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Indian Standard

SPECIFICATION FOR
LEATHER SAFETY BOOTS AND SHOES

PART 1 FOR MINERS

( Fourth Revision )

Second Reprint NOVEMBER 2004
(Including Amendment No. 1, 2, 3 and 4)

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MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

October 1986
Indian Standard

SPECIFICATION FOR LEATHER SAFETY BOOTS AND SHOES

PART 1 FOR MINERS

( Fourth Revision )

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SPECIFICATION FOR

LEATHER SAFETY BOOTS AND SHOES

PART 1 FOR MINERS

(Fourth Revision)

0. FOREWORD

0.1 This Indian Standard (Part 1) (Fourth Revision) was adopted by the Indian Standards Institution on 7 January 1986, after the draft finalized by the Footwear Sectional Committee had been approved by the Chemical Division Council.

0.2 This standard was originally published in 1962 and subsequently revised in 1967. It was again revised in 1973 superseding IS : 3737-1966*. This standard was further revised in 1978 in two parts, namely, Part 1 dealing with leather safety boots and shoes for miners and Part 2 dealing with the leather safety boots and shoes for heavy metal industries. Both the parts of the standard are now being revised. In this revision (Part 1), the vital characteristics and essential critical requirements of the safety boots and shoes, connected accessories, grinderies, etc, have been covered as obligatory requirements and the details of other materials, construction, manufacturing practice with their various requirements either have been deleted or made recommendatory as these were observed too restrictive for manufacturers.

0.3 The purchasers and distributors shall ensure that IS : 6519-1971† is adhered to by the wearers of the safety boots and shoes.

0.4 According to existance practice in the concerned industry, these safety footwears are made on lasts conforming to IS : 5520 - 1969‡ popularly known in the trade as Model No. 10883 and 9150 in sizes 5 to 11 (Paris points 38 to 45), fitted with protective steel toe caps.

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*Specification for leather safety boots for workers in heavy metal industries.
†Code of practice for selection, care and repair of safety footwear.
‡Specification for wooden lasts for heavy-duty boots.
0.5 In accordance with the recommendations of the Technical Committee set by the Government to study the scope of application of these footwear to specific mines, safety leather boots with leather soles (with or without hobnails) will meet the requirement of underground noncoal mines, for example, mines of gold, copper, iron, zinc, mica, manganese, etc. Safety leather boots with rubber soles may be used in coal mines, specially by categories of workers like trammers and shot-firers. The safety leather shoes with leather or rubber soles is suitable for most of the surface mines of coal, limestone, iron ore, etc. This is however not rigid prescription for any kind of footwear to be used in a particular class of mine. Any one or more kinds of boots/shoes manufactured to approved specification may be supplied by mine management which will suit the natural condition prevailing in the mines and satisfy the needs of different categories of workers.

0.6 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*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard (Part 1) prescribes the requirements and methods of sampling and test for leather safety boots and shoes for men miners.

2. TERMINOLOGY

2.1 For the purpose of this standard, the definitions given in IS : 2050-1967† shall apply.

3. REQUIREMENTS

3.1 The safety boots and shoes for men miners shall comply with the requirements for design, materials, manufacture, finish and performance as given in Sections 1 and 2 respectively.

3.2 Fittings — The purchaser shall specify the fittings of these boots and shoes while placing order.

*Rules for rounding off numerical values (revised).
†Glossary of footwear terms.
4. MARKING

4.1 Each boot and shoe shall be marked with following particulars:

   a) The name of manufacturer or its recognized trade-mark, if any on the insole and on the full sock;
   b) The size and fitting numbers on outer sole and on the waist of the full sock;
   c) Batch/Code No. on the insole;
   d) The year of manufacture on the insole; and
   e) Any statutory marking on the full sock.

4.1.1 The product may also be marked with Standard mark.

4.2 The use of the Standard Mark is governed by the provisions of the 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.

5. PACKING

5.1 The material shall be packed as agreed to between the purchaser and the manufacturer.

6. SAMPLING

6.1 The method of drawing representative samples of the material and the criteria for conformity shall be as prescribed in IS : 2051-1976*.

SECTION 1 SAFETY BOOTS

7. DESIGN

7.1 The boots shall be ankle high of derby pattern with 6 eyelets (see Fig. 1 and 2 ), full vamp and shall be made on lasts conforming to IS*: 5520-1969† which corresponds to lasts Model No. 10883 or 9150. The toe shall be reinforced with steel toe cap and tongue shall be padded. The vamp shall be fully lined. The leather sole and heel may be fitted with toe tips, heel tips and further reinforced with rustproof hobnails, if required by the purchaser.

