

DCV/PROV/SHOES NON SLIP/2008

INTEGRATED HEADQUARTERS OF MINISTRY OF DEFENCE(NAVY)

INDIAN NAVY SPECIFICATION

ON

SHOES NON SLIP OIL RESISTANT WITH NITRILE RUBBER SOLE

(DS CAT NO. N8430-000483 to 490)

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FOREWORD.

- 0.1 This specification has been prepared by Directorate of Clothing and Victualling on the authority of the Controller of Logistics, Indian Navy.
- 0.2 This specification is for use by the Indian Navy.
- 0.3 This specification has been prepared on the basis of commercially available similar products available with reputed Indian manufacturers and exporters.
- 0.4 This specification would be used for manufacture, quality assurance and procurement of the item.
- 0.5 AHSP for the item covered in this specification is PDCV, New Delhi, for the Indian Navy.
- 0.6 This specification holds good only for the supply order for which it is issued. PDCV reserves the right to amend or modify this specification as and when necessary.

1. GENERAL.

- 1.1 This specification covers all the requirements of Shoes Non Slip Oil Resistant with Nitrile Sole and heel DMS in sizes 5 to 12 in medium fitting.
- 1.2 The shoes described in this specification are of Derby Design made from Buff smooth calf leather 1.2-1.4 mm PCP & AZO dye free. The Nitrile sole shall be attached by Direct Vulcanising Process.
- 1.3 The shoes are supplied with Laces Nylon Black.
- 1.4 The shoes are intended for use by Naval Personnel and civilian staff as per laid down scales.

2. RELATED SPECIFICATIONS.

2.1 Reference is made in this specification: -

(i)	IS:496	Oil - 30
(ii)	<u>IS:578</u>	<u>Buff smooth calf leather 1.2-1.4mm PCP & AZO Dye free.</u>
(iii)	IS:579(Pt I)	Insole of cellulose Board 2.00 mm.
(iv)	IS:1398	Paper wrapping waterproof plain bitumen laminated.
(v)	IS:1422	Duck Cotton
(vi)	IS:1460	Diesel Oil grade II
(vii)	IS:1895	Tape Newar
(viii)	IS:2508	Low Density Polythene film
(ix)	IS:2771(Pt II)	Solid Fibre Board Boxes
(x)	IS:3400(Pt I)	Method of test for vulcanised Rubber
	(Pt I)	Tensile stress/strain properties
	(Pt II)	Rubber Hardness
	(Pt IV)	Accelerated Ageing
	(Pt XXII)	Chemical analysis
	(Pt IX)	Density
	IS:3400	Oil resistance
	IS:3400	Abrasion
(xi)	IS:3840	Lining Rubber
(xii)	IS:4185	Gummed paper tape
(xiii)	IS:4905	Method of random sampling
(xiv)	IS:5041	Footwear and stationary eyelets
(xv)	IS:8085	Method of test for footwear
(xvi)	IS:8460	Tissue paper
(xvii)	IS:9543	Spun polyester sewing thread
(xviii)	IS:10945	Shank for foot wears
(xix)	JSS 8115-1	Cardboard Cartons
(xx)	IND/TC/0289c	Thread Machine Linen
(xxi)	IND/TC/0304	Lace Nylon Black
(xxii)	CIGS/US/50	Tacks Lasting Mild Steel
(xxiii)	CIGS/US/0282	Nylon/Polypropylene strapping

3. STANDARD PATTERN.

3.1 The standard pattern of Shoes Non Slip Oil Resistant with Nitrile Rubber Sole and heel DMS held in the custody of the Principal Director Clothing and Victualling, Sena Bhawan New Delhi - 110 011 shall constitute the standard with regard to appearance, general workmanship, finish and any other particulars/properties not noted/defined in this specification.

MATERIALS.

