

DCV/CG/NAVY/12/2013  
SHOES, BLACK, NON-SLIP

INTEGRATED HEADQUARTERS OF MINISTRY OF DEFENCE (NAVY)  
DIRECTORATE OF CLOTHING & VICTUALLING

INDIAN NAVY SPECIFICATION

ON

SHOES, BLACK, NON-SLIP  
(HIGH ANKLE / LOW ANKLE)

CAT NO. CNCMT- PSF0041 to 0048

*Safety shoes*

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DIRECTORATE OF CLOTHING AND VICTUALLING  
D-II WING, SENA BHAWAN  
INTEGRATED HEADQUARTERS  
MINISTRY OF DEFENCE (NAVY)  
NEW DELHI - 110 011

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## FOREWORD

This specification is the property of Government of India and is a restricted document, not to be communicated to anyone who is not authorised to receive it. This specification or any drawings, pattern or other information issued in connection therewith may only be used for manufacture and quality assurance against specific procurement order placed by competent authority. It is not to be used for any other purpose whatsoever without the expressed written sanction of the Chief of Naval Staff or his representative.

2. This specification has been prepared on the basis of commercially available similar products available with reputed Indian manufacturers and exporters, existing specifications on various footwear used by Army and Air Force, notably the Aeromedical Specification No.54(Issue II) dated 07 Jan 2008 issued by DGAQS. This specification has been prepared by the Directorate of Clothing and Victualling on the authority of Controller of Logistics, Indian Navy and has been vetted by FDDI, Noida. The Authority Holding Sealed Particulars (AHSP) for the item covered in this specification is Principal Director of Clothing & Victualling (PDCV), Sena Bhawan, New Delhi, for the Indian Navy. The AHSP would be the Quality Assurance Authority for all enquiries related to make and shape regarding this specification.

3. All clauses in this specification shall be complied with in every respect, irrespective of the source of supply or the material and/or components. Any deviation from this specification will not be resorted to without the express written sanction of Quality Assurance Authority. Should any discrepancy be found between this specifications and any sample or pattern, loaned for any purpose, then decision of the AHSP in this regard would be final.

4. Unauthorised departures from this specification may involve rejection of the store, which will be inspected during and after, manufacture and shall be subjected to testing for the final approval of the Quality Assurance Officer before dispatch to the consignee.

5. All the Specifications/drawings referred to in this specification for any tender or contract shall mean the edition current of the date of such tender or contract. The PDCV reserves the right to amend or modify this specification as and when necessary without any prior intimation to any parties associated/affected by the amendment/modification so being carried out.

6. While sending/informing procurement agencies about change in specifications, the AHSP shall ensure that such an action is not linked to any existing/under progress contract cases, unless it is inescapable, in terms of DPM-2009 Para 4.10.1. Notwithstanding the above, the procurement agencies would remain the best judge on whether to include the changes brought in the specification or otherwise for all such existing/under progress contract cases.

## SCOPE

7 This specification covers the requirement of Shoes Black Non-Slip with PU-BNR Sole in sizes 5 – 12 The footwear is to be as per Classification I, Design 'B' of ISO 20345 and to be made by automatic RIM(DIP)/Casting(Pouring) Process with bucket type sole having Polyether Polyurethane(PU) midsole & Butadiene Nitrile Rubber(BNR) outsole.

8. This specification covers the material requirements, construction particulars and overall shoe general requirements used in the manufacture of Shoes Black Non-Slip.

## REFERENCES

9. The succeeding paragraphs refer to the following specifications, which in turn sub-refer to the relevant specifications as applicable for the parameter being detailed:-