---

*Method for sampling of leather footwear (first revision).
†Specification for wooden lasts for heavy-duty boots.
NOTE — This illustration is diagrammatic only and not intended to illustrate the details of design.

FIG. 1 MINERS’ BOOTS (WITH LEATHER SOLE)
8. MATERIALS

8.1 Upper Leather — Printed grain leather of any colour A conforming to following requirements of IS : 578-1985* shall be used.

   a) Tensile strength,
   b) Colour fastness test to dry rubbing,
   c) Solvent extractable substances, and
   d) Chromium (as Cr₂O₃) content.

8.2 Lining Leather — Vegetable tanned or combination tanned leather conforming to the following requirements of IS : 3840-1979† shall be used:

   a) Tensile strength,
   b) Stitch tear strength,
   c) Colour fastness test for finished leather (applicable in case of combination tanned leather),
   d) Solvent extractable substances,
   e) Chromium (as Cr₂O₃) content (applicable in case of combination tanned leather only), and
   f) Hide substance.

8.2.1 Coloured pigment or processed natural finished chrome splits may also be used as agreed to between the manufacturer and the purchaser.

8.3 Bottom Material — Either vegetable tanned sole leather or moulded solid rubber soles and heels shall be used. The sole leather shall conform to the following requirements of IS : 579 (Part 1)-1973‡:

   a) Water absorption,
   b) Resistance to cracking,
   c) Total ash, and
   d) Degree of tannage.

   The moulded solid rubber soles and heels shall conform to Type 1 of IS : 5676-1970§.

---

*Specification for full-chrome upper leather (third revision).
†Specification for lining leather (first revision).
‡Specification for sole leather: Part 1 Vegetable tanned sole leather (second revision).
§Specification for moulded solid rubber soles and heels.
IS : 1989 (Part 1) - 1986

8.3.1 In case water resistant sole leather is required by the purchaser, such treated sole leather shall conform to the following requirements of IS : 579 (Part 2)-1973*:

a) Water absorption,
b) Resistance to cracking,
c) Total ash, and
d) Hide substance.

8.4 Steel Toe Cap — Conforming to Type 1 of IS : 5852-1977† shall be used.

8.5 Tape - Cotton NEWAR (see IS : 1895-1982‡) of 19 ± 1 mm width herring bone weave shall be used.

8.6 Bottom Filling — Bitumen felt shall be used (see IS : 1322-1982§).

8.7 Eyelets — Aluminium or brass coated steel eyelets of size 7.5 mm (Collar dia) (see IS : 5041-1978||) shall be used.

8.8 Toe Compound — Gum, glue or latex based adhesive compound shall be used.

8.9 Threads

8.9.1 For Upper Closing — Cotton thread, matching the colour of the upper leather and conforming to the Variety No. 34 of IS : 1726-1978¶ shall be used.

8.9.2 For Sole Stitching — Depending upon whether stitching is done by hand or by machine, the types of threads given below shall be used:

<table>
<thead>
<tr>
<th>Method of Stitching</th>
<th>Material</th>
<th>Construction</th>
<th>Minimum Breaking Strength in kg on 50 cm Length with Rate of Actuated Grips Being 30 cm/min</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stitching by machine</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Shuttle and welt</td>
<td>Linen</td>
<td>8</td>
<td>23</td>
</tr>
<tr>
<td>b) Top</td>
<td>Linen</td>
<td>10</td>
<td>30</td>
</tr>
<tr>
<td>Stitching by hand</td>
<td>Linen</td>
<td>8</td>
<td>23</td>
</tr>
</tbody>
</table>

NOTE — Silk or synthetic thread of suitable quality may also be used, if agreed to between the purchaser and the manufacturer.

*Specification for sole leather: Part 2 Water-resistant vegetable tanned sole leather (second revision).
†Specification for protective steel toe caps for footwear (first revision).
‡Specification for cotton NEWAR (second revision).
§Specification for bitumen felts for waterproofing and damp-proofing (third revision).
||Specification for footwear and stationery eyelets (first revision).
¶Specification for cotton sewing threads (second revision).
8.10 Rivets — Spear-pointed, bran rivets of 14 ± 1 mm and 16 ± 1 mm length, shall be used.

