

DCV/BOOT DMS /05/2009

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

INDIAN NAVY SPECIFICATION

ON

BOOT DMS FOR MARCOS

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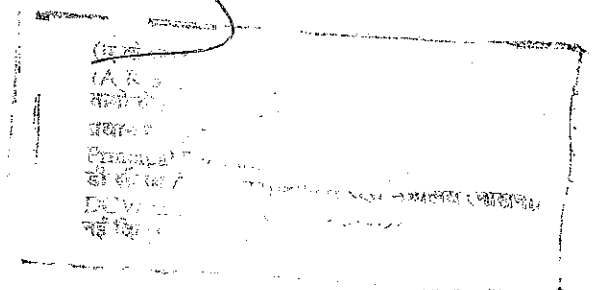
DIRECTORATE OF CLOTHING AND VICTUALLING

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MINISTRY OF DEFENCE (NAVY)

NEW DELHI - 110 011



CONTENTS

SNO	SUBJECT	PAGE NO
01.	Applicability	4
02.	Requirements	4
	Material to be used	4
03.	Upper Boot	4
04.	Other Upper Components	6
05.	Manufacturing Details (Construction)	7
06.	Sole	8
07.	Adhesive	9
08.	Colour Fastness Requirements	9
09 & 10	Design	9
11	Sizing	9
12.	Dimension	10
13.	Testing of Finished Boots	11
14.	Regulation/Standards	11
15.	Advance Sample	11
16	Pre-Inspection by Supplier	11
17	Quality Assurance	12
18	Criteria of Conformity	12
19	Marking of Package.	12
20	Warranty	12
21	Suggestion for improvement	13


A. K. Singh
Principal
DCV
[Stamp]

<u>SNO</u>	<u>DATE</u>	<u>AMENDMENT NO</u>	<u>DETAILS OF AMENDMENT</u>	<u>AMENDMENT CARRIED OUT BY AND DATE</u>

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(A.K. Sinha)
कमिडोर/Comptroller
प्रधान निदेशक
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SPECIFICATION OF BOOT DMS FOR MARCOS

1. **Applicability.** These specification cover requirements of Boot DMS for Marcos.
2. **Requirements.** The Boots DMS is required to meet rough and for use in all kinds of terrain and tropical climatic conditions. The ground conditions shall include wet, dry, muddy, highly abrasive surfaces, tarmac, rocks and grass ground. The boots shall be comfortable to wear with no or minimum seasoning required. They shall fit our local feet well and shall be waterproof and water vapour permeable.

Material to be used.


3. **Upper Boot.** The materials used to make the boot upper shall be as specified herewith: -

(a) **Vamp.** The vamp shall be made of best quality 2.0-2.2 mm thick leather prepared only from fresh or wet salted cowhides thoroughly and carefully chromo-tanned and dressed. Dry hides shall be used. The leather shall be of full grain and shall not be buffed or snuffed. It shall have a strong tight fibre structure without excessive softness. The grain shall be strong, smooth and free from brittleness or tenderness, bad scars and bacterial change. The flesh side shall be smooth and free from loose flesh. Loose or "raggy" leather is not acceptable.

(b) **Treatment.** The leather shall be suitably fat-liquored. Mineral types of fat liquors or oils shall not be used. The leather shall also be treated with an approved rot-proofing agent to prevent mould growth on the boots for at least 1 year of storage under normal storehouse conditions. The chemical used for treatment must not cause any allergy or skin problems to the wearer. The supplier is required to provide details such as the type, composition, amount (% by weight) and properties of the chemical and the method of analysis used.

(c) **Quarter.** The quarter shall be made of nylon duck cloth laminated with non-woven fabric of appropriate thickness. It shall be suitably dyed to black and treated with a water-repellent finish. It shall conform to the requirements specified in Table below.