**Table 1 :Applicable Documents**

Sl.No.	Specifications	Description
(a)	IS: 2050	Glossary of terms relating to footwear. For the purpose of this specification the definitions and terminology given in IS:2050 are applicable.
(b)	IS: 5041-1978	Specification for Footwear and Stationery Eyelets/D-Rings
(c)	IS:4905-1968	Method of random sampling
(d)	IS:5677	Shoes Upper Leather For Direct Moulding Process
(e)	IS:9543	Spun Polyester Sewing Thread
(f)	IS:14181	Plastic Slide Fastener For Defence Requirements
(g)	IS:3400	Methods of Test For Vulcanised Rubber
(h)	IS:11226	Test For Oil Resistance Rubber Soles
(i)	IS:11195	Blend Compositions of Textiles
(k)	ISO:20345-2011	Personal Protective Equipment – Safety Footwear
(l)	ISO 2062	Determination of single-end breaking force and break
(m)	ISO 5402	Flexing resistance of upper leather (Bally Flexing)
(n)	ISO 3376	Leather – Determination of tensile strength and elongation
(p)	ISO 11644	Finish Adhesion Test
(q)	ISO 426/1	Wrought copper-zinc alloys – Chemical composition and forms of wrought products – Part 1: Non-lead and special copper zinc alloys.
(r)	SATRA TM 36	Break/ Pipiness of Leather
(s)	SATRA TM 218	Tear Strength of Rubbers and Plastics – Trouser Method
(t)	SATRA TM 94	Breaking force and extension at break of shoe laces
(u)	SATRA TM 154	Shoe lace to shoe lace and shoe lace to lace carrier abrasion
(v)	SATRA TM 195	Knot slippage test
(w)	SATRA TM 140	Scuff resistance - chisel method
(x)	SATRA TM 104	Fatigue resistance of whole shoe backpart
(y)	SATRA TM 149	Strength of eyelet facings and other laced fastenings
(z)	SATRA TM 310	Atmospheric Sulphide Tarnishing and Salt Water Corrosion

10. The Standards mentioned above or anywhere in this specification contain provisions which through reference in this text, constitute provisions of this standard. In

case of any discrepancy/contradiction the interpretation of the buyer will be considered to be final. For the purpose of this specification the terminology, definitions and symbols given in the relevant applicable standards shall apply. Those edition of referred standards would be applicable which are the most latest with the date of such tender or contract referring to this Specification.

### STANDARD PATTERN

11. The standard pattern of footwear shall be made to derby design on broad toe and padded dual collar, on broad-toe 'H' fitting last with stroble construction and directly moulded PU-BNR sole. The standard pattern held in the custody of IHQ of MoD(N)/DCV shall constitute the standard as regards to any particulars or properties not noted/defined in this specification. An illustrative diagram for reference guidance purposes only is placed at Appendix "A".

12. The standard pattern held by the AHSP would define the general appearances, workmanship, feel finish, shape, design and pattern and for other aspects not defined in this specification.

### MATERIALS

13. The general description of materials to be used for manufacture of the footwear is as indicated at the following Table 2. Detailed physical and chemical properties that the respective materials have to additionally conform to have been placed at Appendix 'B'.

Table 2 : Material Description

Sl.No.	Component	Requirement
(a)	Upper	<u>For Vamp, Quarters And Back Strap:</u> Chrome tanned Black Colour <i>Barton Grain</i> Leather <u>For Toe Piece, Counter and Jug Loop:</u> Chrome tanned Black Colour <i>CG</i> Leather. <u>For Tongue and Padded Collars :</u> Chrome tanned Black Colour <i>Smooth Softy</i> Leather.
(b)	Lining	100% Nylon Black Colour Non-Woven material (Cambrelle type) with anti-microbial properties for complete upper except Collars. An additional Heel Grip Lining of Grey Colour Split Leather is to be provided. The same lining is to be used for the zipper protective flap on the inside of the shoe.
(c)	Foam Insert	Polyurethane Foam/Needle Punch of min 5 mm Thickness between Upper and Lining Components. Padded Collars are to have PU Foam of 15 mm thickness.
(e)	Toe Cap and Counter Stiffener	<u>Toe Cap:</u> Metallic Toe Cap conforming to EN 12568. <u>Counter Stiffener:</u> Best commercial grade Thermo plastic material of minimum thickness 1.6-1.8 mm. The thermal impregnation is to be of thermoplastic EVA Resin. Physical and Chemical Properties as per Appendix 'B'.
(f)	Rings	6nos. Brass D-Rings with internal dimension of Ring being 10 + 2 mm diameter to be fitted on each face.
(j)	Laces	Each pair of footwear shall be provided laced with a pair of Nylon Black Tubular Laces of min 130 cm long. An additional pair of Laces is to be provided within each unit packing.

(h)	Insock	Removable full PU insock, anatomically moulded arch support. An additional pair of insocks is to be provided within each unit packing.
(g)	Insole	Insole will be non-woven polyester fabric in Grey/Black or Two-Toned with thickness of 2 – 2.5 mm.
	Penetration Insert	Non-metallic penetration insert complying with Clause 6.4 EN:12568-2010 after being subjected to treatments described in Clause 7.4, EN:12568-2010.
(k)	Midsole	Direct injection/casting Polyether based PU.
(i)	Outsole	Directly moulded BNR with cleated design having distinct heel. Flat/Wedge Type sole design will not be accepted. Diagram of tread design at Appendix 'A' is for illustrative purposes only.
(m)	Stitching Thread	TKT No.40/60 2-Ply 100 % Polyester/Nylon. The thread should have a min. breaking strength of 100 N when tested in accordance with BS EN ISO 2062.
(n)	Plastic Slide Fastener(PS F) / Zipper	Type A, Designation H, L-Type Slide Fastener with Autolock Slider as per IS:14181-2002 with Amendment No.2 of Mar 08.