NOTE 1 — For extra reinforcement of toe portion, headless nails/blue cut tacks of length 14 ± 1 mm may be used, if agreed to between the purchaser and the manufacturer.

8.11 Screw Wire — Brass screw wire (see IS : 8606-1977*) shall be used.

8.12 Heel Pin — Heel pins 29 ± 1 mm long shall be used for leather sole and 25 ± 1 mm long shall be used for rubber heel.

8.13 Shank — Rustproof steel, ribbed 10 to 1.5 mm thick and not less than 12 mm in width shall be used (see IS : 10945-1984†).

8.14 Laces — Leather or fabric lace 85 ± 5 cm in length, with a minimum breaking load of 20 kg when tested between 18 cm grips, the rate of traverse of power actuated grip being 30 cm/min. The lace shall be of thickness and width so as to easily pass through the eyelets. Cotton lace if coloured black, shall be free from sulphur dyes (see Appendix A).

8.15 Tongue Lining — Woollen/flannel cloth, raised, minimum mass 200 g/m² shall be used.

8.16 Adhesive — Rubber based adhesive shall be used (see IS : 4663-1968‡).

8.17 Leather Components — Each leather component shall comply with the thickness requirements prescribed in Table 1.

9. MANUFACTURE

9.1 The various components of the boots shall be cut to the thickness, shape and design as required (see Fig. 1 and 2 and Table 1). The upper components, specially the vamps and tongues, shall be skived.

9.2 The upper shall be closed on lock stitch machines. The quarter sides, toe cap and tongue shall be stitched with threads (see 8.9.1), the number of stitches being 20 to 25 per dm. At least two rows of stitching about 3 cm apart shall be done at the toe cap and counter and two rows about 6 mm apart or three rows about 3 mm apart at the sides.

9.3 The back seam shall be reinforced by stitching a tape (see 8.5) over the seams.

---

*Specification for brass screw wire for footwear.
†Specification for shanks for footwear.
‡Specification for permanent rubber-based adhesives for footwear industry.
## Table 1 Thickness Requirements for Components

*(Clauses 8.17 and 14.17)*

<table>
<thead>
<tr>
<th>SL No.</th>
<th>Component</th>
<th>Material and Recommended Locations</th>
<th>Thickness, Min. mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>Vamp</td>
<td>Butt portion of upper leather</td>
<td>1.5</td>
</tr>
<tr>
<td>i)</td>
<td>Quarter:</td>
<td>Remaining best portion of upper leather</td>
<td>1.5</td>
</tr>
<tr>
<td>ii)</td>
<td>a) Unlined</td>
<td></td>
<td>1.5</td>
</tr>
<tr>
<td>ii)</td>
<td>b) Lined</td>
<td></td>
<td>1.3</td>
</tr>
<tr>
<td>iii)</td>
<td>Toe cap. outside counter with jug loop and strengthening piece</td>
<td>Remaining best portion of upper leather</td>
<td>1.2</td>
</tr>
<tr>
<td>iv)</td>
<td>Loose/half tongue</td>
<td>Remaining best portion of upper leather</td>
<td>0.8</td>
</tr>
<tr>
<td>v)</td>
<td>Full sock</td>
<td>Chrome lining leather/splits</td>
<td>0.8</td>
</tr>
<tr>
<td>vi)</td>
<td>Vamp and quarter lining</td>
<td>Lining leather</td>
<td>0.8</td>
</tr>
<tr>
<td>vii)</td>
<td>Insole</td>
<td>Stuck and rolled shoulders of sole leather</td>
<td>3.2</td>
</tr>
<tr>
<td>viii)</td>
<td>Through middle sole:</td>
<td>Stuck and rolled shoulders of sole leather</td>
<td></td>
</tr>
<tr>
<td></td>
<td>a) For boots with leather sole</td>
<td></td>
<td>3.7</td>
</tr>
<tr>
<td></td>
<td>b) For boots and shoes with rubber sole</td>
<td></td>
<td>2.1</td>
</tr>
<tr>
<td></td>
<td>c) For shoes with leather sole</td>
<td></td>
<td>2.6</td>
</tr>
<tr>
<td>ix)</td>
<td>Outer sole</td>
<td>Butt portion of sole leather</td>
<td>4.2</td>
</tr>
<tr>
<td>x)</td>
<td>Lifts and split lifts</td>
<td>Compressed bellies or shoulder of sole leather</td>
<td>2.6</td>
</tr>
<tr>
<td>xi)</td>
<td>Stiffeners</td>
<td>Compressed bellies or shoulder of sole leather</td>
<td>2.1</td>
</tr>
<tr>
<td>xii)</td>
<td>Top piece</td>
<td>Butt portion of sole leather</td>
<td>3.5</td>
</tr>
</tbody>
</table>

