Solicitation No. - N° de l'invitation

Amd. No. - N° de la modif.

Buyer ID - Id de l'acheteur

pr751

W8476-113039/A Client Ref. No. - N $^{\circ}$ de réf. du client

File No. - N $^{\circ}$ du dossier

CCC No./N° CCC - FMS No/ N° VME

W8476-113039

pr751W8476-113039

ANNEX A REQUIREMENT (MAIN CONTRACT)

1. TECHNICAL REQUIREMENT

The Contractor is required to provide the Department of National Defence with Land Operation Temperate Boots (LOTB) in DND Brown Colour, Spare Laces and Spare Inserts in accordance with the Specification for Canadian Forces Land Operations Temperate Boot dated May 19, 2011 at Annex B and sealed pattern.

2. ADDRESSES

Destination Address	Invoicing Address
WB941	W1941
Department of National Defence	Department of National Defence
25 CFSD Montreal	CFSD Montreal
6363 Notre Dame St. E.	P.O. Box 4000 Stn K
Montreal, Quebec	Montreal, Quebec
H1N 1V9	H1N 3R9
W248A	W2481
Department of National Defence	Department of National Defence
7 CF Supply Depot	7 CF Supply Depot
195 Ave & 82nd St., Bldg. 236	Stn Forces, P.O. Box 10500
Edmonton, Alberta	Edmonton, Alberta
T5J 4J5	T5J 4J5

3. DELIVERABLES

MAIN CONTRACT QUANTITY

Item	Description	Unit of Issue	Destination	Firm Quantity	Firm Unit Price, DDP, Transportation cost included, GST extra
1	D4-	D-:	Edmonton	38,070	\$
1 Boots Pair	Pair	Montreal	81,930	\$	
			Edmonton	24,000	\$
2	Spare Laces	Pair	Montreal	56,000	\$
2	C I	D. '	Edmonton	24,000	\$
3	Spare Inserts	Spare Inserts Pair	Montreal	56,000	\$

Refer to size roll at Annex C for boots.

The size roll for the spare inserts is to be determined.

Solicitation No. - N° de l'invitation

W8476-113039/A

Amd. No. - N° de la modif.

Buyer ID - Id de l'acheteur

pr751

CCC No./N° CCC - FMS No/ N° VME

Client Ref. No. - N° de réf. du client

W8476-113039

File No. - N° du dossier pr751W8476-113039

OPTION 1

Item	Description	Estimated Quantity	Unit of Issue	Destination	Firm Unit Price, DDP, Transportation cost included, GST extra
4	Doots	40,000	Doin	Edmonton	\$
4	Boots	40,000	Pair	Montreal	\$

OPTION 2

Item	Description	Firm Quantity	Unit of Issue	Destination	Firm Unit Price, DDP, Transportation cost included, GST extra
5	D4-	40.000	D-:-	Edmonton	\$
3	Boots	40,000	Pair	Montreal	\$

A size roll will be provided if and when the options are exercised.





SPECIFICATION

for

CANADIAN FORCES LAND OPERATIONS TEMPERATE BOOT (LOTB)

in

DND Brown Colour

NSN 8430-20-001-2410 A/A

28 June 2011

OPI/BPR: DSSPM 11

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©Sa Majesté la Reine en chef du Canada représentée par le Ministre de la Défense nationale, 2011



SPECIFICATION FOR CANADIAN FORCES LAND OPERATIONS TEMPERATE BOOT (LOTB) IN DND BROWN COLOUR

1.0 SCOPE

1.1 Scope

This specification defines the technical requirements, including design, construction, physical and chemical properties of materials, for the production of the Canadian Forces Land Operations Temperate Boot (LOTB) in the Department of National Defence (DND) Brown colour.