4.1 Shoe shall be manufactured from the following materials: -

- | | | |
|--------|--|--|
| (i) | Buff smooth calf leather 1.2-1.4 mm
PCP & AZO dye free. | Conforming to IS:578 |
| (ii) | Lining leather combination tanned. | Conforming to IS:3840 type 1
Or 3 of 1979 edition |
| (iii) | Thread TKT NO. 40.
or
Spun polyester thread of equivalent grade. | Conforming to IND/TC/0289
Conforming to IS:9543 variety
No. 2 ticket No. 100 |
| (iv) | Drill cotton (Bleached)
(wt 300 g/m ²). | Conforming to IS:177(var No. 4) |
| (v) | Eyelets brass/aluminum hard enamelled
Black for shoes. | Conforming to IS:5041 |
| (vi) | Shank Steel Ribbed rustproof. | Conforming to IS:10945 alongwith
relevant plate attached. |
| (vii) | Laces nylon black 60 cm for shoes. | Conforming to IND/TC/0304 |
| (viii) | Nitrile rubber sole and heel. | Conforming to parameters as
Appendix 'A' |

Note: Besides the above materials a rubber compound/adhesive(based on polychloroprene or polyurethane for permanent bondage), tarred felt, cement compound shall also be used so as to provide the functional requirements.

5. MANUFACTURE.

5.1 Shoe shall be manufactured as described below: -

5.1.1 CONSTRUCTION.

5.1.1.1 The shoe shall be made by Direct Vulcanised Process (DVP) with Nitrile rubber sole N-5 on model last No. 5338 conforming to the dimensions stipulated in Appendix 'B'.

5.1.2 SOLE DESIGN.

5.1.2.1 The Nitrile rubber sole made to N 5(modified) last with side cleat for water proofing all round by vulcanisation process.

5.1.3 CUTTING OF COMPONENTS.

5.1.3.1 The various upper and bottom components of leather shall be cut from the material and to the thickness as prescribed in Appendix 'C'. All components shall be free from serious grain damage flay cuts and other visual defects. Care shall be taken that all parts forming the upper are so cut that the lines of tightness of the leather lie in the direction from heel to toe.

5.1.3.2 The exposed edges of quarters shall be skived.

5.1.3.3 All the bottom components of leather shall be prepared before use as follows: -

5.1.3.3.1 The insole shall be made of good quality Cellulose board 2.00 mm with heel piece and made as per last and dipped in acetone. The insole shall be made of uniform thickness throughout.

5.1.3.3.2 The stiffener shall be of the correct shape so as to support the heel part of the foot properly.

5.1.4 UPPER CLOSING.

5.1.4.1 The upper shall be machine closed with lock stitches using thread TKT No. 40 black or spun polyester thread of equivalent grade for upper and lining parts respectively. The number of stitches should be 4 ± 1 stitch/cm. Care shall be taken to maintain the spacing and uniform tension of the stitches at all places. The loose ends of the stitching threads shall be fastened.

5.1.4.1.1 The back of the two quarters shall be stitched either by lock stitches 3 mm apart or by zig zag stitches. The back seams shall be properly rubbed clean to avoid ridges/wrinkles and reinforced with cotton tape.

5.1.4.1.2 The front and top of upper quarter shall be properly folded.

5.1.4.1.3 The back strap shall be centrally positioned over the back joint of quarters and shall be stitched around the exposed edges with a row of stitches 1.5 mm apart on either side and 3 mm apart at top.

5.1.4.1.4 The quarter lining shall be in two pieces and joint of quarter lining shall fall on the inner side 40 ± 2 mm apart from centre of the back. An underlay allowance of 9 ± 1 mm shall be provided in inner quarter lining. The joint of these quarters shall be adequately strengthened with 2 rows of stitches.

5.1.4.1.5 The tongue shall be joined under the vamp with double row of stitches 1.5 ± 0.5 mm apart. The tongue joint shall be not visible in the laced condition of the finished shoe.

5.1.4.1.6 The tongue lining shall be properly joined over the vamp lining by means of a row of stitches ensuring that wrinkles are not formed. The quarter lining should be cut and stitched in such a way that it covers and extends to 35 mm of vamp.

5.1.4.1.6.1 The tongue lining shall be short by 4 ± 1 mm around the exposed edges of the upper tongue and shall be secured with a row of stitches so that tongue lining is also attached with vamp by means of stitches.

5.1.4.1.7 Fabric stays of the same material as used for vamp lining shall be provided on either side of each vamp, so that the stays provide proper reinforcement to the joint region.

5.1.4.1.8 The union of two quarters shall be laid over the sides of vamp in proper alignment taking care that no wrinkles occur.

5.1.4.1.8.1 Each of the side shall be strengthened with two rows of stitches being one double row and the other single row of stitches. The distance between these two rows of stitches shall be 3.5 ± 0.5 mm.

5.1.4.1.8.2 The upper quarter shall be properly secured with quarter lining by means of row of stitches. Each quarter facing shall be reinforced with the vamp by means of stitching a 15 mm long stay at the height of 13 ± 1 mm from the tab with double row of stitches.