SNo	Property	Requirement	Test Method
(i)	Unit weight (Gms)	800 ± 10	BS EN 22286
(ii)	Tensile Strength (N/mm)	40 min	ISO 3376
(iii)	Tear strength (N)	120 min	SATRA TM30
(iv)	Flexing endurance after 1,00,000 cycles (dry test at 20 °C)	No damage	IS: 3400 (Pat 16)
(v)	Water vapour permeability (mg/cm ² .hr)	5 min	BS EN 344-1-Sect 5.13
(vi)	Water vapour coefficient (mg/cm ²)	30 min	BS EN 344-1
(vii)	Water absorption after 30 minutes (%)	25 Max	
(viii)	Water repellency (spray rating)	90 min	FED-STD-191


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(d) **Finish and Colour.** The leather shall be finished soft and smooth mill-dyed to black. A light finish coat shall be applied to the leather. When tested by the specified methods, the leather shall conform to the physical and chemical requirements in Table below.

SNo	Property	Requirement		Test Method
		Minimum	Maximum	
PHYSICAL *				
(i)	Shrinkage temperature (°C)	98	--	ISO 3380
(ii)	Tensile strength (N/mm ²)	17	--	ISO 3376
(iii)	Tear strength (N)	120	--	IS: 3400(Pt I)
(iv)	Water absorption after 30 minutes (%)	--	25	
(v)	Lastometer tests: (aa) Distension at grain crack (mm) (ab) Load at grain crack (N)	7 245	--	IS: 3400(Pt I) ISO 3379
(vi)	Flexing resistance after 100,000 cycles.	No damage	--	IS: 12240 BS 3144
(vii)	Adhesion of finish after 10,000 flexes	No damage	--	IS: 12240 BS 3144
CHEMICAL **				IS:3400(Pt 22)
(i)	Petroleum ether extract (oils and fats) (%)	6	10	
(ii)	Total ash (excluding Cr ₂ O ₃) (%)	--	3	
(iii)	Chromium oxide (Cr ₂ O ₃) as % of hide substance	5	--	
(iv)	pH of aqueous extract	3	5	
(v)	Hide substance (%)	50	65	


Notes:

- Specimen for physical testing shall be conditioned according to ISO 2419.

** Specimen for chemical testing shall be prepared according to ISO 4044 and the results shall be adjusted to 16% moisture content.

(d) **Tongue.** The tongue shall be made of the same material as the quarters specified in Para (c). It shall be padded with suitable non-water absorbent foam of about 5 mm thick.

(e) **Lining.** The material used to line the interior of the boot shall be a 3-layer laminate consisting of a face layer of polyester knit, a functional layer of micro-porous polymeric film of expanded polytetrafluoroethylene impregnated with an oleophobic polymer and a backing of 100% nylon knit. The lining shall conform to the requirements specified in Table below. Alternative materials meeting all the specified requirements shall be considered for use.


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SNo	Property	Requirement	Test Method
(i)	Tear strength (N)	120 min	ISO 4674 – A2
(ii)	Abrasion resistance (aa) Dry (3,00,000 cycles at 12 kPa pressure) (ab) Wet (1,00,000 cycles at 9 kPa pressure)	No breakdown No breakdown	IS: 3400 (Part III)
(iii)	Water vapour permeability (mg/cm ² .hr)	3.5 min	BS EN 344-1
(iv)	Water vapour coefficient (mg/cm ²)	25 min	BS EN 344-1
(v)	Wet flex (after soaking in water for 24 hours and 85,000 cycles of flexing)	No delamination or bubbles of more than 5 mm in diameter	SATRA TM25
(vi)	Resistance to delamination after ageing at 95% relative humidity for 168 hours	No delamination	IS: 3400 (Part 2) IS:3400 (Part 4) & BS 3424 – Pt 12
(vii)	Hydrostatic resistance film to water (psi)	120 min	ASTM D 751

4. **Other Upper Components.** The facing/eyelet stay and the back strap shall be made of the same leather as the vamp specified in para (a). The top collar shall be made of 0.6 – 0.8 mm thick soft leather or other suitable fabric in black and smooth finish. It shall be padded with a 6 mm thick latex foam or equivalent non-water absorbent high-density foam.