1.2 Intended Use

- 1.2.1 The Canadian Forces LOTB in DND Brown colour is intended for use by men and women of the Land Force to provide enhanced foot protection in conjunction with the Combat Sock System for operations in temperate and dry climatic conditions that do not include the desert or jungle. The focus is on the ambient temperature range of: 0°C to +35°C. Personnel are required to carry out a full range of tasks from marching over uneven terrain while carrying heavy loads, to standing, climbing, operating and maintaining vehicles and equipment, and firing weapons.
- 1.2.2 **Combat sock system**. The combat sock system consists of three socks; a liner sock, a medium weight (temperate) sock and a heavy weight (thermal) sock. The liner sock and medium weight sock are worn with this boot. This sock system allows the user to choose the level of thermal protection required to address personal variables in work rate and metabolism and protect against blisters by reducing friction between the foot and the boot.
- 1.2.2.1 **Hot weather sock**. In addition to the combat sock system, a hot weather sock may be worn as a stand alone sock.

2.0 APPLICABLE DOCUMENTS

2.1 The following documents or referenced portions must be considered part of the requirement for the LOTB in DND Brown colour. Documents referenced within the documents cited will not be applicable unless specifically delineated. The edition in effect on the date of the Request for Proposal (RFP) is the applicable edition unless otherwise specified.

SPECIFICATIONS AND STANDARDS

CFTPO-LOTB

Canadian Forces Transportation Packaging Order

Copies of the above mentioned documents may be obtained from: Department of National Defence, Ottawa, Ontario, K1A 0K2 Attention: DSCO 4-7-5.

2.2 **Other publications.** The following documents form part of this manufacturing data to the extent specified herein. Effective date will be that in effect on the date of manufacture. Sources are as shown:

AATCC

P.O. Box 12215

Research Triangle Park, NC

27709, USA

Telephone: (919) 549-3526 Website: www.aatcc.org

AATCC Evaluation Procedure #6 Instrumental Colour Measurement

American Society for Testing and Materials (ASTM)

100 Barr Harbor Drive, P.O. Box C700

West Conshohocken, Pennsylvania, 19428-2959, U.S.A.

D624	Tear Resistance of Vulcanized Rubber
D1052	Measurement of Cut Growth of Rubber by the Use of the Ross Flexing Machine
D1630	Abrasion Resistance of Rubber Compounds for Soles and Heels
D3489	Microcellular Urethane Materials
D4966 -98	Abrasion Resistance (Martindale Test Method)
D3574	Flexible Cellular Materials – Slab, Bonded, and Moulded Urethane Foams
D5034	Breaking Strength and Elongation of Textile Fabrics (Grab Test)
E308-99	Computing The Colors of Objects by Using the CIE System
F1930-00	Evaluation of Flame Resistant Clothing for Protection Against Flash Fire Simulations Using an Instrumented Manikin

CIE International Committee on Illumination

CIE Central Bureau

Kegelgasse 27, A-1030

Vienna, Austria

CIE 1976 L*a*b*

CIE publication 15 – 2004 Colorimetry

Standardization Documents Order Desk,

Building 4D, 700 Robbins Avenue,

Philadelphia, Pennsylvania, 19111-5094

FED-STD-601 Federal Test Method: Rubber Sampling And Testing

• Method 6001 Liquid Treatment Tests – General; and

• Method 6211 Change In Volume – Liquid Immersion

Shoe and Allied Trades Research Association, (SATRA)

SATRA House, Rockingham Road,

Kettering, Northants, NN169JH

SATRA TM31A Abrasion Resistance - Martindale Method

SATRA TM144 Friction (Slip Resistance) of Footwear and Floorings

SATRA TM190 SATRA Ground Insulation Index

SATRA TM194 Longitudinal Stiffness Of Footwear

General Services Administration

Federal Supply Service

FSS Product Acquisition Center

Supply Standards Division (FLAS)

Arlington, VA

22202 USA

Telephone: 703-605-2567

Website: http://apps.fss.gsa.gov/pub/fedspecs/

Download Documents: http://assist.daps.dla.mil/quicksearch/

MIL-C-41814 F Counter, Footwear

MIL-PRF 3122 J Leather, Cattlehide, For Footwear, Uppers And Gusset,

Chrome Tanned, Fatliquored

2.3 **Sealed Pattern**

DSSPM 398-09

DND Brown

Note: Sealed Pattern DSSPM 398-09 is sealed for colour (applicable to all materials), Infra-Red Reflectance (IRR), pebble grain pattern (applicable to leather only) and finish (applicable to leather only).