### CONSTRUCTION

14. The footwear shall be manufactured as per standard manufacturing techniques, some aspects of which is described in the succeeding paragraphs.

#### Upper Design

15. The components of the upper leather portion of the footwear are to be made from the respective upper material as indicated at Table 2 above. Care must be taken in cutting the leather to ensure that the tightness of the leather is in heel to toe direction. All upper components shall be fitted and closed in the best commercial practice. All edges of the upper components will be properly skived to ensure innocuous appearance.

16. The tongue shall be full bellows with cushion & lining and stitched with the vamp using parallel row of stitches (4-5 mm wide) and so fitted that wrinkles do not occur where it is joined to the vamp. The joining of quarter and vamp shall be done with two rows of stitches (4-5 mm wide). The end tab of the quarter shall be reinforced with parallel (4-5 mm wide) row of stitching placed midway between the face stitching and the quarter and vamp joining stitching, in the manner illustrated in the drawing. The length of tab stitches shall be between 12 to 15 mm. The distance between the two rows of stitching at the facing of the quarters shall not exceed 2 cm, the first row of stitches being 3-4 mm from the edge of the quarter. The number of stitches shall be 30-40 per/dm.

17. The toe and counter is to be adhered to the upper and their edges have to be fixed with two rows of stitches, 3-4 mm apart and 3-4 mm from the edge, after proper skiving of the edges. Counter stiffener is to be correctly positioned and aligned prior to moulding. The depth of Toe shall be  $55 \pm 2$  mm for size 8 with increase or decrease of 2 mm per size. The Back Strap, with width of  $25 \pm 2$  mm, has to end with a Jug Loop and fixed with stitching pattern as shown in the illustration.

18. All upper components and lining are to be firmly adhered together using flexible adhesive with the foam insert between them. Care should be taken to ensure that no air

pockets are formed/remain between the layers. The shoe is to be constructed such that it is not possible to remove the anti-penetration insole without damaging the footwear. Care shall be taken to maintain the space and uniform tension of the stitching at all places. All seams and stitches shall be properly hammered off and set.

#### D-Rings

19. The D-Rings should be affixed 15 mm (centred) from the edge of the eyelet face. The bottom D-Ring has to be affixed 15 mm from the edge of the face and top D-Ring should be fixed 20 mm from the top edge of the face/collar. The remaining Rings should be fixed equidistant between the two.

20. The Rings are to be riveted with washers on the inside so as to result in the riveted edges on the inside being smooth and innocuous to feel. The Rings shall not be susceptible to season cracking. Any residual stress in the Rings shall be removed by a suitable heat treatment and tested in accordance with ASTM B 154.

#### Collar

21. The Shoe Black Non-Slip has to have two collars of  $20 \pm 2$  mm each for added comfort. This dual collar piece has to be manufactured separately as they are to be made completely from the specified material without lining, i.e. inner and outer side of collar would be same material. This distinct collar component would then be attached to the quarter. The underlay of the collar component on the inside is to be kept within the quarter lining after having being properly skived and pasted to the quarter so that no impression is visible on the outer surface of the lining.

#### Plastic Slide Fastener(PSF)/Zipper

22. The shoe has to be provided with a PSF as per the on the inside of the footwear starting from 15-20 mm above the Nip Line to the Top Line of the Collar. No impression of the Zipper should be visible in the Nip Line area. Attention is to be paid to ensure that the alignment of the Zipper is maintained straight while affixing with the upper. There should be at least 2mm between the edge of the slider and the edge of the upper to ensure that there is no strain on the slider from either side.

23. A bottom stop has to be provided at the lower end of the Zipper. The face of the Zipper should be covered with the upper leather from both sides so as to hide the Zipper in the closed position.

24. On the inner side, the Zipper has to be covered with a protective flap made from same material as the Heel Grip/Counter Lining. The protective flap is to be stitched 5-7 mm away from on the Zipper tape on the Heel Side extending to 5-7 mm on other side of the Zipper tape.

#### Safety Toe Cap

25. The toe cap shall be incorporated in the footwear in such a manner that they cannot be removed without damaging the footwear.