(a) **Counter.** The counter or stiffener shall be made of 1.5 – 2.0 mm thick reconstructed leather board or thermoplastic sheet fully moulded in shape corresponding to the counter pocket pattern. It shall provide a firm support to the wearer.

(b) **Toe Puff.** The toe puff shall be made of elastic or other suitable material moulded to shape of suitable length. Its thickness shall be 1.2 – 1.5 mm.

(c) **Shank.** The shank shall be constructed from a strong material that could provide good support to the foot. It shall be of suitable shape and dimensions.

(d) **Tacks and Staple Wires.** The tacks and staple wires used for lasting shall be made of suitable material. They shall securely clinch through the bottom of the insole.

(e) **Eyelets and Washers.** The eyelets and washers shall be fabricated of 0.5 mm thick brass suitably treated and blackened to a matt finish. The eyelets shall have an inside diameter of about 5.0 mm. When tested in accordance with IS: 5041, the minimum rating shall be Grade 4.

(f) **Loop-Hole Hooks and Rivets.** The loop-hole hooks and rivets shall be fabricated of 0.7 – 0.9 mm brass suitably treated and blackened to a matt finish. The

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hooks shall not be susceptible to season cracking. Any residual stress in the hooks shall be removed by a suitable heat treatment and tested in accordance with IS: 3400.

(g) **Thread.** Unless otherwise specified, nylon or other suitable hydrophobic thread shall be used for stitching the upper components. It shall have minimum breaking strength of 100 N when tested in accordance with IS: 3400.

(h) **Laces.** The laces shall be made of nylon suitably dyed to black and shall not be less than 2,000 mm long. They shall be finished soft and have minimum breaking strength of 1,000 N when tested in accordance with IND/TC/0304.

(i) **Insert Cushioning.** A pair of cushioning inserts made of latex foam or other suitable good shock-absorbing materials shall be provided with each pair of boots. The inserts shall be shaped to the contour of the foot and shall have a built-in arch support. A piece of soft and durable non-skid fabric shall be fully and securely lined to the top surface of the Inserts. The inserts shall fit into the boots snugly. The inserts shall be soft, comfortable, durable and water resistant, and shall have quick recovery form impact. They shall not degrade or disintegrate during storage under our local climatic conditions. They shall be suitably antibacterial treated and odour, absorbing. When tested, there shall be no bacterial colonies.

(j) **Fastener Lace.** Each boot shall be supplied with a small lace fastener made of durable plastic and finished in matt black. The fastener shall have a spring catch for fastening the lace.

5. **Manufacturing Details (Construction).**

(a) **Cutting of Leather.** None of the leather components shall be split or shaved. Care must be taken in cutting the leather to ensure that the tightness of the leather is in heel to toe direction.

(b) **Skiving.** All skiving of leather components shall be straight taper on the flesh side of the leather. The skives shall be of suitable width and thickness

(c) **Upper Fitting.** All upper components shall be marked, fitted and closed in the best commercial practice. Line marking patterns shall be used for all upper fittings. No marking holes shall appear in any part of the upper. The stitching shall be of lock-stitch type containing 10 – 12 stitches per 25 mm. Unless otherwise specified, all joining of components shall be cemented and stitched with at least double rows of stitching. There shall be sufficient allowance for the seam and underlay. The strength of the stitched seams shall not be less than 20 N/mm when tested in accordance with IS: 9543 and IS: 8085 (Part I).

(c) **Lacing of Boots.** A combination of loop-hole hooks and eyelets shall be used for the lacing of boots. The loop-hole hooks and the eyelets shall be set along the eyelet facing above and below the ankle level respectively. The number of loop-hole hooks and eyelets for each boot shall be in accordance with Table below.

Size	Number of Hooks	Number of Eyelets
3 to 11	10	06



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12 and above	12	06
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(d) **Setting of Loop-hole Hooks and Rivets.** The hooks shall be positioned about 13 mm from the edge of the quarter to the innermost edge of the hook and shall be equally spaced. The top hook shall be positioned about 13 mm from the top edge of the boot. The rivets of similar material shall clinch the hooks firmly in position. The hooks shall not be flattened or fractured during clinching. They shall have breaking strength of not less than 250 N when tested in accordance with IS: 5041 and IS: 8085 (Part I).