5.1.4.1.9 Four eyelets shall be fitted in each of the quarter facing equidistantly. Each eyelet shall be clenched properly without distortion.

5.1.5 LASTING.

5.1.5.1 Toe puff and counter to be of non woven thermo plastic material. Counter stiffener must be properly moulded before lasting. All layers of the upper shall be carefully pulled over the last with a uniform tension to prevent formation of air pocket in between the layers.

5.1.5.2 The upper shall be properly laced through the eyelets before lasting so that the quarters remain on proper alignment.

5.1.5.3 In the lasting operation the upper and the insole shall not be wetted or damped too much.

5.1.5.4 The shoes shall remain on the last long enough to ensure proper shape of the upper and adequate hardening of the toe puff and the stiffener.

Note: Normally the shoes should remain on lasts for 24 hrs where possible. The aim may be achieved in a shorter period by the use of heat setting equipment.

5.1.6 BUFFING.

5.1.6.1 The lasted edges of the upper leather shall be properly buffed. Care shall be taken to ensure that any lasting tacks, if found loosened off after pounding buffing operation shall be replaced with fresh adhesive.

5.1.7 SHANK FITTING.

5.1.7.1 The shank of specified quality shall be fitted at the waist of the insole so that it shall support the waist.

5.1.8 DIRECT VULCANISING PROCESS.

5.1.8.1 Before processing, the dust, dirt or any foreign material shall be properly removed from the surface of the bottom, to be adhered in each shoe. The bottom surface shall be coated properly with the adhesive. The Nitrile rubber sole with heel shall then be assembled with lasted shoe by direct vulcanisation process on a high pressure moulding machine. Care shall be taken to see that no air bubbles are entrapped in the shoe and all parts are properly and adequately vulcanised.

5.1.8.2 The moulding flash at the sole and heel shall be neatly trimmed.

5.1.9 SEAT SOCK FIXING.

5.1.9.1 A seat sock of the lining leather shall be struck down neatly at the seat of the insole by means of adhesive.

5.1.10 LACING.

5.1.10.1. Each pair of shoes shall be provided with a pair of laces nylon 60 cm for shoes.

5.2 DIMENSIONS.

5.2.1 The shoes shall be made on plastic/wooden lasts taken from model no. 533 conforming to the dimensions as stipulated.

5.2.2 ALLOWANCES.

5.2.2.1 Some of the important allowances which shall be provided in each of the shoes are as under: -

5.2.2.1.1 FOLDING ALLOWANCE.

At front and top of the quarter 5 ± 0.5 mm

Top of the back strap	8 ± 1 mm
Underlay allowance	9 ± 1 mm

5.2.2.1.2

5.2.3 The back height when lasted shall be given below: -

<u>Sizes</u>	<u>Back Height (mm)</u>
5 to 7	60
8 to 10	62
11 to 12	64
Tolerance	± 1

5.2.4 The thickness of Nitrile rubber sole and heel from outside without storn welt/rand for all sizes in the finished shoes shall be as under: -

<u>SNo.</u>	<u>Components</u>	<u>Thickness (mm)</u>
1.	At fore part	8 ± 1
2.	At waist	6 ± 1
3.	At heel	23 ± 1
4.	Depth of cleat at sole & heel	3

6. REQUIREMENTS.

6.1 The material used in the manufacture of Shoes Non Slip Oil Resistant with Nitrile rubber sole and heel DMS shall be tested to the specification/requirement given in clause 4 of this specification.

6.1.1 The material of the Nitrile rubber sole and heel shall conform to the requirements prescribed in Appendix 'A'. The Nitrile Rubber sole shall not show any sign of distortion or deterioration like brittleness or crackiness after the accelerated ageing test as given in Appendix 'A'.

6.2 ADHESION/BOND STRENGTH TEST ON VULCANISED BOTTOM.

6.2.1 The testing of Nitrile rubber sole and heel with upper shall be done after 24 h of Vulcanisation.

6.2.2 There shall be no visible parting of the bottom from the upper at a pressure 250 N at the toe and 300 N at the seat when tested for adhesion in accordance with the relevant clause of IS:8085 (Pt 1).