26. The internal toe caps shall have a vamp lining(non-woven) or an element of the upper that serves as a lining, and in addition the toe caps shall have an edge covering extending from the back edge of the toecap to at least 5 mm beneath it and at least 10 mm in the opposite direction. There should be no ridge apparent on the finished footwear.



### PU-BNR Sole

27 The sole complex has to be of the bucket/cup type of construction. i.e. there should be no flare in the sole along the feather line. The PU Midsole has to be in Light-Grey Colour and the BNR outsole has to be in Jet Black Colour. The tread design is to have the cleat design with channels open to the sides.

28. The physical dimensions of the sole complex are to be maintained in accordance with clause 5.8.1.1 to 5.8.3 of ISO:20345-2011. For guidance, the following dimensions may be adopted:-

**Table 3 :Dimensions of PU-BNR Sole**

S.No.	Description	Thickness (Min)
1.	Thickness of BNRoutsole	1.5 mm
2.	Cleat height	2.5 mm
3.	Thickness of composite sole when measured from outside with side wall in accordance with applicable IS/ISO specs:-	<u>Thickness (Approx)</u>
	(a) At Forepart	20 mm
	(b) At Waist	16 mm
	(c) At Heel	35 mm

### TESTS OF SAFETY FOOTWEAR

29. The specific requirements to be met by the complete shoe would be as laid down at the following table when read in conjunction with the referred clauses of the ISO against each:-

**Table 4 :Complete Footwear Compliance**

Sl.No.	Component	Requirement
(a)	Mass of Whole Footwear	One pair of finished footwear of Size 8 (High Ankle as indicated below) should weigh $1400 \text{ gms} \pm 50 \text{ gms}$ with an increase or decrease of 50gms for each bigger/smaller size respectively. The corresponding weight for Size 8 of Low Ankle will be $1300 \text{ gms} \pm 50 \text{ gms}$ .
(b)	Height of Upper	The Height of Upper for Size 8 Shoes shall be $155 \pm 2.0 \text{ mm}$ (High Ankle) or $115 \pm 2.0 \text{ mm}$ (Low Ankle) as indicated by the buyer in the RFP/Tender. The Height of Upper will have an increase or decrease by 3.0 mm for each bigger and smaller size respectively. The height will be measured as per Clause 5.2.2 of ISO:20345-2011 and should be equal across both odds across each pair.
(c)	Upper/Outsole and Sole Interlayer Bond Strengths	Clause 5.3.1.2 and Clause 5.8.6 of ISO:20345-2011.
(d)	Water Penetration and Absorption	Clause 6.3 of ISO:20345-2011

(e)	Toe Cap Length, Impact Resistance, Compression Resistance and Corrosion Resistance	Clause 5.3.2.2 to 5.3.2.5 respectively of ISO:20345-2011
(f)	Penetration Resistance	Clause 6.2.1.1.2 of ISO:20345-2011
(g)	Antistatic Footwear	Clause 6.2.2.2 of ISO:20345-2011
(h)	Resistance to Harsh Environments – Heat and Cold Insulation	Clause 6.2.3.1 and 6.2.3.2 respectively of ISO:20345-2011
(j)	Energy Absorption of Seat Region	Clause 6.2.4 of ISO:20345-2011
(k)	Tests for Sole Complex	
	(i) Slip Resistance	Clause 5.3.5.2 of ISO:20345-2011
	(ii) Hydrolysis Test	Clause 5.8.5 of ISO:20345-2011
	(iii) Cleated Outsole	Clause 5.8.1 of ISO:20345-2011
	(iv) Water Resistance	Clause 6.2.5 of ISO:20345-2011
	(v) Resistance to Hot Contact	Clause 6.4.1 of ISO:20345-2011 (300±5° C)
	(vi) Resistance to Fuel Oil	Clause 6.4.2 of ISO:20345-2011
	(vii) Backpart Fatigue Test	Conformance to SATRA TM 104

### Workmanship And Finish

30. The Shoes Black Non-Slip shall be free from manufacturing defects, any chemical damage and the workmanship and finish throughout shall be of the best quality. The store manufactured shall be delivered in dry and clean condition.

31. The patterns of the quarters, vamp, lining, toe cap and toe puff etc. shall be so designed and shall be correctly fitted in such a way that these do not form excessive pleats at toe and counter regions during lasting. The sole and heel flashes shall be neatly trimmed smooth. There should be no blowholes or shrinkage or warpage in any part of the sole.

32. In appearance, the general workmanship, feel, finish and shade of the Shoe Black Non-Slip shall conform to the standard pattern held in the custody of AHSP.