**NOTE** — The thickness (not at skived portion) except full sock shall be checked before fabrication of boots and shoes.
NOTE — This illustration is diagrammatic only and not intended to illustrate the details of design.

FIG. 2  MINERS’ BOOTS (WITH RUBBER SOLE AND HEEL)
9.4 The counter shall be turned over to within 15 mm at the top of the leg so as to form a jug loop as shown in Fig. 1. The joint of the quarters shall be reinforced by stitching a wide strip of leather at the back.

9.5 Eyelets shall be fitted at equal spacing in each face and clenched without distortion.

9.6 The full vamp shall be lined with leather and tongue with raised woollen/flannel cloth. The tongue shall be full bellows. A layer of raised woollen/flannel cloth shall be stitched to the flash side of the tongue to act as cushioned padding.

9.7 The stiffener shall be reinforced with cement toe compound. Steel toe cap shall be placed in between the toe cap and full vamp to the exact shape and contour of the last.

9.8 In the case of leather soled footwear the heel shall consist of whole lifts, two-piece lifts or one split lift and a top piece.

9.9 The boots shall be well lasted. The lasting edge of the stiffeners shall come under the grip of the lasting tacks and clear lasting allowance of about 13 mm shall be provided all round.

9.10 The steel shank shall be fitted to the waist of the insole. The middle sole shall be riveted with rivets of 14 mm and 16 mm lengths as indicated in 8.10. Rivets of 16 mm length shall be used at the toe and the seat and rivets of 14 mm length at the remaining portion using 10 to 14 rivets per decimetre.

9.11 The leather sole shall be securely stitched aloft in an open channel with the middle sole by the lock stitch method using threads as indicated in 8.9.2. The number of stitches shall be 16 to 20 per dm. The outersole shall be pieced under the heel provided the joint shall be not less than 25 mm behind the breast of heel. The pieced sole shall be of the same quality and thickness as sole. The outersole shall be screwed by machine all round 25 mm apart maximum with brass screw wire. All screws shall penetrate through the outer sole, middle sole, upper and the insole without protruding. The heels shall be attached by 12 to 14 heel pins ( see 8.12 ) from inside.

9.12 In case of boots with rubber sole, the inside surface of the sole shall be suitably roughened and coated with a thin layer of adhesive which shall also be applied on the outer ( flesh ) surface of the leather middle sole. The rubber sole shall be stitched with middle sole by the lock stitch method using linen threads. The number of stitches shall be 12 to 15 per dm. For reinforcement, 9 heel pins of 25 mm length shall be used from inside through the holes provided for the purpose both by hand or machine method. A leather welt or split-lift may also be placed below the heel.
10. **FINISH**

10.1 The sole and heel edges shall be neatly trimmed, scoured and finished to match the colour of the boot. The edge setting shall be uniformly done by using matching colour heel ball. The sole and heel edges of the rubber sole boots shall be secured and finished smooth. Each pair of boots shall be provided with a pair of full sock and laces (see 8.14).

10.2 Boots with leather sole may be fitted with hobnails and rustproof toe tips and heel tips using toe tip and heel tip nails (see IS : 8060-1976*) flush with the tip fillings, if agreed to between the purchaser and the manufacturer.

10.3 The upper shall be finished bright by polishing. The boots shall be free from injurious folds and wrinkles in the upper, trapped air, blisters, embedded foreign matter, excessive surface markings. No metallic grinderies shall protrude and cause discomfort to the wearers. The finish shall be in accordance with sound manufacturing practice.

10.4 The height of the leg when measured from inside shall be 150 ± 3 mm (both odds of a pair shall be equal in height) for size 8 and shall increase or decrease by 3 mm from size to size. The height of the heel when measured at the back portion in line with jug loop shall be 30 ± 2 mm for all sizes. The heel shall be in proper alignment with the tread of the sole.

