

भारतीय मानक
जूतों के लिए संरक्षी इस्पात पंजा टोपी — विशिष्टि
(चौथा पुनरीक्षण)

Indian Standard
PROTECTIVE STEEL TOE CAPS FOR
FOOTWEAR — SPECIFICATION
(*Fourth Revision*)

ICS 13.340.50

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BUREAU OF INDIAN STANDARDS
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FOREWORD

This Indian Standard (Fourth 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.

Protective steel toe caps are used in protective footwear to give protection against impact when tested at an energy level of 14 kgf.m. It forms an in-built integral part of the protective footwear.

This standard was originally published in 1970 and was subsequently revised in 1977, 1992 and 1996. In the original standard, C-60 carbon steel along with its composition was recommended as raw material for the manufacture of protective steel toe caps. Hardness also was recommended at 400-500 HV at 10 kg load.

In the first revision composition of raw material was deleted and hardness value was revised to 300-450 HV at 30 kg load. In the second revision hardness requirement was deleted and raw material thickness and performance value of Type 2 protective steel toe cap for safety footwear was raised.

In the third revision dimensional requirement, method of test for performance and performance value of Type 2 protective steel toe caps were revised.

In this fourth revision emphasis has been given to upgrade the standard in line with the industries' requirement. Accordingly, several experimental studies were conducted and based on these studies some requirements have been revised as follows:

- a) Thickness requirement has been deleted;
- b) Dimensional requirements of 'a' and 'b' have been deleted;
- c) Size-wise performance values (clearance) have been specified; and
- d) Performance test method has been revised by incorporating plasticine cylinders in place of metal capsules.

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

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 : 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
**PROTECTIVE STEEL TOE CAPS FOR
 FOOTWEAR — SPECIFICATION**
(Fourth Revision)

1 SCOPE

This standard prescribes requirements and methods of sampling and test for protective steel toe caps, used for reinforcement of the toe of protective footwear.

2 REFERENCE

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

<i>IS No.</i>	<i>Title</i>
2050 : 1991	Glossary of terms relating to footwear (<i>first revision</i>)

3 TERMINOLOGY

For the purpose of this standard, the definitions given in IS 2050 shall apply.

4 TYPES

This standard covers two types of protective steel toe caps depending on the shape, design and use:

- Type 1 For footwear having leather soles
- Type 2 For footwear having rubber soles/
moulded soles

5 REQUIREMENTS**5.1 Shape and Dimension**

Protective steel toe caps, Types 1 and 2 shall conform to the shape shown in Fig. 1 and Fig. 2 respectively. Dimensions 'a' and 'b' shall be in accordance with buyers requirements, hence, not specified. Dimensions 'c' and 'd' shall conform to the corresponding sizes as given in Table 1. Dimension 'e' is for guidance only and is not an obligatory requirement.

5.2 Performance Test

Performance test shall be conducted on the protective steel toe caps at an energy level of 14 kgf.m in accordance with the method prescribed in Annex A. The sizewise clearances during impact shall conform to the minimum values as stated under.

Size 8 protective steel toe caps, when subjected to an impact of 14 kgf.m in accordance with the method prescribed in Annex A, shall retain a minimum clearance of 19 mm for Type 1 and 22 mm for Type 2 respectively and will increase or decrease by 0.5 mm for every increase or decrease in size.

5.3 Finish

The edge of the protective steel toe caps shall be finished smooth and without any sharp point of edges.

5.4 Rust Preventive

Steel toe caps of Type 1 shall be coated with suitable rust preventives.

Table 1 Dimensional Requirements*(Clause 5.1)*

All dimensions in millimetres.

Sl No.	Sizes	c	d Min	e	
				Type 1 Max	Type 2 Min
(1)	(2)	(3)	(4)	(5)	(6)
i)	4 - 5	Shall not be lower than the value of d	38	3	3
ii)	6 - 7	do	39	3	4
iii)	8 - 9	do	40	3	4
iv)	10 - 11	do	41	3	4
v)	12 and above	do	42	3	4

5.4.1 Steel toe caps of Type 2 may be coated with suitable rust preventives subject to agreement between the purchaser and the supplier.

6 MARKING AND PACKING

6.1 Marking

Each protective steel toe cap shall be marked with type, size, the particular side of the footwear pair for which it is intended in addition to the indication of the source of manufacture.

6.1.1 BIS Certification Marking

The product may also be marked with the Standard Mark.