### MARKING

33. On each footwear odd, at the waist of the outer sole, the following shall be clearly and permanently marked, e.g. by embossing or branding:-

- (a) Size
- (b) Name/Trade Mark of Manufacturer
- (c) Month & Year of Manufacture
- (d) Country of Manufacture
- (e) Number and Edition of Standards
- (f) Symbol Markings of 'P', 'A', 'HI', 'E', 'CI', 'WR', 'HR', 'OR' and 'NS'. The above markings could also be included through the use of applicable pictograms.

34. In addition a Taffeta Label with woven markings as at SI(a) to (d) is required to be stitched at the base of the tongue on the inner side on top of the lining material. Further, each pair of the footwear is to be supplied with a leaflet containing the following information as indicated at Clause 8.1 of IS: 20345-2011:-

- (a) Name and full address of the manufacturer and of his authorised representatives in India.
- (b) Explanation of the Symbol markings/pictograms marked on the sole.
- (c) Instructions for safe use, storage and maintenance, including maximum periods between maintenance check and procedures.
- (d) Instructions for cleaning and/or decontamination
- (e) Caution notice as follows:-

#### CAUTION NOTICE

"Antistatic footwear cannot guarantee an adequate protection against electric shock as it introduces only a resistance between foot and floor. The electrical resistance of this type of footwear can be changed significantly by flexing, contamination or moisture. The footwear will not perform its intended function if worn in wet conditions. Where the antistatic footwear is in use, the resistance of the flooring should be such that it does not invalidate the protection provided by the footwear.

In use, no insulating elements should be introduced between the inner sole of the footwear and the foot of the wearer. The footwear has been tested with the removable insock in place, therefore, the footwear is to be used only with the original insocks in place and the insock should be replaced by a comparable insock supplied only by OEM."

#### QUALITY ASSURANCE

35. The Shoes Black Non-Slip shall be manufactured only by Manufacturers who have their manufacturing/production facilities certified under relevant Quality Management Systems (QMS). The QMS has to be as per certified by authorised agency and should be valid and in-date. The purchaser may seek **supply chain certification** of the raw materials used in the manufacture of the stores against any specific order referring to this specification.
36. The stores shall conform to the requirements when tested in accordance with the method mentioned against each in the specification. Pilot samples shall be forwarded to AHSP from bulk supplies to check/monitor the quality of store whenever required. If stipulated in the contract, the manufacturer shall submit prescribed numbers as advance sample at AHSP for clearance by the Inspection Authority before commencement of Bulk Production.
37. Manufacturers/ Contractors must satisfy themselves first by carrying out thorough pre-inspection of each lot/ batch that the stores manufactured are in accordance with the contract and fully conform to the specification, before tendering to QA officer nominated under the terms of contract. It is mandatory of the manufacturers to give Certificate of Conformity from respective OEM's of the raw materials, wherever desired by AHSP, used

the construction of the shoe. The AHSP reserves the right to test such items and so check with the OEM to determine the validity of the certification

38. A declaration by the Contractor that necessary pre-inspection/ tests have been carried out on the stores tendered and the same are fit for inspection and test shall be rendered along with the challan. The declaration shall include the method followed in pre-inspection showing features checked / tested and the test reports be submitted along with challan

### SAMPLING AND CRITERIA FOR CONFORMITY

39. The Shoes Black Non-Slippairs of the same described nomenclature and of the same batch belonging to one size and fitting or a set of sizes and fittings offered against one challan shall constitute a lot. The lot size shall not exceed 10 (Ten) thousand pairs.

40. In all cases samples shall be drawn using technique of random sampling as per IS: 4905. The sampling officer shall first draw the samples for visual, dimensional, and construction parameters and comparison with approved/standard sample as per Column 3 of Table-6 appended below.

41. If on examination as above the samples are found compliant to specifications as per Column 4 of Table-6, the officer may draw (out of it) and send samples for lab testing as per Column 5 of Table-6. The samples so drawn shall be subject to testing. If samples are found compliant as per Column 6, the lot shall be accepted and considered to be compliant and inspection report shall be prepared.

**Table-5: Sampling Plan**

S. No.	Lot Size in Pairs	For Visual, Dimensional, Constructional Parameters and compliance to approved sample		For Laboratory Testing for Physical and Chemical Parameters	
		Number of samples to be drawn	Permissible no. of non-conforming samples	Number of samples to be drawn	Permissible no. of non-conforming samples
(1)	(2)	(3)	(4)	(5)	(6)
(a)	Up to 2500	50	5	3	0
(b)	2501 to 5000	90	8	5	0
(c)	5001 to 8000	150	14	7	1
(d)	8001 to 10000	200	20	10	1

### PACKING

42. Each pair of Shoes Black Non-Slip shall be wrapped in tissue paper and shall be packed in a 3-Ply corrugated box that will form a unit pack. A paper label with Nomenclature, Manufacturer's name/ Trade mark, Size and Month and Year of Manufacture shall be securely pasted on front of the unit box, which shall be clearly readable. Each individual unit pack is to contain the additional pair of laces and insocks as indicated at Table 2.