11. **MASS**

11.1 **Boots with Leather Sole and Heel** — The mass of boots with hobnails, toe tips and heel tips shall not exceed 1 750 g per pair of size 8. The mass of boots without hobnails, toe tips and heel tips shall not exceed 1 650 g per pair of size 8. The mass of the boots with heel tips and toe tips, without hobnails shall not exceed 1 700 g per pair of size 8. The mass shall increase or decrease by 75 g per pair for bigger or smaller sizes respectively.

11.2 **Boots with Rubber Sole and Heel** — The mass of boots shall not exceed 1 750 g per pair of size 8. The mass shall increase or decrease by 75 g per pair for bigger or smaller sizes respectively.

12. **PERFORMANCE TEST**

12.1 The safety boots when subjected to the impact test prescribed in Appendix B shall withstand a blow of 14 kgf.m. The test is intended to ensure that the toe portion of the boot is strong enough to withstand the

*Specification for heel-tip and toe-tip with nails for footwear.
specified impact without any injury to wearer's toes. Further, the clearance inside the boot at the moment of maximum depression when subjected to impact test shall be:

a) 15.0 mm or more in case of leather sole with hobnails, and
b) 13.5 mm or more in case of leather sole without hobnails or rubber sole.

SECTION 2 SAFETY SHOES

13. DESIGN

13.1 The shoes shall be of derby design, with 4 eyelets or less as specified by the purchaser (see Fig. 3 and 4) and shall be made on lasts conforming to IS : 5520-1969* which corresponds to last Model No. 10883 or 9150. The toe shall be reinforced with steel toe cap and the tongue shall be padded. The shoe shall be lined with leather throughout. The leather sole and heel may be fitted with toe tips, heel tips and further reinforced with rustproof hobnails, if required by the purchaser.

14. MATERIALS

14.1 Upper Leather — Printed grain leather of any colour shall conforming to the following requirements of IS : 578-1985† shall be used:

a) Tensile strength,
b) Colour fastness test to dry rubbing,
c) Solvent extractable substances, and
d) Chromium (as Cr₂O₃) content.

14.2 Lining Leather — Vegetable tanned or combination tanned leather conforming to the following requirements of IS : 3840-1979‡ or coloured pigment finished chrome splits shall be used:

a) Tensile strength;
b) Stitch tear strength;
c) Colour fastness test for finished leather (applicable in case of combination tanned leather);
d) Solvent extractable substances;
e) Chromium (as Cr₂O₃) content (applicable in case of combination tanned leather); and
f) Hide substance.

*Specification for wooden lasts for heavy-duty boots.
†Specification for full-chrome upper leather (third revision).
‡Specification for lining leather (first revision).
NOTE — This illustration is diagrammatic only and not intended to illustrate the details of design.
14.2.1 Coloured pigment or processed natural finished chrome splits may also be used as agreed to between the manufacturer and the purchaser.

14.3 **Bottom Material** — Either vegetable tanned sole leather or moulded solid rubber soles and heels shall be used.

i) The sole leather shall conform to the following requirements of IS: 579 (Part 1)-1973*:
   a) Water absorption,
   b) Resistance to cracking,
   c) Total ash, and
   d) Degree of tannage.

ii) The moulded solid rubber soles and heels shall conform to Type 1 of IS: 5676-1970†.

14.3.1 In case water resistant sole leather is required by the purchaser such treated sole leather shall conform to the following requirements of IS: 579 (Part 2)-1973‡:
   a) Water absorption,
   b) Resistance to cracking,
   c) Total ash, and
   d) Hide substance.

14.4 **Steel Toe Cap** — Conforming to Type 1 of IS: 5852-1977§ shall be used.

14.5 **Tape** — Cotton NEWAR (see IS: 1895-1982||) of 19 ± 1 mm width herring bone weave shall be used.

14.6 **Bottom Filling** — Bitumen felt shall be used (see IS: 1322-1982¶).

14.7 **Eyelets** — Aluminium or brass coated steel eyelets of size 7.5 mm (collar dia) (see IS: 5041-1978**) shall be used.

14.8 **Toe Compound** — Gum, glue or latere based adhesive compound shall be used.

14.9 **Threads**

14.9.1 **For Upper Closing** — Cotton thread, matching the colour of the upper leather and conforming to the Variety No. 34 and 30 of IS: 1720-1978†† shall be used.

