. The drums are mounted next to each other with their axes parallel.

5.4.2 A means of rotating the smaller of the two drums at a rate of 60 rev/min ± 5 rev/min with the direction of rotation being reversed every 30 s ± 5 s. The larger of the two drums rotates freely and is driven by physical contact with the smaller drum via the test specimen.

5.4.3 A means of applying a force of 1,0 N ± 0,1 N between the two drums for every 1 mm width of the test specimen.

5.4.4 A method of counting the total number of rotations of the smaller of the two drums regardless of the direction of rotation.



Key

1 Idling drum (diameter 162,5 mm ± 0,5 mm)
2 Hook tape
3 Driven drum (diameter 160 mm ± 0,5 mm)
4 Loop tape
F Force between drums = 1 N × for every millimetre of effective width of fastener
X Drum

Figure 4 — Touch and close fastener cycling machine

6 Test specimens

6.1 Peel strength

6.1.1 Cut one piece of minimum length 420 mm from both the hook and loop tapes.

6.1.2 Mark on the reverse side of each piece of tape four lines at 100 mm ± 5mm intervals from one end, as shown in Figure 5, to define the four test specimens.

6.1.3 Mark one end of each test specimen with a “1” and the other end with a “2” as shown in Figure 5.

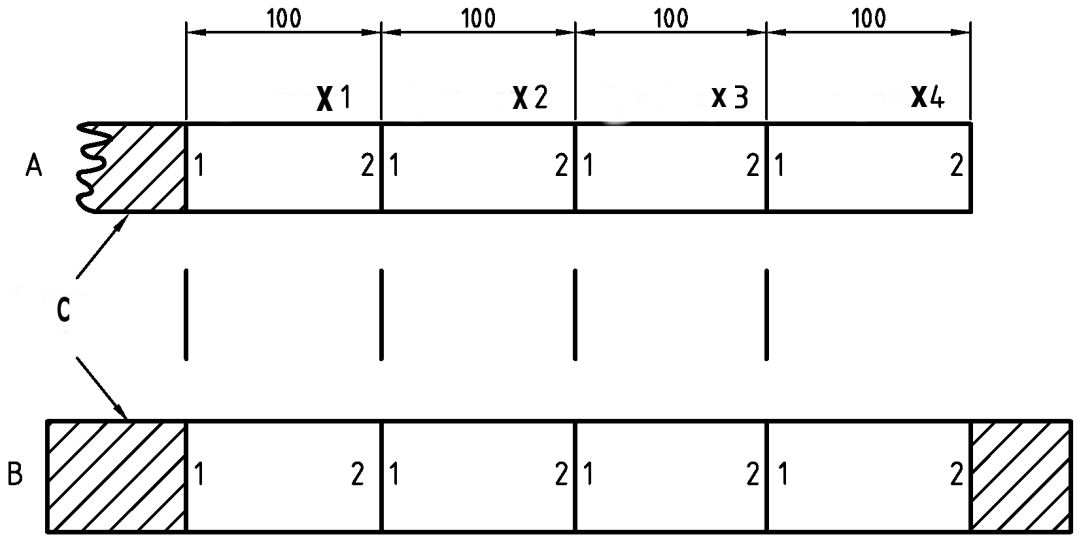
6.1.4 Separate the four test specimens by cutting along the lines drawn in 6.1.2.

6.2 Peel strength after repeated opening and closing

6.2.1 Cut one piece of length 540 mm ± 10 mm from both the hook and loop tapes.

6.2.2 Mark four test specimens, each of length 100 mm ± 5 mm on the central portion of both tapes.

6.2.3 Mark each 100 mm test specimen section with a “1” at one end and a “2” at the other (see Figure 5). Do not cut the test specimens out at this stage.



Key

A Hook tape
B Loop tape
C Spare tape
X Specimen

Figure 5 — Marking and cutting of test specimens

7 Conditioning

The test specimens shall be conditioned in accordance with the standard atmosphere specified in EN 12222 for a minimum of 24 h prior to the test. The closing of the test specimens and the testing shall also take place under these conditions.

8 Procedure

8.1 Peel strength

8.1.1 Measure the effective width (3.2) of both a hook and loop tapes (see 6.1.1), according to EN 12240, to an accuracy of 0,5 mm and use the smaller of these two values as the width of all the assembled fasteners.

8.1.2 Place four test specimens (see 6.1.4) cut from the loop tape on a flat surface with the pile uppermost.

8.1.3 Gently place one of the test specimens cut from the hook tape on top of each of the loop test specimens (see Figure 6), so that:

- Two of the fasteners are assembled so that the ends marked “1” (see 6.1.3) on both the hook and loop specimens coincide: Type A assembly.