6.1.2 The use of the Standard Mark is governed by the

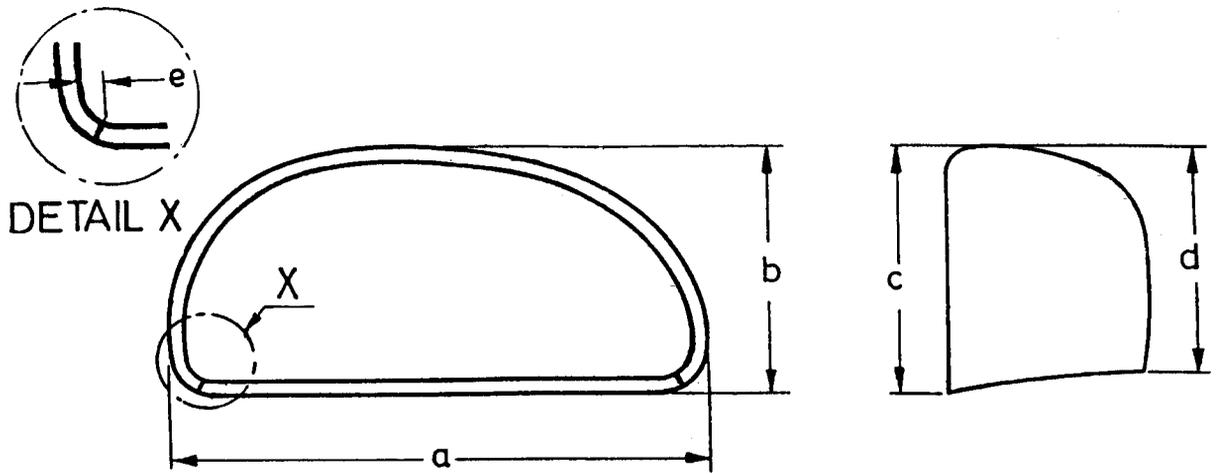
provisions of *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

6.2 Packing

The material shall be packed as agreed to between the purchaser and the supplier. Packing should bear suitable Code Number to identify date of manufacture.

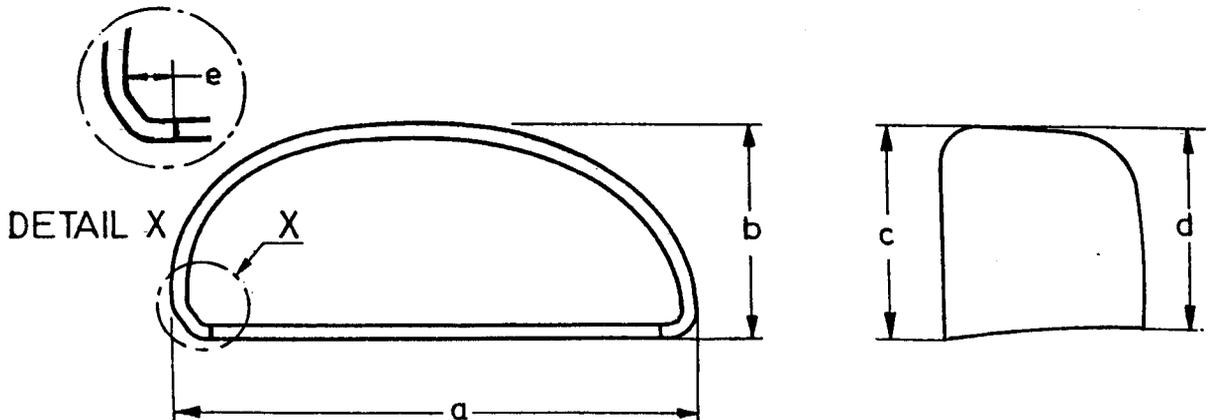
7 SAMPLING

The scale of sampling and the criteria for conformity of the material shall be as given in Annex B.



All dimensions in millimetres.

FIG. 1 STEEL TOE CAP TYPE 1, HAVING LEATHER SOLE



All dimensions in millimetres.

FIG. 2 STEEL TOE CAP TYPE 2, HAVING RUBBER/MOULDED SOLE.

ANNEX A

(Clause 5.2)

METHOD OF TEST FOR PERFORMANCE OF PROTECTIVE STEEL TOE CAP

A-1 GENERAL

The impact test is carried out on finished toe caps ready for incorporation in the safety/protective footwear.