---

†Specification for moulded solid rubber soles and heels.
‡Specification for sole leather: Part 2 Water-resistant vegetable tanned sole leather (second revision).
§Specification for protective steel toe caps for footwear (first revision).
||Specification for cotton NEWAR (second revision).
¶Specification for bitumen felts for waterproofing and damp-proofing (third revision).
**Specification for footwear and stationery eyelets (first revision).
††Specification for cotton sewing threads (second revision).
14.9.2 *For Sole Stitching* — Depending upon whether stitching is done by hand or by machine, the types of threads given below shall be used:

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<th>Construction</th>
<th>Minimum Breaking Strength in kg on 50 cm Length with Rate of Actuated Grips Being 30 cm/min</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shuttle and welt</td>
<td>Linen</td>
<td>8</td>
<td>23</td>
</tr>
<tr>
<td>Top</td>
<td>Linen</td>
<td>10</td>
<td>30</td>
</tr>
</tbody>
</table>

NOTE — Silk or synthetic thread of suitable quality may also be used if agreed to between the purchaser and the manufacturer.

14.10 *Rivets* — Spear-pointed, brass rivets of 14 ± 1 mm and 16 ± 1 mm length, shall be used.

NOTE — For extra reinforcement of toe portion, headless nails/blue cut tacks of length 14 ± 1 mm may be used, if agreed to between the purchaser and the manufacturer.

14.11 *Screw Wire* — Brass screw wire (*see IS: 8606-1977*) shall be used.

14.12 *Heel Pin* — Heel pins 29 ± 1 mm long shall be used for leather sole and 25 ± 1 mm long shall be used for rubber heel.

14.13 *Shank* — Rustproof steel, ribbed 1.0 to 1.5 mm thick and not less than 12 mm in width shall be used (*see IS: 10945-1984†*).

14.14 *Laces* — Cotton laces shall conform the length and breaking load of Variety No. L/60/36 of IS: 4778-1982‡ of any colour. If the laces are coloured black, it shall be free from sulphur dyes (*see Appendix A*).

14.15 *Tongue Lining* — Woollen/flannel cloth, raised, minimum mass 200 g/m² shall be used.

14.16 *Adhesive* — Rubber based adhesive (*see IS: 4663-1968§*) shall be used.

14.17 *Leather Components* — Each leather component shall comply with the thickness requirements prescribed in Table 1.

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*Specification for brass screw wire for footwear.
†Specification for shanks for footwear.
‡Specification for cotton laces for footwear (*first revision*).
§Specification for permanent rubber-based adhesives for footwear industry.
15. MANUFACTURE

15.1 The various components of the shoe shall be cut to the thickness, shape and design as required (see Fig. 3 and 4 and Table 1). The upper components specially the vamp and tongue shall be skived.

15.2 The upper shall be closed on lock stitch machines. The quarter sides, toe cap and tongue shall be stitched with thread of Variety No. 34 and rest with Variety No. 30 (see 14.9.1). The number of stitches shall be 25 to 30 per dm. At least two rows of stitching about 3 mm apart shall be done at the toe cap and counter and two rows about 6 mm apart or three rows about 3 mm apart at the sides.

15.3 The joint of the quarter shall be reinforced by stitching a wide strip of leather at the back.

15.4 Eyelets shall be fitted at equal spacings and clenched without distortion.

15.5 The full vamp and quarter shall be lined with leather and tongue with raised woollen/flannel cloth. The tongue shall be loose or half bellows. A layer of raised woollen/flannel cloth shall be stitched to the flesh side of the tongue to act as cushioned padding.

15.6 The stiffener shall be reinforced with cement toe compound. Steel toe cap shall be placed in between the toe cap and full vamp to the exact shape and contour of the last.

15.7 In the case of leather soled footwear the heel shall consist of whole lifts, two-piece lifts or one split lift and a top piece.

15.8 The shoes shall be well lasted. The lasting edges of the stiffeners shall come under the grip of the lasting tacks and a clear lasting allowance of about 13 mm shall be provided all round.

15.9 The steel shank shall be fitted to the waist of the insole. The middle sole shall be riveted with rivets of 14 mm and 16 mm lengths as indicated in 14.10. Rivets of 16 mm length shall be used at the toe and the seat and rivets of 14 mm length at the remaining portion using 10 to 14 rivets per dm.