(e) **Setting of Eyelets and washers.** The eyelets with washers shall be securely clinched without splitting in a manner that will prevent detachment from or cutting of the surrounding material. They shall be positioned about 12 mm from the edge of the quarter to the centre of the eyelet and shall be equally spaced. The bottom eyelet shall be located about 15 mm from the front edge of the facing. The breaking strength of the eyelets shall not be less than 250 N when tested in accordance with IS: 5041 and IS: 8085 (Part I).

(f) **Shank Fixing.** The shank shall be of suitable length and width for each size of boots. It shall be positioned and fixed centrally with the forward end levels with the ball line and the rear end reaching to within approximately 40 mm of the end of the last when tested in accordance with IS: 10945.

(g) **Lasting.** Last of correct size to that of the upper shall be used. The boot shall be well lasted so that the upper is snugly bedded to the last. The lasting margins shall not be less than 12 mm.

(h) **Removal of Tacks and Staples.** All tacks and staples shall be removed with care to ensure that no broken tack points remain.

6. Sole.

(a) **Insole.** The insole shall be made of 2.5-3.0 mm thick chrome-tanned leather board or other material suitable for the intended use. It shall not crack or break easily during use and shall conform to the requirements specified in Table below:-

SNo	Property	Requirement	Test Method
(i)	Water absorption (%)	40 min	BS EN 344-1
(ii)	Water desorption (%)	40 min	BS EN 344-1
(iii)	Abrasion resistance after 400 cycles	No surface tearing	IS: 3400 (Part III)

(b) **Midsole.** The midsole shall be made of EVA or equivalent material. It shall have minimum tear strength of 4.0 N/mm when tested according to IS: 8085 (Part I).

(c) **Outsole.** The outsole shall be made of oil resistant rubber compound and finished in black. It shall conform to the requirements specified in Table below and shall not crack or deteriorate easily during storage under normal storage conditions.

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SNo	Property	Requirement	Test Method
(i)	Hardness (IRHD)	70 – 80	IS: 6719 – 72
(ii)	Abrasion resistance (mm ³)	140 max	IS: 3400 (Part III)
(iii)	Density (g/cc)	1.2 max	IS: 3400 (Part IX)
(iv)	Tear strength (N/mm)	20 min	IS: 11226 – 1985
(v)	Belt flex after 50,000 cycles	No cracking	IS: 12240 – 1983
(vi)	Oil resistance (%)	12 min	BS EN 344-1

7. **Adhesive.** The adhesive used for bonding the various boot components shall be compatible with the materials to be bonded and allowed the boots to be used in the conditions stated. It shall also offer maximum adhesion and flexibility to the boots.

8. **Colour Fastness Requirements.** Unless otherwise specified, the materials used shall be colour fast, conforming to the requirements specified in Table below.

SNo	Colour Fastness	Fastness Rating		Test Method
		Colour Change	Staining	
(i)	Light (Xenon Arc)	5	--	BS EN ISO 105 & Tr class
(ii)	Laundrying	4 – 5	4 – 5	BS EN ISO 105 & Tr class
(iii)	Rubbing	--	4	BS EN ISO 105
(iv)	Perspiration	4 – 5	4 – 5	IS: 4777 – 1992


Design.

9. The general design of the boot shall be as shown in Fig 1. The boot shall have a smooth finished leather vamp without toe cap, a laminated nylon duck quarter with loop-hole hooks and eyelets lacing system, a padded collar, a leather back strap, a padded nylon duck tongue extending from the top line to the vamp and a rubber outsole. the interior of the boot shall be suitably lined with a 3-layer waterproof and water vapour permeable laminate to ensure the foot remains dry in all weather conditions. A fitting cushioning insert and a lace fastener shall be provided with each boot.

10. The outsole shall have tread of pattern as shown in Fig 2. The tread pattern shall give good traction property and shall not trap mud and soil readily during use. All internal corners shall be slightly rounded to reduce concentration of strains. The inner sidewall of the sole shall be designed to give good arch support. The sidewall of the sole shall be of smooth finish.