3.0 REQUIREMENTS

- **3.1 Definition of Product**. The Department of National Defence expects the LOTB to be sufficiently durable to meet the 180 day life expectancy under normal Army operations.
- 3.1.1 The Canadian Forces LOTB must have the following features:
- a) water resistant and breathable upper material. Upper materials must be DND Brown colour in accordance with Sealed Sample DSSPM 398-09 and have a matte finish, which minimizes light reflection. If leather is used, it must have a pebble grain embossing;
- b) lace-to-toe closure with speed lacing system in each quarter;
- c) Goodyear Welt (GYW) or Injection Moulding are the only acceptable constructions for this boot;
- d) abrasion resistant, moisture-wicking textile lining (must be a visual match to the DND Brown colour);
- e) bottoming process must provide good ground insulation (print through). The width of the sole must be as narrow as possible without compromising lateral stability;
- f) lightly padded collar (in DND Brown colour in accordance with Sealed Sample DSSPM 398-09);
- g) one-piece back strap and counter-pocket (must be a visual match to the DND Brown colour) on the inside that extends to the lower edge of the collar and a one-piece back strap (in DND Brown colour in accordance with Sealed Sample DSSPM 398-09) on the outside of the boot that extends to the lower edge of the collar, without any tab or loop;
- h) leatherboard counter made of reconstituted leather complete with polyurethane ankle pad;
- j) functional bellows tongue in DND Brown colour in accordance with Sealed Sample DSSPM 398-09;
- k) finished height for mondopoint size 265/104 must be between 21.5 cm and 22.5 cm, as measured inside the boot, from the heel to the top of the boot, and graded proportionately to a minimum of 19.0 cm for size 210/86 and a maximum of 25.0 cm for size 310/118; and

- 1) weight must be no more than 875 grams per boot for the regular /medium size 265/104.
- 3.1.2 **Mondopoint sizing system.** The sizing system designed for the LOTB is based on the Mondopoint sizing system principles. This system creates a direct relationship between the measurements of the length and width of the foot with socks on, and the numerical designations on the size label. The increment between sizes is 5.0 mm in length and 4.0 mm in width. The complete range of 74 sizes complete with NATO Stock Numbers (NSNs) is listed in Table V. The Contractor must produce boots in the sizes and quantities designated in the Contract.

3.2 Patterns, Tooling and Lasts

- **3.2.1** The Contractor must be responsible for the paper patterns and tooling, including cutting dies, moulds and lasts required to manufacture the LOTB design in the sizes and quantities designated in the Contract.
- **3.2.2** The LOTB must be manufactured on DND Last 601 which constitutes the standard for this requirement.
- **3.2.3** The Contractor must be responsible for the acquisition of the lasts required for production in the contracted sizes, in the quantities required to meet the delivery requirements. Lasts will not be available for loan from Canada.
- **3.2.3** The DND Last 601 is for the exclusive use of the DND and those manufacturers contracted by DND to produce military footwear.

3.3 Materials

- 3.3.1 **Upper material**. The boot upper must be made with water resistant material. The material must have a matte finish to minimize light reflection, and must be easily maintained by the user. The colour must be DND Brown colour in accordance with Sealed Sample DSSPM 398-09.
- 3.3.2 **Colour and Infra-Red Reflection (IRR)**. The following are CIE L*a*b* 1976 co-ordinates for the DND Brown sample.

$$L^* = 33.74$$
 $a^* = 4.17$ $b^* = 10.60$ Wavelength (900 to 1200nm)

Wavelength Longueur d'onde			Upper Tolerance tolérance supérieure
nm	%	%	%
350	4.0	5	6.0
400	4.0	5	6.0
450	4.0	5	6.0
500	4.8	6	7.2
550	6.4	8	9.6
600	8.0	10	12.0