- Two of the fasteners are assembled so that the end marked “1” on the hook test specimen coincides with the end marked “2” (see 6.1.3) on the loop test specimen: Type B assembly.

8.1.4 Consolidation of fasteners:

8.1.4.1 Adjust the roller device (5.2) to produce a force, in N, numerically equal to, or within 1 N of the effective width of the fastener, in mm, as measured in 8.1.1.

8.1.4.2 Take the assembled fastener (see 8.1.3) and traverse the full length of it with the roller device (5.2).

8.1.4.3 Turn the fastener over and repeat the procedure in 8.1.4.2.

8.1.4.4 Repeat the procedure in 8.1.4.2 and 8.1.4.3 a further four times so that the fastener has been transversed by the roller a total of ten times.

8.1.5 Partly peel open one type A and one type B assembly (see 8.1.3) from the end where the hook tape is marked 1. Partly peel the remaining type A and type B assembly from the end where the hook tape is marked 2, (see Figure 6). In all cases take care not to peel more than 40 mm of the fastened length.

8.1.6 Take an assembly and clamp one of its free separated ends into each of the jaws of the tensile testing machine (5.1.1) ensuring that the longer edges of the specimen fastener are parallel to the axis of the machine.

8.1.7 Turn on the recording system of the tensile testing machine.

8.1.8 Operate the tensile testing machine with a jaw separation rate of 100 mm/min $\pm$ 10 mm/min until at least 50 mm of the fastened length has been separated.

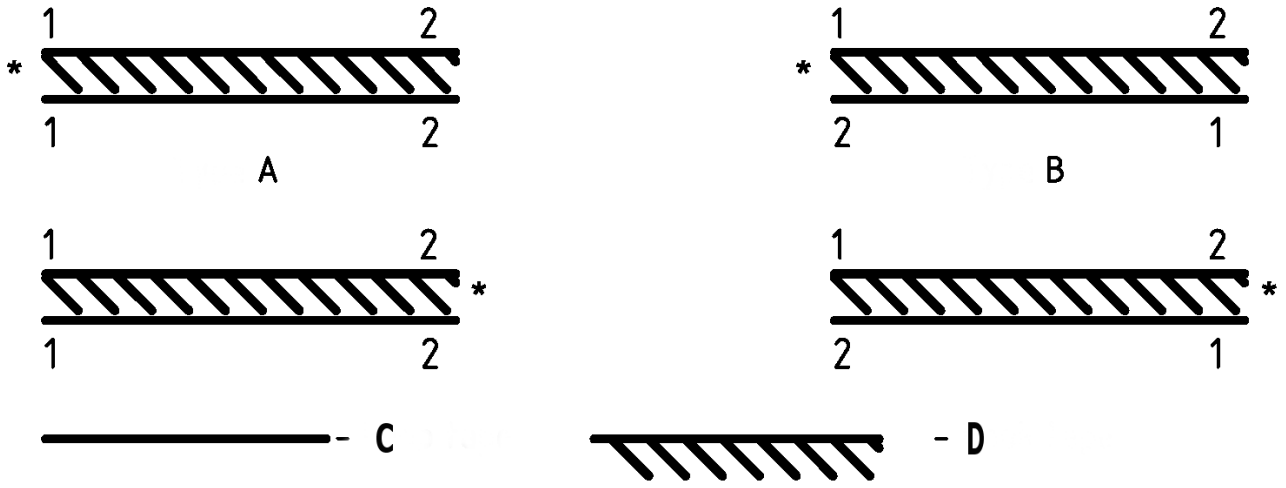
8.1.9 Turn off the recording system (5.1.3).

8.1.10 Repeat the procedure in 8.1.6 to 8.1.9 for the other three assemblies.

8.1.11 Repeat the procedure in 8.1.2 to 8.1.10 a further two times using the same pieces of tape to produce a total of twelve results, three for each of the four test configurations shown in Figure 6.

8.1.12 For each of the twelve graphs of force versus jaw separation produced by the recording system determine the average peeling force, in N.

NOTE The mean peeling force can be estimated by visually comparing areas on the force versus extension graph. When a horizontal line is drawn at the average peeling force, the area bounded by the line and the portion of the force versus extension curve above the line will be equal to the area bounded by the line and the portions of the curve below the line.



Key
* Start peel from this end
A Type A
B Type B
C Loop tape
D Hook tape

Figure 6 — Peel configurations

8.2 Peel strength after repeated opening and closing

8.2.1 Measure the effective width of the fasteners by using the procedure in 8.1.1.

8.2.2 Attach the length of loop tape (6.2.1) round the circumference of the smaller drum (5.4.1) so that its backing surface is against the drum. Tuck the free ends of the tape into the slot in the drum.