Sizing.

11. The boots shall be in Standard sizing and width fitting. Equivalent Mondopoint size shall also be indicated in the size marking.


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12. Dimensions

(a) **Upper.** The upper, after lasted into the boot, shall provide a snug and comfortable fitting to the wearer. It shall conform to the dimensions in Table below.

Size	Topline (MM) * (Tolerance ± 3 mm)	Height (MM) ** (Tolerance ± 2 mm)
5	221	187
6	227	193
7	233	199
8	239	205
9	245	211
10	251	217
11	257	223
12	263	229

Note:

* Measured flag from edge to edge of top of boot.

** Measured upward on inside along side of quarter from heel to top of boot.

(b) **Tongue.** The dimension of tongue for the boot shall be comfortable and suitable for use and shall not cause difficulty to wearer in putting on the boots.

(c) **Sole.** Unless otherwise specified, the outsole shall conform to the measurements in Table below when finished. Engineering drawings of the moulds for all sizes of boots shall be submitted to the procuring agency for approval.

SNo	Size	Measurement (MM)
(i)	Sole Thickness	17.0 ± 1.0
(ii)	Waist thickness	7.0 ± 0.5
(iii)	Cleat Height: (a) At centre of sole (b) At edges of sole	7.5 ± 0.5 9.0 ± 0.5
(iv)	Heel height	28.0 ± 1.5
(v)	Toe-spring	20.0 ± 1.0

(d) **Tread Pattern.** As a reference, the sole tread pattern for Standard size 9 shall be of dimensions conforming to Fig 2. The dimensions for the other sizes shall be proportional. Dimensional details of sole tread pattern for all sizes of boots shall be submitted to the procuring agency for approval.

(e) **Lasts.** The lasts used shall provide good fitting to the feet and make the boots comfortable to wear. Dimensional details of the lasts for all sizes shall be furnished to the Authority for approval.

13. **Testing of Finished Boots.** The finished boots complete with inserts shall comply with the requirements in Table below when tested by the specified methods.

SNo	PRIORITY	REQUIREMENT	TEST METHOD
1.	Water resistance after 500,000 flexes	Less than 300 mm ² area of penetration	IS: 8085 (Pt I)
2.	Upper/outsole strength (N/mm)	bond 5.0 min	IS: 3400 & BS EN 344-1
3.	Shock absorption		IS: 6719 & SATRA TM142
(a)	Declaration (m/s ²) Forepart Heel	210 max. 150 max.	
(b)	Penetration (mm) Forepart Heel	4-6 6-8	
©	Energy return (%) Forepart Heel	30 min. 35 min.	

14. **Regulation/Standards.** The material/fabric used for the manufacture of combat boots should have the certification from the Principal manufacturer for Raw material assurance and Raw material Concurrence certificate. Also, the material used, method of physical testing of various components used/finished product and safety features required should comply to following current National/International Standards: -

- Current MILSEC/HSE/NATO/ISI material performance standards.
- Certification as per ISI/ISO/BS/EN/ASTM/SATRA or equivalent Standards.

15. **Advance Sample.** The firms shall submit one in number advance sample (Pilot Sample) for approval by PDCV (AHSP) or appropriate authority as mentioned in the contract prior to commencement of bulk production.

16. **Pre-Inspection by Supplier**

(a) The suppliers must satisfy themselves first that the store manufactured are in accordance with the contract and fully conform to the specifications by carrying out through pre-inspection of each lot/batch before being offered for inspection to the Inspection Authority.

(b) The supplier shall furnish a declaration that necessary pre-inspection/tests have been carried out on the store being offered and same is fit for inspection. Test report and findings shall be submitted along with the challan.

(c) If the Quality Assurance Officer finds that pre-inspection of the consignment as required above have not been carried out the consignment is liable for rejection

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17. **Quality Assurance**

(a) Examination of samples taken from any portion of the consignment or during inspection shall conform to the requirements, when tested in accordance with the test parameters as laid down in this specification.