Diagram - 1: Inner Side Of Shoe Black Non-Slip

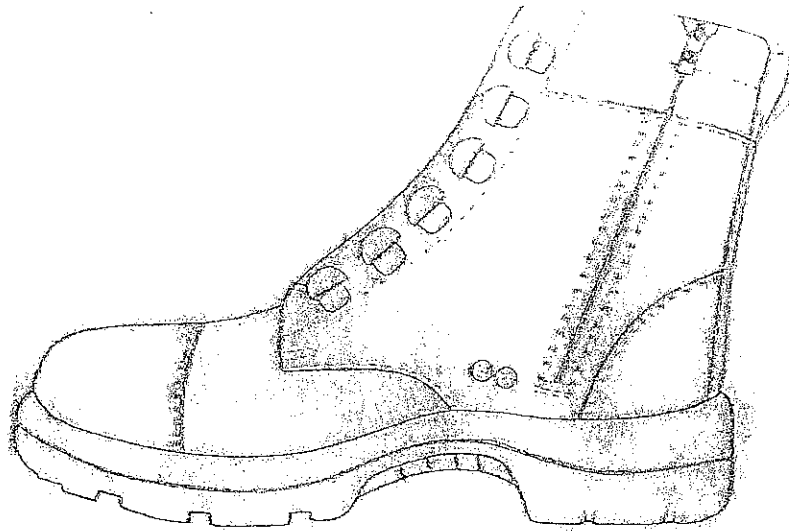


Diagram - 2: Counter, Back Strap and Jug Loop

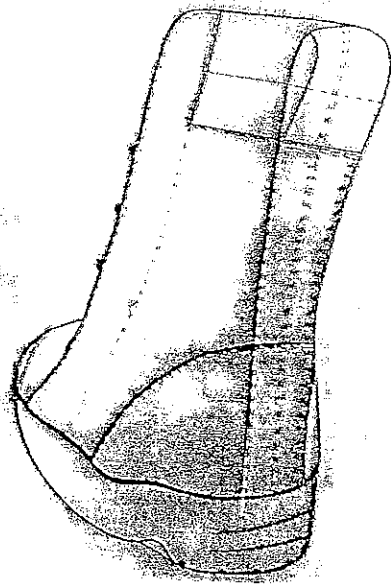
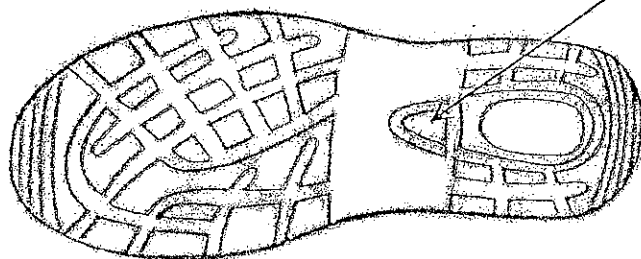


Diagram -3: Illustrative Tread Design For Outsole



Inbuilt Bridge  
(Bridging Support  
as per Fig.1 of  
IS:11226:1993)

**Table-2 : Non-Woven Lining Material**

Sl.No.	Parameter	Requirement	Test Method
(a)	Blend Composition	Nylon 100%	IS 11195
(b)	Weave	Non Woven	Visual
(c)	Thickness	0.7 mm (min)	SATRA TM 27
(d)	Mass (gm / m <sup>2</sup> )	150 ± 25	IS 1964
(e)	Tear Strength in N, Min	15	Clause 5.5.1 of ISO:20345-2011
(f)	Mullen Burst in Kg / cm <sup>2</sup>	4(min)	IS:7016 Part-6/ IS:1966 Part-1
(g)	Abrasion Martindale, Min	25,600 Cycles (dry) 12,800 Cycles (wet)	Clause 4.5.3 of ISO:20345-2011
(h)	Colour Fastness a. Light b. Washing c. Perspiration	4 or better 4 or better 4 or better	IS: 2454 IS: 984 / IS:764 IS: 971
(j)	Anti-Microbial Properties for Staphylococcus Aureus (AATCC 6538) and Klebsiella Pneumonia (AATCC 4352)	90% Reduction of both bacteria.	AATCC 100-2004 (Using Nutrient Agar)
(k)	Anti-Fungal Properties for Trichophyton Mentagrophytes	Grade 0 or 1 Growth after 07 Days	AATCC 30
(l)	Water Vapour Permeability And Water Vapour Coefficient	Permeability ≥ 2 mg/(cm <sup>2</sup> .h) & Coefficient ≥ 30 mg/cm <sup>2</sup>	Clause 4.5.4 of ISO:20345-2011