Wavelength Longueur d'onde	Lower Tolerance tolérance inférieure	Specified Reflectance réflexion spécifié	Upper Tolerance tolérance supérieure
nm	%	%	%
650	9.6	12	14.4
700	10.4	13	15.6
750	10.8	13.5	16.2
800	11.2	14	16.8
850	11.2	14	16.8
900	11.2	14	16.8
950	11.6	14.5	17.4
1000	12.0	15	18.0
1050	12.4	15.5	18.6
1100	12.8	16	19.2
1150	12.8	16	19.2
1200	12.8	16	19.2
1250	13.2	16.5	19.8
1300	13.6	17	20.4
1350	13.6	17	20.4
1400	13.6	17	20.4
1450	13.6	17	20.4
1500	13.6	17	20.4
1550	14.0	17.5	21.0
1600	14.4	18	21.6
1650	14.4	18	21.6
1700	14.4	18	21.6
1750	14.4	18	21.6
1800	14.4	18	21.6
1850	14.4	18	21.6
1900	14.4	18	21.6
1950	14.4	18	21.6
2000	14.4	18	21.6

3.3.2.1 **Measurement Requirements**. All measurements for both colour and infra-red reflection are to be made in accordance with CIE publication 15 - 2004 and ASTM E 308-99 using CIE Illuminant C and a 2 degree observer, specular component included. These conditions of measurement must be followed and included in all test reports.

Sample preparation for all chromaticity and IRR measurements must be in accordance with AATCC Instrumental Measurement Procedure #6, A1.3, non-opaque samples. It has been found that more than one layer of self fabric are usually required to provide consistent readings. A standard black backing is recommended. It is the responsibility of the test operator to determine and follow a standard sample preparation which meets the stated conditions.

Representative samples are to be measured a minimum of four times, rotating the sample 90 degrees after each measurement. All measurements are then to be averaged to produce a single set of reflectance values. The test results must include the average spectral reflectance of each measured sample.

NOTE: Referee conditions include:

- diffuse spectral 80/hemispheral reflectance factors using a 150 mm diameter integrating sphere accessory coated with BaSO4;
- measurements made at 1 nm intervals over the entire required range with a fixed spectral bandpass of 5 nm up to 860 nm and a variable spectral bandpass of greater than 20 nm from 860 nm to 2000 nm:
- measurement geometry 80 incidence, hemispherical collection (80/t), with the spectral component included;
- referee sample measurement: the irradiated area to be 8 mm x 15 mm with a bandpass of 5 nm (preferred);
- where sample size or other condition dictates, irradiated area may be reduced to 4 mm x 9 mm with the bandpass also reduced to 2 nm; and
- where it is impractical to follow this preparation method, a single layer of the sample may be backed by NRC (National Research Council) standard black felt backing (Reference REN09870.DAT).
- **3.3.3 Boot lining.** The lining must incorporate a permanent durable anti-bacterial/anti-fungal, anti-odour treatment that is non-hazardous to the user. The lining must have moisture wicking properties and be abrasion resistant as per ASTM D4966-98 or SATRA TM31A. The material must be a visual match to the DND Brown colour.
- **3.3.4** Counters. The counters must be cut from a 2.6mm leather board made of reconstituted leather that meets the requirement of Tables I and II. The counter must correspond to the shape and design of the heel portion of last DND 601, (left and right lasts), and be supplied in a sufficient number of sizes to cover the boot size range. The counter must have an indent (groove), similar to a half circle at the top back of the counter of approx. 6.35 mm deep extending no more than 25.4 mm width. The Contractor must provide his schedule of the counter sizes to fit the boot size range for confirmation at the pre-production stage. It is expected that a minimum of eight (8) counter sizes will be required (see Table III). The counters must have a lasting flange with a 4.8 mm shelf and a 6.3 mm lip for Goodyear Welt construction and a 10.0 mm flat flange for the injection moulding process. The counters must be skived all around with a bevel type scarf that is 22.2 mm wide at the front ends, 15.8 mm wide at the top edge and 12.7 mm wide along the bottom edge. Tolerance on the skiving must be +/- 1.5mm. The counters must have a fungicide treatment that prevents mould and mildew. Adhesives used must remain soft and flexible for the life of the boot. The counters must be accurately positioned prior to activation. To ensure reliable attachment, activation must be optimised by following the recommendations offered by the counter supplier for the attachment process.