A-2 TESTING APPARATUS

A-2.1 The testing apparatus shall be such that a 27.0 ± 0.2 kg weight can be allowed to fall freely on vertical guides from various predetermined heights to strike a cylindrical mild steel plunger, 38 mm in diameter and 145 mm in length. The plunger shall be freely supported in a vertical guide, and shall have attached to its lower end a horizontal mild steel bar 155 mm long, 38 mm wide and 10 mm thick. The bar shall be such that it can rest across the toe cap with its front edge in line with the point of the toe cap (*see Fig. 6*), the upper end of the plunger shall have screwed to it, a mild steel plate 63 mm in diameter and 6 mm thick, which may be replaced when damaged. The above dimensions shall have a tolerance of ± 1 mm.

A-2.2 The base of the machine shall be solidly constructed of hard wood, 75 mm thick. To this a flat bed plate of steel or any other suitable material shall be mounted so that the bottom edge of the steel toe cap rests freely on it.

A-3 PLASTICINE CYLINDER

Prepare the plasticine cylinder suitable for measuring the clearance of Type 1 and Type 2 steel toe caps at the moment of impact in accordance with Fig. 3 and Fig. 4 respectively. To avoid stickness, the plasticine cylinder may be wrapped with aluminium foil, as generally used in the kitchen.

A-4 PROCEDURE

Place the toe cap in such a way that the bottom edge can rest freely on the flat metal surface at the base of the machine and rigidly held in position with the help of a metal bar with fork (*see Fig. 5*). The metal bar with fork is secured by two bolts horizontally mounted on the clamping plate and two nuts.

Prior to tightening the nuts, place the plasticine cylinder in the slot of the fork and position it in such a way that the same rests on the test axis keeping its rear edge approximately 2 mm inside the rear edge of the steel toe cap (*see Fig. 6*).

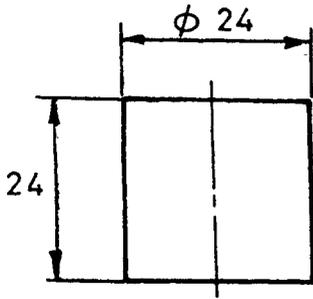
A-4.1 Impact

Rest the vertical plunger on the secured steel toe cap in such a way that the front edge of the horizontal metal bar remains in line with the front edge of the steel toe cap (*see Fig. 6*).

Adjust the mass to a height of 508 ± 5 mm above the top of the vertical plunger and allow it to fall freely to strike the plunger. Thus the impact energy shall be 14 kgf.m.

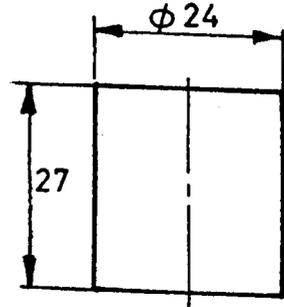
A-4.2 Measurement

Remove the plasticine cylinder with utmost care so as not to influence its form and measure the area depressed most to the nearest 0.1 mm with the aid of a dial gauge or a dial vernier calliper applying light pressure to ensure that the foot of the measuring instrument does not struck into the surface of the plasticine cylinder. This value is the clearance at the moment of maximum depression under impact.



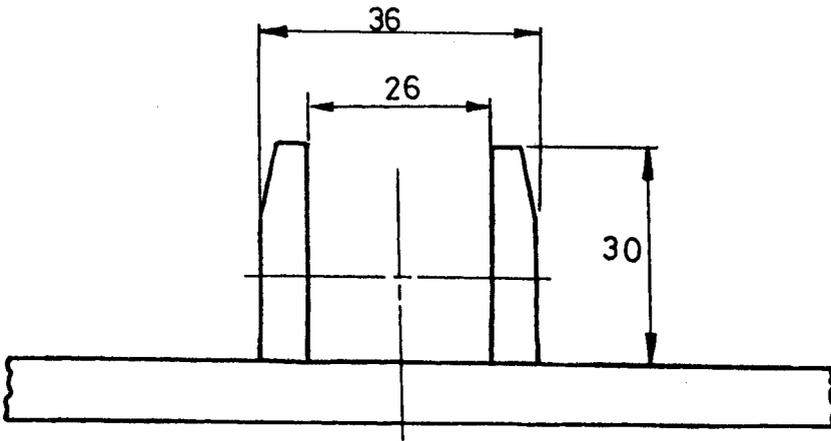
All dimensions in millimetres.

FIG. 3 PLASTICINE CYLINDER FOR TYPE 1 STEEL TOE CAP



All dimensions in millimetres.