7. MARKING.

7.1 The waist portion of the insole shall be legibly and indelibly steel stamped with the following: -

- (a) Name and recognised trademark.
- (b) Cat No.
- (c) Size fitting.
- (d) Month and year of manufacture

7.1.1 The sizes and fitting of the shoe shall also be legibly and indelibly marked with green colour on the waist of the Nitrile rubber sole. The green Marking on the waist of the Nitrile sole is for the purpose of identification and distinguishing the Non Slip shoes from other similar shoes.

8. ACCEPTANCE MARK.

8.1 Each shoe shall be legibly stamped with indelible ink/paint on the waist near breast portion using steel stamp of size 6 mm or 12 mm.

9. PACKING AND MARKING.

9.1 The following materials shall be used for packaging: -

<u>Materials</u>	<u>Conforming to</u>
(i) Tissue paper	IS:8460
(ii) Cardboard cartons 1.8 to 2.0 mm thick of suitable sizes	JSS:8115-1
(iii) Tape paper gummed 25 mm wide	IS:4185
(iv) Paper wrapping waterproof plain (using craft paper having substance 60 g/m ²)	IS:1398(Type I)
(v) Solid fibre board boxes	IS:2771(Pt II)
(vi) Polypropylene strapping 0.55 mm thick x 19 mm wide(for solid fibre board boxes)	CIGS/US/282

9.2 METHOD.

9.2.1 The shoe shall be delivered in a new, clean and dry condition.

9.2.2 UNIT PACK.

9.2.2.1 Each pair shall be wrapped with tissue paper and packed in cardboard cartons of suitable sizes.

9.2.2.2 Carton shall then be sealed by means of two strips of tape paper brown gummed which shall be affixed at a distance of 5 cm from each end so as to extend completely across the bottom side and top of the carton.

9.2.2.3 The carton shall then be labelled with two box labels of the size 8 x 6 cm one of which shall be gummed to the top and the other to one of the sides of the carton, these labels shall bear the following marking: -

- (i) Nomenclature and Pattern No(if any).
- (ii) Manufacturers name, initial or recognised trademark.
- (iii) Month and year of manufacture.
- (iv) Size and the fitting of the shoes.

9.2.3 MULTIPLE PACK.

9.2.3.1 Sixteen unit packs as indicated in sub clause (9.2.2) shall be placed in solid fibre board boxes as above. The ends of the flat flaps on either side of the box shall then sealed by means of 25 mm wide tape paper gummed. Galvanised mild steel staples of 0.55 mm wire with 13 m crown and 3 mm width shall then be strapped at two position/places by means of polypropylene 19 mm wide and securely sealed. Proper precautions shall be exercised so that the strapping does not get stressed during handling.

9.3 MARKING OF PACKAGE.

9.3.1 The solid fibre board boxes shall be indelibly marked/labelled with the following details: -

- (a) Nomenclature of the store and Pattern No.
- (b) Quantity packed in the case.
- (c) Lot and serial number.
- (d) Name of manufacturer.
- (e) Month and year of packing.
- (f) Gross mass of box in kg.
- (g) Name and address of consignee.
- (h) A/T No. and date.
- (j) Inspection note number and date.

10. SAMPLING PLAN AND CRITERIA OF CONFORMITY.

10.1 The sampling plan and criteria of conformity shall be as per Appendix 'D', 'E' and 'F'.

Appendix 'A'CHEMICAL/PHYSICAL REQUIREMENTS OF
NITRILE RUBBER SOLE AND HEEL OF SHOES

<u>SNO.</u>	<u>CHARACTERSTICS</u>	<u>REQUIREMENT</u>	<u>METHOD OF TEST</u>
01.	Sole material	<i>Hydrocarbon / Carbon black</i> Pure Nitrile	<u>IS:3400(Pt 22)</u>
02.	Density	1.2± 0.02 g/cm ²	IS:3400(Pt IX)
03.	Tensile strength		
	(a) Original	12.3 MN/m	IS:3400(Pt I)
	(b) Change after ageing at 100 ⁰ C ± 1 ⁰ C for 70 Hrs in an air oven	+ 0% of original - 15% of original	
04.	Elongation at break: -		IS:3400(Pt I)
	(a) Original	225% min	
	(b) Change after ageing at 100 ⁰ C ± 1 ⁰ C for 70 Hrs in an air oven.	+ 0% - 30%	
05.	Hardness-		IS:3400(Pt II)
	(a) Original	65 ± 5IRHD	
	(b) Change after ageing at 100 ⁰ C ± 1 ⁰ C for 70 Hrs in an air oven.	+ 10 IRHD from original - 0 IRHD	
06.	Abrasion DIN 53516	250 MMQ max	
07.	Flexing Test	6mm max, 30,000 cycles	
08.	Heat Resistance	300 ⁰ C for 1 min	
09.	Oil swelling in ISOCTANE for 22 Hrs.	12.0% max	