15.10 The leather sole shall be securely stitched aloft in an open channel with the middle sole by the lock stitch method using threads as indicated in 14.9.2. The number of stitches shall be 16 to 20 per dm. The outersole shall be pieced under the heel provided the joint shall be not less than 25 mm behind the breast of the heel. The pieced sole shall be of the same quality and thickness as the sole. The outersole shall be screwed by machine all round 25 mm apart maximum with brass screw wire. All screws shall penetrate through the outersole, middle sole, upper and the insole without protruding. The heels shall be attached by 12 to 14 heel pins (see 14.12) from inside.
NOTE — This illustration is diagrammatic only and not intended to illustrate the details of design.

FIG. 4 MINERS SHOES (WITH RUBBER SOLE AND HEEL)
15.11 In case of shoes with rubber sole, the inside surface of the sole shall be suitably roughened and coated with a thin layer of adhesive which shall also be applied on the outer surface of the leather middle sole. The rubber sole shall be stitched with middle sole by the lock stitch method using linen threads indicated in 14.9.2. The number of stitches shall be from 12 to 15 stitches per dm. For reinforcement, 9 heel pins of 25 mm length shall be used from inside through the holes provided for the purpose both by hand and machine method. A leather welt or split lift may also be placed below the heel.

16. Finish

16.1 The sole and heel edges shall be neatly trimmed, scoured and finished to match the colour of the shoe. The edge setting shall be uniformly done by using matching colour heel ball. The sole and heel edges of the rubber sole shoes shall be secured and finished smooth. Each pair of shoes shall be provided with a pair of full sock and laces (see 14.14).

16.2 Shoes with leather sole may be fitted with hobnails and rustproof toe tips and heel tips using toe tip and heel tip nails (see IS: 8060-1976*), flush with the tip fillings, if agreed to between the purchaser and the manufacturer.

16.3 The upper shall be finished bright by polishing. No metallic grinderies shall protrude and cause discomfort to the wearers. The shoes shall be free from injurious folds and wrinkles in the upper, trapped air, blisters embedded foreign matter, excessive surface markings. The finish shall be in accordance with sound manufacturing practice.

16.4 The height of the heel when measured at the back portion shall be 30 ± 2 mm for all sizes. The heel shall be in proper alignment with the tread of the sole.

17. Mass

17.1 Shoes with Leather Sole and Heel — The mass of shoes with hobnails, toe tips and heel tips shall not exceed 1 600 g per pair of size 8. The mass of shoes without hobnails, toe tips and heel tips shall not exceed 1 500 g per pair of size 8. The mass of the shoes with heel tips and toe-tips, but without hobnails shall not exceed 1 550 g per pair of size 8. The mass shall increase or decrease by 50 g per pair for bigger or smaller sizes respectively.

17.2 Shoes with Rubber Sole and Heel — The mass of shoes shall not exceed 1 600 g per pair of size 8. The mass shall increase or decrease by 50 g per pair for bigger or smaller sizes respectively.

*Specification for heel-tip and toe-tip with nails for footwear.
18. PERFORMANCE TEST

18.1 The safety shoes when subjected to the impact test prescribed in Appendix B shall withstand a blow of 14 kgf.m. The test is intended to ensure that the toe portion of the shoe is strong enough to withstand the specified impact without any injury to wearer’s toes.

Further, the clearance inside the shoe at the moment of maximum depression when subjected to impact test shall:

a) 15.0 mm or more in case of leather sole with hobnails, and
b) 13.5 mm or more in case of leather sole without hobnails or rubber sole.

APPENDIX A

(CLASSES 8.14 AND 14.14)

METHOD FOR DETECTION OF SULPHUR DYES IN BLACK COLOURED LACES

A-1. PROCEDURE

A-1.1 Roil the laces in alkaline hydrosulphite solution for one minute. If the shade is reduced to pale brown or yellow colour and on oxidation restored to the original colour, sulphur dyes shall be suspected to be present.

A-1.2 For confirmation, boil the laces in acid stannous chloride solution in a test tube covered with a piece of filter paper moistened with lead acetate. A blackish/brown stain with metallic lustre confirms the presence of sulphur dyes.

APPENDIX B

(CLASSES 12.1 AND 18.1)

DETERMINATION OF IMPACT VALUE

B-0. GENERAL

B-0.1 An impact test for determining the performance of toes of protective boots/shoes reinforced with steel toe cap to withstand a blow of 14 kgf.m is described here.
B-1. REQUIREMENTS

B-1.1 The test shall be made on the toe of finished boot/shoe sampled from each size of a lot.

