

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

INDIAN NAVY SPECIFICATION

ON

SANDAL SUBMARINE WITH STRAPS
(Sizes 5-11)
CAT NO. CNCMT- SMF0021 TO 0027

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DIRECTORATE OF CLOTHING AND VICTUALLING
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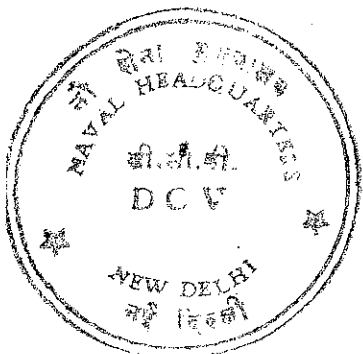
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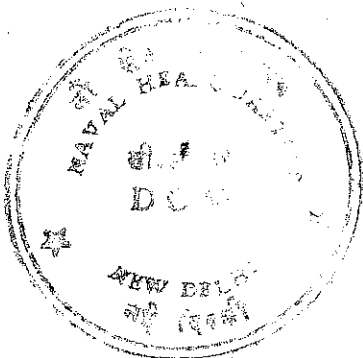

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FOREWORD

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 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 based on **Naval Headquarters Specification DCV/PROV/SUBMARINE SANDAL/4/2009 dated 27 Mar 09** and has been prepared by the Directorate of Clothing and Victualling on the authority of Controller of Logistics, Indian Navy by taking into account the **recommendations received from CLRI, Chennai**. 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.

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

MATERIALS

12. The general description of materials to be used for manufacture of the sandal is as indicated at the following Table 2. The physical and chemical properties that these materials have to conform to have been placed at Appendix 'B'.

Table 2 : Material Description

Sl.No.	Component	Requirement
(a)	All Leather Upper Components	Chrome CG Softy Black Colour
(b)	Lining	100% Polyamide Black Colour Non-Woven material (Cambrelle type) with anti-microbial and anti-fungal properties for all leather upper components, including back strap lining.
(c)	Foam Insert	Polyurethane Foam of min 5 mm Thickness between Upper and Lining Components. Padded Collars are to have PU Foam of 15 mm thickness.
(d)	Buckle & Velcro	Buckle : Brass. Velcro: 100% Nylon
(e)	Insole/Footpad	Blown EVA
(f)	Outsole	Pre-moulded Flat BNR Sole (full bucket/cup type) having soling pattern as per Cleated Design(Stud Pattern) of IS:5676. Diagram of tread design at Appendix 'A' is for illustrative purposes only.
(g)	Stitching Thread	TKT No.20/40 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 .

CONSTRUCTION

13. The Footwear, Sandal, Submarine shall be manufactured as per standard manufacturing techniques, some aspects of which is described in the succeeding paragraphs.

Upper Design

14. The components of the upper leather portion are to be cut as per the illustration with four cross straps with back strap & collar. The front three cross straps will have open seam as decoration. The leather strap of the buckle is to be embossed with marking "Indian Navy". The Velcro has to be of **25 ± 1 mm width and 55 ± 1 mm length (At longer edge)** as per design at illustration.

15. 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. The straps of the upper are to be pasted below the footbed/insole while being on the last itself and then the outsole is to be attached to ensure proper shape retention. The length of the straps kept as underlay between the footbed/outsole is to be

15. The sole complex shall be made of high quality material, suitable for interlayer bond strength and not to be delaminated when subjected to the test.

16. All decorative stitches shall be 30-40 per/dm and placed 3-4 mm wide from the edges and so fitted that wrinkles do not occur.

17. 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. 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.

Insole/Footbed & BNR Sole Complex

18. The sole complex has to be of full bucket/cup type(including the waist portion) of construction wherein there should be no flare in the sole along the feather line. The Insole/Footbed has to be in **Light-Grey Colour** and the BNR outsole has to be in **Jet Black Colour**.

19. The tread design(soling) is to have the cleat design with channels open to the sides. The soling shall not included continuous lateral tread patterns or any other features, such as sharp corners at the base of the sole pattern, which may accelerate or cause premature crack formation.