FIG. 4 PLASTICINE CYLINDER FOR TYPE 2 STEEL TOE CAP



NOTE — Dimensions of the fork may be changed according to the requirements.

All dimensions in millimetres.

FIG. 5 METAL BAR WITH FORK

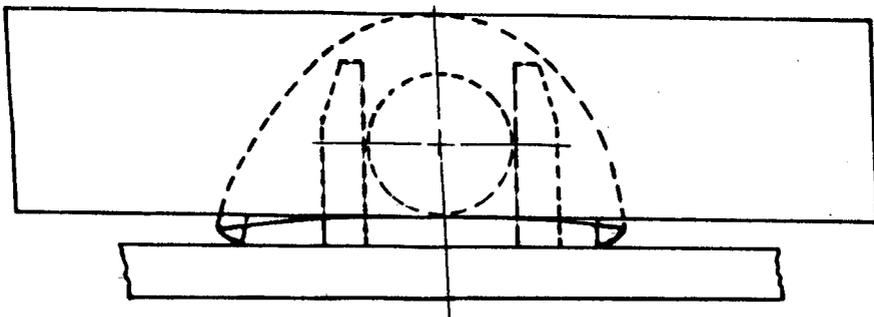


FIG. 6 POSITION OF PLUNGER IN RELATION TO STEEL TOE CAP AND PLASTICINE CYLINDER

ANNEX B

(Clause 7)

SCALE OF SAMPLING AND CRITERIA FOR CONFORMITY

B-1 SCALE OF SAMPLING**B-1.1 Lot**

All protective steel toe caps in a consignment shall be grouped together in pairs of the same type and size to constitute a lot.

B-1.2 The conformity of the steel toe cap to the requirements of this specification shall be ascertained for each lot separately. A pair of steel toe caps shall be the unit of sampling. The number of pairs to be selected from each lot shall be in accordance with col 3 and 5 of Table 2.

B-1.3 These pairs of steel toe caps shall be selected at random from the lot. If the steel toe caps are packed in a number of boxes, at least 20 percent of the boxes shall be opened and equal number of pairs shall be selected

from each box to constitute the required sample.

B-2 NUMBER OF TESTS AND CRITERIA FOR CONFORMITY

B-2.1 All the steel toe cap pairs selected under **B-1.2** shall be examined for shape, design and dimensions. A pair shall be termed as defective if one or both of the toe caps fail to satisfy the requirements for shape, design and dimensions. The lot shall be accepted as conforming to the requirements if the number of defective pairs found does not exceed the permissible number of defective pairs given in col 4 of Table 2.

B-2.2 For examining the lot in respect of impact test, the number of finished steel toe cap pairs to be tested is given in col 5 of Table 2. There shall be no failure if the lot is deemed to be satisfactory for performance requirements.

Table 2 Scale of Sampling and Permissible Number of Defective Pairs

(Clauses B-1.2, B-2.1 and B-2.2)

Sl No.	Lot Size <i>N</i>	For Shape and Dimensions		No. of Steel Toe Caps Tested for Impact Test
		No. of the Steel Toe Cap Pairs	Permissible Number of Defective Pairs	
(1)	(2)	(3)	(4)	(5)
i)	Up to 50	5	0	1
ii)	51 to 200	8	0	2
iii)	201 to 500	13	1	2
iv)	501 to 1 000	20	1	3
v)	1 001 and above	32	1	3

ANNEX C

(Foreword)

COMMITTEE COMPOSITION

Footwear Sectional Committee, CHD 19

<i>Organization</i>	<i>Representative(s)</i>
Footwear Design & Development Institute, Noida	SHRI V. B. PARVATIKAR (<i>Chairman</i>) Ms RASHMI (<i>Alternate I</i>) SHRI DAS (<i>Alternate II</i>)
The Indian Rubber Institute, Kolkata	SHRI B. DUTTA SHRI AMITAVA PAL (<i>Alternate</i>)
Bata India Limited, Kolkata	DR B. M. CHAUDHURI
Bengal Waterproof Limited, Kolkata	SHRIMATI SHREYA S. KARMAKAR SHRI D. DAS (<i>Alternate</i>)
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Central Footwear Training Institute, Agra	SHRI S. N. GANGULY SHRI S. CHAKRABORTY (<i>Alternate</i>)
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DR (SHRIMATI) KANCHAN ANAND
Director (CHD), BIS

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