(b) Samples shall be forwarded to PDCV from bulk supplies to check/monitor the quality whenever required.

18. **Criteria of Conformity.** All the sample units drawn shall be tested/examined to the requirements as per laid down specifications. If all the samples units are found to conform to the requirements of this specification the lot shall be considered to be in conformity to the specification.

19. **Marking of Package.** Each bale shall be legibly marked by stencil with Indelible Marking Ink/Paint showing the following details:

- (a) Nomenclature & Cat No. of the store.
- (bi) Quantity packed in the bale.
- (c) Lot and Serial No. of the bale.
- (d) Month and Year of Packing.
- (e) Name and Trade Mark of the Manufacturer.
- (f) Gross Weight of the bale.
- (g) Name and Address of the Consignee.
- (h) S O No. & Date.
- (j) Inspection Note No. and Date.

20. **Warranty**

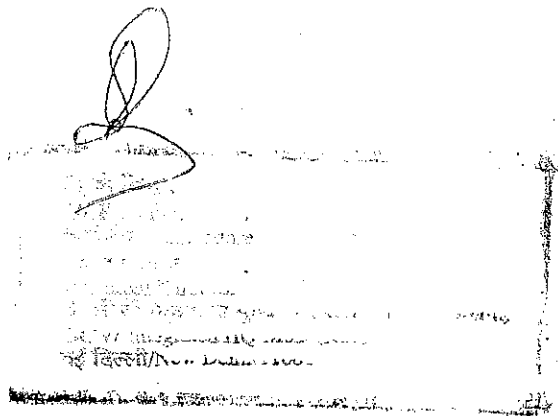
(a) Except as otherwise provided in the invitation to the tender, contractor/supplier shall declare that the boot supplied to the purchaser against this specification is of best quality and workmanship and new in all respect and is strictly in accordance with the laid down specifications.

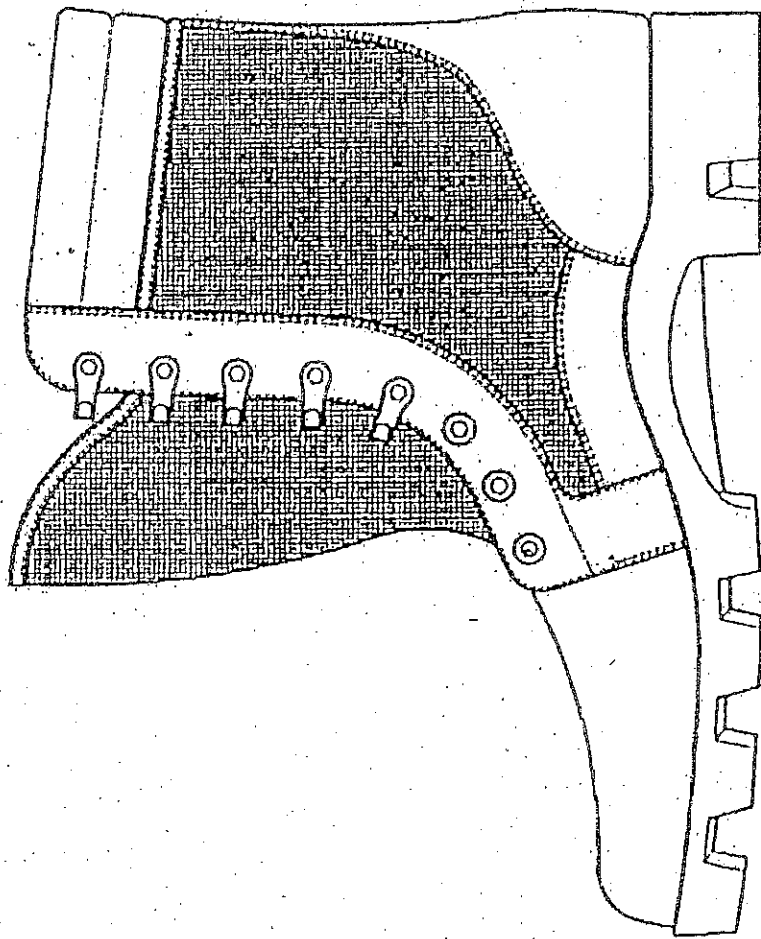
(b) The contractor/supplier shall guarantee that the combat boot would continue to conform to the description and quality aforesaid for a period of atleast **twelve months** from the date of delivery of the boot to the purchaser or twelve months from the date of despatch from the supplier's premises, whichever is earlier and notwithstanding the fact that the purchaser (Inspector) may have inspected and /or approved the consignments. If during the aforesaid period of 12 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. In such an event the warranty period shall apply to the boot 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.