20. The physical dimensions of the sole complex are to be maintained in accordance with the following for guidance:-

Table 3 : Dimensions of BNR Sole

S.No.	Description	Thickness(Min)
(a)	Thickness of BNR outsole	1.5 mm
(b)	Cleat height of BNR outsole	2.0 mm
(c)	Thickness of composite sole when side wall is measured from outside	Thickness (Min)
	(a) At Forepart	10 mm
	(b) At Waist	8 mm
	(c) At Heel	23 mm

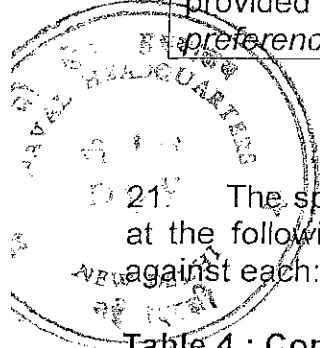
Note : Considering the nature of the item, the above dimensions have been provided for guidance only. However, during technical evaluation of tender samples preference will be accorded to products that are closest to the indicated values

TESTS OF WHOLE SANDAL

21. 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 boots of Size 8 should weigh 630 gms ± 20 gms with an increase or decrease of 10 gms for each bigger/smaller size respectively.
(b)	Height of Upper	The Height of Upper of the boot shall be 66 ± 2.0 mm , for Size 8 with an increase or decrease by 3.0



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(b) Caution notice as follows:-

CAUTION NOTICE

"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."

QUALITY ASSURANCE

27. The Footwear, Sandal, Submarine 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.

28. 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.

29. 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 in the construction of the shoe. The AHSP reserves the right to check such items and also with the OEM to determine the validity of the certification.

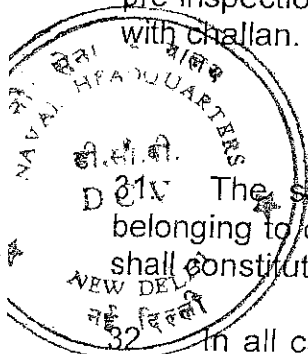
30. A declaration by the Contractor that necessary pre-inspection/ tests have been carried out on the stores tendered and the same are fit for inspection and test shall be rendered along with the challan. The declaration shall include the method followed in pre-inspection showing features checked / tested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

SAMPLING AND CRITERIA FOR CONFORMITY

The sandals of the same description 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.**

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.

33. 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



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...shall be accepted and considered to be ... 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

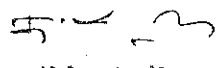
34. Each pair of Sandal shall be wrapped in tissue paper and shall be packed in a 3-Ply corrugated box that will form a unit pack. A paper label with Nomenclature, Manufacturer's name/ Trade mark, Size and Month and Year of Manufacture shall be securely pasted on front of the unit box, which shall be clearly readable.

35. Suitable number of unit packs shall further be packed in one 7-Ply corrugated carton strong enough to withstand transit hazards and to the satisfaction of inspecting officer.

36. The Carton, thereafter shall be sealed with adhesive tapes and tape bound with polypropylene tapes. Each package shall be legibly marked with:-

- (a) Nomenclature of the store.
- (b) Quantity packed in the package.
- (c) Lot and serial No. of the package.
- (d) Month and year of manufacturer.
- (e) Gross mass of the package in kg.
- (f) Name and address of the consignee.
- (g) Name and recognized trade mark of the supplier.




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WARRANTY

37. Except as otherwise provided in the invitation to the tender, contractor/supplier shall declare that the Shoes supplied to the purchaser against this specification is of best quality and workmanship and new in all respect and is strictly in accordance with the laid down specifications.

38. The contractor/supplier shall guarantee that the Shoes would continue to conform to the aforesaid description and quality, including all physical and chemical parameters

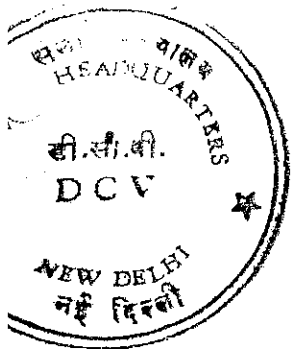
... 12/15 months from the date of delivery of the goods to the purchaser or fifteen months from the date of despatch from the supplier's premises, whichever is earlier and notwithstanding the fact that the purchaser (Inspector) may have inspected and /or approved the consignments.

39. If during the aforesaid period of 12/15 months the said consignment is discovered not conforming to the description and quality aforesaid or not giving satisfactory performance or have deteriorated and the decision of the purchaser in the behalf shall be final and binding on the contractor/supplier to rectify/replace by acceptable goods or such portion or portions thereof as is found to be defective by the purchaser within a reasonable period not exceeding three months or as decided by the purchaser.