**Table-3 :Brass D-Rings**

Sl.No.	Parameter	Requirement	Test Method
(a)	Raw Material	Brass (Cu : Zinc::65:35 ± 2)	ISO 426/1
(b)	Attachment and Breaking Strength	Min 250 N	SATRA TM 149
(c)	Atmospheric Sulphide Tarnishing & Salt Water Corrosion	Min Grade 4	SATRA TM 310

**Table-4 :Laces**

Sl.No.	Parameter	Requirement	Test Method
(a)	Material & Construction	100% Nylon	IS:11195
(b)	Breaking Strength	Min 500 N	SATRA TM 94 or BS 5131-Sec 3
(c)	Abrasion Resistance (Against itself and Against D-Ring)	10,000 Cycles	SATRA TM 154
(d)	Ability To Retain Knots	Pass	SATRA TM 195

**Table-5: Insock**

S.No.	Parameter	Requirement	Test Method
(a)	Composition	100% Virgin PU with density of 0.4 ± 0.05 gm/c	IS: 11195
(b)	Thickness	Min 2 mm at forepart and min 5 mm at heelpart	Clause 5.7.1 of ISO:20345-2011
(c)	Top Wearing Surface	100 % non-woven Polyamide	IS: 11195
(d)	Anti-Microbial and Anti-Fungal Properties	As provided at Table 2 above.	
(e)	Abrasion Resistance	Clause 5.7.4.2 of ISO:20345-2011	

Table-6: Insole

S.No.	Parameter	Requirement/Norm	Test Method
(a)	Blend Composition	100% Polyester with HDPE	IS 11195
(b)	Antistatic Value	Coating on one side	
(c)	Water Absorption And Desorption	Clause 4.3.4.2 of IS:15298 Pt I	
(d)	Abrasion Resistance	Clause 4.7.3 of IS 15298 Pt I	
(e)	pH Value	Clause 4.3.4.2 of IS:15298 Pt I Clause 4.7.2 of IS:15298 Pt I	

Table-7: Penetration-resistant non-metallic insert

S.No.	Parameter	Requirement/Norm	Test Method
(a)	Composition	Non-Metallic	---
(b)	Compliance	Clause 6.2.1.1.2 and 6.2.1.5.2 of ISO:20345-2011	
(c)	Construction	Clause 6.2.1.2 of ISO:20345-2011	
(d)	Dimensions	Clause 6.2.1.3 of ISO:20345-2011	
(e)	Flex Resistance	Clause 6.2.1.4 of ISO:20345-2011	

Table-8 : Polyether Based PU Mid Sole

Sl.No.	Parameter	Requirement / Norm	Test Method
(a)	Hardness	40 to 50 Shore 'A'	SATRA TM 205
(b)	Moulded Density in Kg / m <sup>3</sup>	430 to 500	SATRA TM 134
(c)	Tear Strength	Min 4.0 N/mm	SATRA TM 218

Note: Only Basic test for Midsole since it is sun-exposed part of the sole complex

Table-9 :BNR Outsole

Sl No.	Parameter	Requirement	Test Method
(a)	Material	Pure Nitrile Butadiene Rubber(NBR)	IS:3400 Pt II
(b)	Polymer Content of NBR Material	50% Min	IS 3400 Pt II
(c)	Carbon Black	23% Min	IS 3400 Pt II
(d)	Moulded Density	Max 1.2gm / c <sup>3</sup>	SATRA TM 134
(e)	Hardness	Original	IS 3400 Pt II
		After ageing at 100°C ± 1% for 70 Hrs in Air Oven	
(f)	Tensile Strength	Original	IS 3400 Pt I
		After ageing at 100°C ± 1% for 70 Hrs in Air Oven	
(g)	Elongation at Break	Original	IS 3400 Pt I
		After ageing at 100°C ± 1% for 70 Hrs in Air Oven	
(h)	Tear strength	≥ 8 kN/m	Clause 5.8.2 of ISO:20345-2011
(i)	Abrasion Resistance	≤ 250 mm <sup>3</sup>	Clause 5.8.3 of ISO:20345-2011
(j)	Flexing Resistance(Cut growth till 30,000 flexes)	≤ 4 mm	Clause 5.8.4 of ISO:20345-2011
	Upper/ Outsole and Sole Interlayer Bond Strengths (Whole shoe flexing for 1,00,000 cycles).	The footwear shall be placed in RH of 100% at a temperature of 70° C for 5 days.	Clause 5.3.1.2 and Clause 5.8.6 of ISO:20345-2011.