8.2.3 Attach the length of hook tape (6.2.1) round the circumference of the larger drum (5.4.1) so that its backing surface is against the drum. Tuck the free ends of the tape into the slot in the drum.

8.2.4 Bring the two drums together so that the hook and loop tapes are in contact with each other, and apply a force, in N, between the drums which is numerically equal to, or within 1 N of the effective width of the fastener, in mm.

8.2.5 Rotate the smaller drum at a speed of 60 rev/min ± 5 rev/min for 5 000 revolutions.

8.2.6 Remove both the hook and loop tapes from the drums and cut each tape into four test specimens as shown in Figure 5.

8.2.7 Carry out the procedure in 8.1.2 to 8.1.12 to assess the peel strength of the fasteners after repeated opening and closing.

9 Calculation and expression of results

9.1 Peel strength

9.1.1 Divide each of the twelve average peeling forces, in N, determined in 8.1.12 by the width of the fastener measured in 8.1.1 to give the average peel strength for each test, in N/mm.

9.1.2 Calculate the arithmetic mean of the three average peeling strengths, in N/mm, for each of the four test configurations shown (see 8.1.11).

9.2 Peel strength after repeated opening and closing

Repeat the calculations in 9.1.1 and 9.1.2 for the fasteners subjected to repeated opening and closing.

10 Test report

The test report shall include the following information:

a) reference to this document, EN ISO 22777;

b) full identification of the touch and close fastener tapes, including commercial codes, colours, nature, etc.;

c) the minimum mean value of peeling strength obtained in 9.1.2;

d) any deviation from this test method and any incident which could affect the result;

e) date of testing.

Annex ZA
(normative)

Normative references to International publications with their corresponding European publications

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE Where an International Publication has been modified by common modifications, indicated by (mod.), the relevant EN/HD applies.

Publication	Year	Title	EN	Year
ISO 7500-1	2004	Metallic materials — Verification of static uniaxial testing machines — Part 1: Tension/compression testing machines — Verification and calibration of the force-measuring system	EN ISO 7500-1	2004
ISO 18454	2001	Footwear — Standard atmospheres for conditioning and testing of footwear and components for footwear	EN 12222	1997

(*Continued from second cover*)

(Part 15)	Washability in a domestic washing machine for whole shoe (*under preparation*)
(Part 16)	Flexing durability for whole shoe (*under preparation*)
(Part 17)	Abrasion resistance for accessories shoe laces (*under preparation*)

The text of ISO Standard has been approved as suitable for publication as an Indian Standard without deviations. Certain conventions and terminologies are, however, not identical to those used in Indian Standards. Attention is particularly drawn to the following:

a) Wherever the words `this document' appear referring to this standard, they should be read as `Indian Standard'; and
b) Comma (,) has been used as a decimal marker in the International Standard, while in Indian Standards, the current practice is to use a point (.) as the decimal marker.

Standards also exist. The corresponding Indian Standards, which are to be substituted in their respective places, are listed below along with their degree of equivalence for the editions indicated:

International Standard	*Corresponding Indian Standard*	*Degree of Equivalence*
ISO 7500-1 : 2018 Metallic materials — Verification of static uniaxial testing machines — Part 1: Tension/compression testing machines — Verification and calibration of the force measuring system (ISO 7500-1 : 2004)	IS 1828 (Part 1) : 2022 Metallic materials — Calibration and verification of static uniaxial testing machines: Part 1 Tension/ compression testing machines — Calibration and verification of the force measuring system	Identical with ISO 7500-1 : 2018

The technical committee has reviewed the provisions of the following International Standards referred in this standard and has decided that they are acceptable for use in conjugation with this standard:

International Standard	*Title*
EN 12222	Footwear — Standard atmospheres for conditioning and testing of footwear and components for footwear
EN 12240	Touch and close fasteners — Determination of the overall and effective widths of tapes and the effective width of a closure

Conditioning and test atmospheres stipulated in this standard may not be applicable to tropical/subtropical countries like India. The applicable Standard Atmospheric Conditions (SAC) for Indian Conditions are (27 ± 2)º C and (65 ± 5) percent relative humidity and may be observed while using this standard.

In reporting the result of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS 2 : 2022 'Rules for rounding off numerical values (*second revision*)'.

Bureau of Indian Standards

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Review of Indian Standards

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 website-www.bis.gov.in or www.standardsbis.in.

This Indian Standard has been developed from Doc No.: CHD 19 (22016).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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