40. In such an event the warranty period shall apply to the shoes replaced from the date of replacement or otherwise the contractor/supplier shall pay the purchaser, such compensation as determined by the purchaser as may arise by reason of breach of the warranty contained herein.

Suggestion for Improvement

41. Any suggestion for improvement of this document may be forwarded to:-
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CRITERIA FOR PHYSICAL AND CHEMICAL PROPERTIES

Table-1: Leather Upper

S.No.	Parameter	Requirement	Test Method
(a)	Thickness	1.4 ± 1	ISO: 2589/SATRA TM 1
(b)	Tear Strength (Min)	120 N	Clause 5.4.3 of ISO:20345-2011
(c)	pH Value	≥ 3.5	Clause 5.4.7 of ISO:20345-2011
(d)	Flexing Resistance	No damage after 100,000 cycles	ISO 5402
(e)	Tensile Strength	17 N/mm ²	ISO 3376
(f)	Lastometer Tests:- (a) Distension at Grain Crack (b) Load at Grain Crack	(a) 7 mm (b) 245 N	ISO 3379
(g)	Adhesion of Finish	Min 2 N/mm	ISO 1'644
(h)	Break Pipiness Test	Min 3-4	SATRA TM 36
(j)	Colour Fastness To Rubbing (Both Wet & Dry)	Min 4	IS:5914

Note :

- (i) All upper leather components have to be in adherence to IS:5677.
(ii) The leather shall be suitably fat-liquored. Mineral types of fat liquors or oils shall not be used.

Table-2 : Non-Woven Lining Material

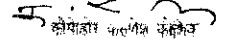
Sl.No.	Parameter	Requirement	Test Method
(a)	Blend Composition	Nylon: 100%	IS: 11195
(b)	Weave	Non Woven	Visual
(c)	Thickness	0.7 mm (min.)	SATRA TM 27
(d)	Mass (gm / m ²)	150 ± 25	IS: 1964
(e)	Tear Strength in N, Min	15	Clause 5.5.1 of ISO:20345-2011
(f)	Mullen Burst in Kg / cm ²	4(min)	IS:7016 Part-6/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



Sl.No.	Parameter	Requirement / Norm	Test Method
(a)	Raw Material	Brass (Cu : Zinc: 65:35 ± 2)	ISO 426/1
(b)	Attachment Strength & Strap Tear	Min 250 N	SATRA TM 149
(c)	Buckle Season Cracking/Residual Stress Atmospheric Sulphide	Pass	ASTM B 154
(d)	Tarnishing & Salt Water Corrosion	Min Grade 4	SATRA TM 310
(e)	Buckle Bending	Min 200 N	SATRA TM 181
(f)	Breaking Strength of Upper Strap(including lining)	Min 10 N/mm	ISO:17706
(g)	Velcro Opening Strength	Min 100 KPa	ISO:22776
(h)	Velcro Peel Strength	Min 0.10 kg/cm	SATRA TM 123
(j)	Velcro Shear Strength	1 kg/cm ²	SATRA TM 123

Table-4 : BNR Outsole

SI.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 1.2 gm / c ³	SATRA TM 134
(e)	Hardness	Original 65 ± 5 IRHD After ageing at 100°C ± 1% for 70 Hrs in Air Oven - 0 to +10 IRHD	IS 3400 Pt II
(f)	Tensile Strength	Original 12.3 MPa (Min) After ageing at 100°C ± 1% for 70 Hrs in Air Oven - 0% to +15%	IS 3400 Pt I
(g)	Elongation at Break	Original 250% Min After ageing at 100°C ± 1% for 70 Hrs in Air Oven - 30% to +0%	IS 3400 Pt I
(h)	Tear strength	≥ 8 kN/m	Clause 5.8.2 of ISO:20345-2011
(j)	Abrasion Resistance	≤ 250 mm ³	Clause 5.8.3 of ISO:20345-2011
(k)	Flexing Resistance (Cut growth)	≤ 4 mm till 30,000 flexes	Clause 5.8.4 of ISO:20345-2011
(l)	Upper/ Outsole and Sole Interlayer Bond Strengths	The Boots shall be placed in RH of 100% at a temperature of 70° C for 5 days and then tested for whole shoe flexing for 100000 cycles.	Clause 5.3.1.2 and Clause 5.8.6 of ISO:20345-2011.


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Note

(i) The rubber material shall not contain any natural/reclaimed/vulcanised rubber waste or impurities and deleterious