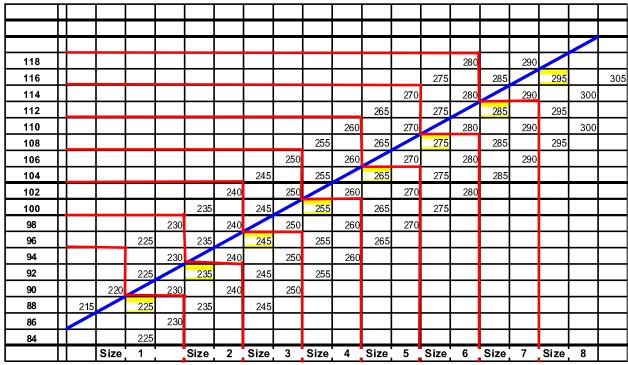
TABLE I - FINISHED COUNTER MATERIAL REQUIREMENTS*

PHYSICAL PROPERTIES	TEST METHOD	REQUIREMENTS	
Crush Resistance (Crush %)	MIL-C-41814F	8% minimum to 35% maximum	
	Para 4.3.1	and at least 80% must pass.	
Water Absorption (%)	MIL-C-41814F	50 % maximum	
	Para 4.3.3	and at least 80% must pass	
TCMTB Analysis (ppm)	MIL-PRF-3122J	20 ppm minimum and	
		80 ppm maximum	
Water Soluble	MIL-C-41814F	Less than 0.5 %	
	Para 4.3.4		
Disintegration (%)	MIL-C-41814F	Less than 1.25%	
	Para 4.3.5		

*Notes:

2. The Pre-Moulded Leather board counter by P.N. Farrar inc. has been found to meet these requirements. Bidders may submit an alternative product accompanied by independent test results to demonstrate full compliance to Table II and III.

TABLE II - PATTERN DIMENSIONS FOR THE LEATHER BOARD MOULDED COUNTER**



**Notes:

For size 210/86 use the same size counter as 215/88.

For size 310/118 use the same size counter as 305/116.

3.3.5 Ankle pad. The ankle pad must be manufactured from a 6.0 mm Microcellular Polyurethane foam that is moisture resistant and meets the requirements and sizes as stipulated in Table III. This foam must also be treated with an anti-fungi/anti-bacteria additive that prevents and inhibits mould and mildew. These ankle pads must correspond to the shape and design of the heel portion of last DND 601. A left and right ankle pad is required and must be supplied in a size range

^{1.} Counters must conform to MIL-C-41814F except the physical requirement for single hole wet tear strength is eliminated and the counters need not meet the chemical requirements of MIL-C-41814 but must meet the fungicide requirements of MIL-PRF-3122J.

that meets the requirements of the aforementioned last. The Contractor must provide samples of his scheduled sizes so that same may be approved at the pre-production stage. It is anticipated that a minimum of 8 sizes will be required to cover the range. The dimensions and overall thickness must abide by those as stipulated and approved by the Project Authority with a thickness tolerance of plus or minus 0.5 mm. Note: the ankle pad must be assembled with the counter with adhesives that will not disassemble or delaminate over time.

TABLE III - ANKLE PAD MATERIAL REQUIREMENTS

PROPERTY	TEST METHOD	REQUIREMENTS
Thickness (mm)	n/a	6.0 mm (Tolerance: plus or minus 10%)
Density (lb/cu ft)	ASTM D3574 – Test A	15.0 lb/cu ft nominal
Elongation (%)	ASTM 3574-E	Greater than 150 %
	DIE A (2)	
Tensile Strength (psi)	ASTM D3574-E	Greater than 25 psi
	DIE A	
Tear Strength (lb/lineal inch)	ASTM D624	Greater than 3 pli
	DIE C	
Service temperature	Continuous Use R	ange: -40°F to 158°F (-40°C to 70°C)
	Intermittent	Use Maximum: 220°F (104°C)
Compression Deflection at	D3489 (1)	2 – 4 PSI
25% Compression (psi)		
Compression Set (%)	ASTM D3574-D (1,3)	Less than 4% At 50% compression, 23°C
	ASTM D3574-D (1,3)	Less than 10% At 50% compression, 70°C
	ASTM D3574-J2 & D (1,3,4)	Less than 5% Autoclave, 50% compression, 70°C