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पते दिवसे ...

19. Suggestion for Improvement. Any suggestion for improvement of this document may be forwarded to:-

The Principal Director of Clothing & Victualling
Integrated Headquarters
Ministry of Defence (Navy)
Sena Bhawan, DHQ Post,
New Delhi - 110 011





SIDE VIEW

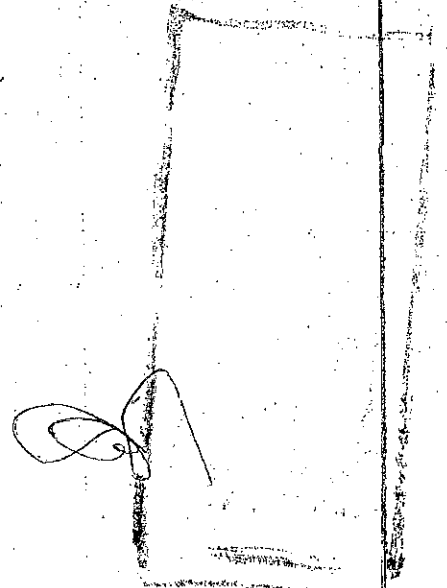
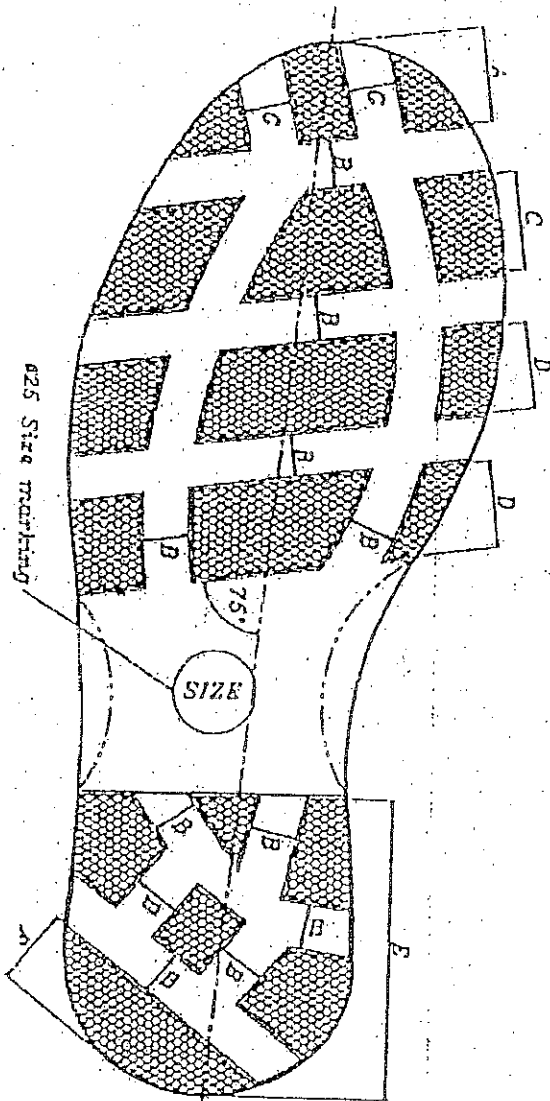


FIGURE - 1

Handwritten signature



BOTTOM VIEW OF SOLE

DIMENSIONS OF THREAD PATTERN FOR SIZE 9 (US)

A	B	C	D	E	F	G
18	16	22	21	83	22	18