B-2. TEST MACHINE

B-3. MEASUREMENT OF IMPACT VALUE

B-3.1 Point of Measurement of Clearance Inside the Boot or Shoe — The position or point of measurement of clearance inside the boot/shoe shall be found by using a size 8 last of the same shape as that, on which the boot/shoe to be tested was made (see Fig. 5). The toe point is found by placing the last on a flat surface so that its inside surface and toe touches two vertical places at right angles to each other. \(M\) is the point of contact of the toe with one of these planes. A line \(MXY\) is drawn from toe to heel (the heel point can be located by eye with sufficient accuracy) and 23 mm is marked off down this line from the toe to give point \(A\). A line perpendicular to \(XY\) is drawn through \(A\) cutting the outside edge of the last at \(P\) and the inside edge at \(Q\).

NOTE — For a new last shape, the procedure given in A-3.1 may be modified suitably by the testing laboratory if in their opinion the position obtained for measuring clearance is not a reasonable one.

B-3.1.1 The boot/shoe to be tested shall be drilled through the sole in such a manner that with the last in it, the drill comes through the insole at the point \(O\) on the last, and is approximately perpendicular to the surface of the last at the point \(A\). A suitable jig can be devised for this purpose.

B-3.2 Method of Measurement of Clearance at the Moment of Maximum Depression — A device capable of measuring the clearance at the moment of maximum depression, between the insole and the upper shall be fixed to the insole by means of a screw passing through the hole drilled in the position defined in B-3.1.1. A suitable measuring device is shown in Fig. 6.

B-4. PROCEDURE

B-4.1 Clamping of Boot or Shoe — The boot/shoe, with the measuring device inserted, shall be tightly clamped so that it cannot move longitudinally or laterally, with its toe part on the flat horizontal steel plate. The angle of the boot/shoe shall be such that the forward 65 mm of the sole is judged by the operator to be on the average horizontal, and the boot/shoe shall be supported in this position by a wedge under the heel, the wedge being such that it supports only the heel and no part of the sole.
FIG. 5  POSITION FOR THE MEASUREMENT OF CLEARANCE INSIDE
THE BOOt AND SHOE

FIG. 6  CAPSULE FOR MEASURING THE CLEARANCE AT THE TIME OF
MAXIMUM DEPRESSION
B-4.2 Position of Boot or Shoe — The boot or the shoe clamped as specified in B-4.1 shall be positioned under the striking bar so that the measuring capsule is 10 mm behind the central line of the bar. The bar shall rest on the boot or the shoe with its longest direction roughly at right angles to the length of the boot or shoe.

B-4.3 Adjust the mass to a height of 508 ± 5 mm above the top of the vertical plunger as specified in B-2.1 and allow it to fall freely. This gives the mass an impact of 14 kgf.m as required in 12.1 and 18.1. Measure the clearance inside the boot or the shoe at the moment of maximum depression in mm and report the value.
AMENDMENT NO. 1 MARCH 1088

TO

IS: 1989(Part 1)-1986 SPECIFICATION FOR LEATHER SAFETY BOOTS AND SHOES

PART 1 FOR MINERS

(Fourth Revision)

(Page 8, clause 8.7, line 1) Substitute '10 mm' for '7.5 mm'.

(Page 8, clause 8.9.1, line 2) - Substitute '35' for '34'.

(Page 16, clause 14.7, line 1) - Substitute '10 mm' for '7.5 mm'.

(Page 16, clause 14.9.1, line 2) - Substitute '35' for '34'.

(CDC 40)
AMENDMENT NO. 2 OCTOBER 1995
TO
IS 1989 (Part 1) : 1986 SPECIFICATION FOR
LEATHER SAFETY BOOTS AND SHOES
PART 1 FOR MINERS

(Fourth Revision)

(Page 9, clause 9.2, line 4) — Substitute '3 mm' for '3 cm'.

(CHD 19)
AMENDMENT NO. 4 JUNE 2003
TO
IS 1989 (PART 1) : 1986 SPECIFICATION FOR
LEATHER SAFETY BOOTS AND SHOES
PART 1 FOR MINERS

( Fourth Revision )

( Page 4, Foreword, clause 0.6 ) — Insert the following new clause after 0.5
and renumber the subsequent clause:

'0.6 Whenever ISO method exists this may be adopted as additional method.'

( CHD 19 )

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