- **3.3.6 One-piece backstrap and counter interlining pocket**. The face side of the lining must be interlined at the heel with a top layer of thermally bonded non-woven nylon 6,6, that is stitched through to the lining. The colour must be a visual match to the DND Brown colour. The interlining must be cut to extend beyond the edges of the counter and extend as a one-piece backstrap to the lower edge of the collar. Note: Cambrelle or Isofix materials are known to meet this requirement.
- **3.3.7** Shank. The shank area must be reinforced to provide the level of performance required.
- **3.3.8 Laces**. The laces must be fire retardant (see para 3.4.5). The lace ends must be self-tipped for a length of 25.0 mm (+/- 3.0mm) by an ultrasonic or heat molding process. Breaking strength must be 220 lbs (minimum) when tested in accordance with ASTM D5034. The length must allow donning and doffing of boot while maintaining the lace through the top eyelet/loop. Two pairs of laces must be supplied with each pair of boots (see para 3.3.13).
- **3.3.9 Bottoming components.** All bottoming components are left to the discretion of the bidders. The colour must be a visual match to the DND Brown colour. The insoles, midsoles, outsoles and any other components must be selected by the bidders. The resulting boot bottoms must meet the requirements outlined in Table IV and those applicable whole boot tests outlined in paragraph 3.4.5:

TABLE IV –	- REQUIREMENTS FOR	BOTTOMING	COMPONENTS

PROPERTY	TEST METHOD	RESULT
Abrasion resistance	ASTM D1630	Minimum 80 NBS abrasion
Ross Flex, Oil #3	ASTM D1052	200% maximum
		100,000 flexes
Volumo Swell Evel D	FED-STD 601	30% maximum
Volume Swell, Fuel B	Method 6001 and 6211	
Outsole Lug Design	field testing	self-cleaning

- 3.3.10 **Removable cushion inserts.** The colour must be must be a visual match to the DND Brown colour. Each pair must be washable, fast drying, and breathable with a durable anti-bacterial/antifungal, anti-odour treatment that is non-hazardous to the user. The inserts must be permanently formed to cup around the foot at the heel and provide support through the arch area. One pair of inserts in the correct size must be inserted inside each pair of boots. A second pair of inserts in the correct size must be enclosed in a plastic bag (see para 3.3.13) and attached to one of the boots.
- **3.3.11 Upper reinforcement.** The whole boot upper must be constructed in such a way that moisture and/or perspiration will not cause stretching of the upper.
- **3.3.12 Labels and marking**. Boots must have the following information legibly and indelibly printed on a label positioned on the inside of the boot at the top of the tongue lining and securely attached around all edges:
 - a) NATO Stock Number (NSN) for each size. NSNs will be designated in the contract;
 - b) Month and year of production (e.g. 09/2011);
 - c) Nomenclature in English and French as follows:

Boots, Combat, Land Operations, Temperate. Bottes, Combat, Operations Terrestres, Tempéré.

- d) Contractor's name or logo/brand;
- e) Size and width in mondopoint (e.g. 255/100); and
- f) A line designated as "ID", appropriate for the user to write his name.

EXAMPLE:

NSN: 8430-20-001-2464 Boots, Combat, Land Operations, Temperate. Bottes, Combat, Operations Terrestres, Tempéré. 09/2011 Jones Footwear Company Size 260 / 98 ID: ______

- 3.3.13 **Care Instructions**. Care instructions will be provided by the Contractor and inserted in a bag with the second pair of removable cushion inserts and the second pair of laces. The Contractor must provide bilingual care instruction for the boots with each pair delivered. The care instructions must be printed on paper, 0.009 inches (0.223 mm) thick, +/- 5%. The instruction sheet must be approximately 10 cm wide by 22 cm long.
- **3.3.14** Hang tags. Hang tags identifying brand or product names may be acceptable, provided that approval for text and use has been granted by the Project Authority. Hang tags when authorized must be easy to remove without damage to the boots.
- **3.3.15** Marking of removable inserts. The mondopoint size boot size (e.g. 270/98) must be indelibly printed or embossed on the bottom of the removable inserts.
- **3.3.16 Finishing**. Boots must be packaged in accordance with CFTPO-LOTB. The abbreviated nomenclature for the label on the bags must read "Boots, Combat, Land Operations, Temperate / Bottes, Combat, Operations Terrestres, Tempéré".