NOTE:

1. The Nitrile rubber material shall reasonably be free from vulcanised waste reclaimed Nitrile rubber and deleterious ingredients like copper maganese and their compound.
2. The nitrile rubber shall be vulcanised adequately. The vulcanised Nitrile rubber shall be homogenous and free from sulphur bloom. The surface shall be free from blemishes and defects. Manufacturer will give Quality certificate for Nitrile sole.
3. The contractor shall supply along with the shoes two tests slabs (one 15 x 15 cm and 6 mm thick). The other 30 x 30 cm x 1.5 m thick of the same composition and cured to the same degree of vulcanisation as the sole and heel to facilitate testing of the physical parameters.

Appendix 'B'**DIMENSIONS OF WOODEN LAST MODEL NO. 5338**

SIZE :	<u>LENGTH OF SIZE STICK</u>	<u>JOINT GIRTH</u>	<u>INSTEP GIRTH</u>
	(mm)	(mm)	(mm)
	(a)	(b)	(c)
8 Medium	283	247	251

(a) Increasing or decreasing by 8.5 mm for each size.

(b)&(c) Increasing or decreasing by 6.4 mm for each size.

Appendix 'C'**THICKNESS OF LEATHER COMPONENTS(REF CLAUSE 5.1.3)**

<u>SNO.</u>	<u>COMPONENTS</u>	<u>MATERIALS</u>	<u>THICKNESS(mm)</u>	
			<u>Min</u>	<u>Max</u>
(1)	(2)	(3)	(4)	
01.	Vamp	Buff smooth calf leather PCP & AZO dye free	1.2	1.8
02.	Quarters	--do--	1.3	1.5
03.	Tongue	--do--(Butt/Bend or Belly)	0.8	1.0
04.	Back strap	--do--(shoulder)	1.3	1.5
05.	Quarter Lining	combination tanned natural	0.8	1.2
06.	Tongue Lining	--do--	0.5	0.8
07.	Seat socks	--do--	0.8	1.0
08.	Insole	Cellulose Board	2.0	2.0
09.	Stiffener	Thermo Plastic	1.4	1.6
10.	Toe tuff	Thermo Plastic	1.0	1.2
11.	Vamp lining	Duck cotton scoured	--	--

Appendix 'D'**SAMPLING PLAN AND PERMISSIBLE NO. OF DEFECTIVES FOR VISUAL INSPECTION****(Base on 5.0% IO)**

Lot size in pairs (I)	Sample size (II)	Acceptance No. (a) for major defects only (III)
Up to 90	34	0
91 to 150	38	0
151 to 280	42	0
281 to 500	50	0
501 to 1200	80	1
1201 to 3200	125	3
3201 to 10000	200	5

Appendix 'E'**SAMPLING PLAN AND PERMISSIBLE NO. OF DEFECTIVES FOR MAJOR PARAMETERS****(FOR LABORATORY TEST)****(Base on AQL 4%)**

Lot size in pairs:	<u>Chemical Attributes</u>		<u>Physical Attributes</u>	
	<u>Sample Size</u> (n)	<u>Acceptance Number</u> (a)	<u>Sample Size</u> (n)	<u>Acceptance Number</u> (a)
Upto 100	5	0	5	0
101 to 150	5	0	13	1
151 to 300	13	1	13	1
301 to 500	13	1	13	1
501 to 1000	13	1	20	2
1001 to 3000	13	1	32	3
3001 to 10000	20	1	32	3

SAMPLING PLAN AND PERMISSIBLE NO. OF DEFECTIVES FOR MINOR PARAMETERS
FOR LABORATORY TESTS)
 Based on AQL 6.5%)

Lot size in pairs	<u>Chemical Attributes</u>		<u>Physical Attributes</u>	
	Sample Size (n)	Acceptance number (a)	Sample size (n)	Acceptance number (a)
upto 100			5	0
101 to 150			8	1
151 to 300			13	2
301 to 500			13	2
501 to 1000			13	2
1001 to 3000			32	5
3001 to 10000			32	5