Note :

- (ii) The rubber material shall not contain any natural/reclaimed/vulcanised rubber waste or impurities and deleterious ingredients like copper manganese and their compounds
- (iii) The BNR shall be vulcanised adequately. The vulcanised BNR shall be non-porous, homogenous and free from pitting, grit, sulphur bloom and other visible defects. The surface of the vulcanised BNR Sole shall be free from blemishes and defects that can be directly or indirectly attributed to poor workmanship, worn-out dies/tooling/machinery or any other aspect of the manufacturing process
- (iii) The contractor shall supply along with the shoes two test slabs (one 15cm x 15cm and 6 mm thick and the other 30cm x 30cm and 1.5mm thick) of the same composition and cured to the same degree of vulcanisation as the outsole to facilitate testing of the physical parameters.

**Table-10: Tests For Chemical Substances**

S.No	Material	Test	Norm	Test Method
(a)	All Leather & Lining Components including insole/ insocks	Azo Free dyes	SG Criteria	ISO 17234, ISO 14362
		Chlorinated Phenols (PCP/TCP/TeCP/OPP)	SG Criteria	ISO 17070
		Cr-6	SG Criteria	ISO 17075
		Heavy Metals extractable	SG Criteria	ISO 105 EO4/1CP
		Formaldehyde	SG Criteria	ISO 17226
(b)	Polyester, Laces	Azo Free Dyes	SG Criteria	ISO 17234, ISO 14362
		Chlorinated Phenols (PCP/TCP/TeCP/OPP)	SG Criteria	ISO 17070
		Dispersed dyes allergenic & carcinogenic	SG Criteria	DIN 54231
		Formaldehyde	SG Criteria	ISO 17226
(c)	Sole Complex	Phthalate	SG Criteria	Solvent Extraction/GCMS
		Organotins Compounds (TBT/DBT/MBT)	SG Criteria	ISO 17353
		Lead	SG Criteria	EN 1122
		Cadmium	SG Criteria	EN 1122
(d)	Eyelets	Nickel free	SG Criteria	DIN EN 12471

**Table-11 : Tests For Thermoplastic Counter Stiffner**

Sl.No.	Parameter	Requirement / Norm	Test Method
(a)	Peel strength <sup>1</sup> (N/mm)	Min 0.5	Appendix 'C'
(b)	Shape retention stiffner from finished footwear :- (a) After First Collapse (b) After V <sup>th</sup> Collapse (c) After 2 hrs recovery	(a)18% (b)21% (c)21%	Appendix 'D'
<b>Note :</b>			
1. Best Results are achieved after bonding to upper at 180 °C and 200 kPa.			



Determination of Peel Strength For Thermoplastic Toe Puff & Counter Stiffener

1. Apparatus And Materials. Universal Tensile Testing machine with rate of traverse of  $100 \text{ mm} \pm 20 \text{ mm/minute}$ . Laboratory Press comprising of two platens, heating up to  $150^{\circ} \text{ C}$  and pressure of 6 bar. Solvent, like acetone, methyl ethyl ketone or any other solvent recommended by the Toe-puff or counter stiffener manufacturer.
2. Preparation Of Sample. Lay the Toe Puff / Counter Stiffener between the leather upper and the leather lining. Heat the assembly up to  $110^{\circ} \text{ C}$  for 2 minutes and then press for 40 seconds a 5 bar pressure. Allow to dry for 24 hours.
3. Test Pieces. Cut six test specimens. The test pieces used for shape stability and repeated load test can also be used for this test. The length of the test piece shall be greater than 50 mm and the width shall be 10 mm.
4. Procedure. The bond of the Toe Puff / Counter stiffener on to the lining/leather is determined. If required the bond of the Toe-Puff /Counter Stiffener onto the leather Upper can also be determined.
5. Clamp the two open ends of the peel strength assembly in the jaws of the tensile testing machine. Open the bond at a speed of  $100 \text{ mm/minute}$  for 75 mm length.
6. Peel strength is expressed in  $\text{N/cm}$ . Record the peel strength and divide by the width of the specimen. Determine the average of the six test pieces.