3.4 Manufacture

- **3.4.1 Sole attachment methods.** The sole attachment method must be Goodyear Welt or Injection moulding.
- **3.4.2 Workmanship.** The complete boot must demonstrate high standards of quality throughout the manufacturing process.
- **3.4.3 Boot finishing**. If a top finish is used, it must not restrict the breathability of the boot nor affect the colour (include non glossy finish). The uppers and soles must be cleaned of foreign matter.

3.4.4 Whole boot tests

- **3.4.4.1 Fire resistance testing**. Whole boot testing must be performed to demonstrate that the boots pass 4 second test as per ASTM F1930-00. The boot and laces must self extinguish after the 4 second burn and remain intact. There must be video and written report submitted to demonstrate.
- **3.4.4.2 Whole boot breathability testing.** The following boot breathability test is designed to indicate the Moisture Vapor Transmission Rate (MVTR) through the boot by means of a difference

in concentration of moisture vapor between the interior and the exterior environment.

The Whole Boot Breathability Test must be conducted as follows:

Apparatus.

- a. The external test environment control system must be capable of maintaining 23 °C (\pm 1 °C) and 50% (\pm 2%) relative humidity throughout the test duration.
- b. The weight scale must be capable of determining weight of boots filled with water to an accuracy of (± 0.01) gram.
- c. The water holding bag must be flexible so that it can be inserted into the boot and conform to the interior contours; it must be thin enough so that folds do not create airgaps; it must have much higher MVTR than the footwear product to be tested; and it must be waterproof so that only moisture vapor contacts the interior of the footwear product rather than liquid water.
- d. The internal heater for the boot must be capable of controlling the temperature of the liquid water uniformly in the boot to 35° C ($\pm 1^{\circ}$ C).
- e. The boot plug must be impervious to both liquid water and water vapor.

Procedure.

- a. Place boot in test environment.
- b. Insert holding bag into boot opening and fill with water to a height of 12.5cm (5in) measured from inside sole.
- c. Insert water heater and seal opening with boot plug.
- d. Heat water in boot to 35°C.
- e. Weigh boot sample and record as Wi.
- f. Hold temperature in boot after weighing for a minimum of 6 hours.
- g. After 6 hours, reweigh boot sample. Record weight as Wf and test duration as Td.
- h. Compute whole boot MVTR in grams/hour from the equation below:

$$MVTR = \frac{Wi - Wf}{Td}$$

- 3.4.4.2.1 **Method of Inspection**. Each boot must be tested in accordance with the method described in paragraph 3.4.5.2. The whole boot breathability of the LOTB must not be less than 5.0 grams/hour.
- **3.4.4.3 Longitudinal stiffness testing**. Each boot must be tested in accordance with SATRA TM194 (Jan 94). The result must be "good" meaning the stiffness index must range from 8 to 19.9 in order to be compliant.
- **3.4.4.4 Slip resistance testing**. Each boot must be tested in accordance with SATRA TM144 on a wet (with water), stainless steel surface at room temperature. Footwear must be tested in two modes; forward flat slip and forward heel slip. Minimum test results for slip resistance must be the following:

Forward flat slip = Coefficient of Friction of 0.35 μ

Forward heel slip = Coefficient of Friction of 0.25 μ

3.4.4.5 Ground insulation testing. Each boot must be tested in accordance with SATRA TM190. The result must be "good" meaning the range must be 93 to 99 in order to be compliant.

4.0 NOTES

- 4.1 Definition of terms.
- **4.1.1 Master sealed pattern.** A master sealed pattern is the authorized prototype of the item to be produced, and is held only by Canada.
- 4.1.2 **Sealed pattern.** A sealed pattern is an exact duplicate of the master sealed pattern and is available to the manufacturer to be used as guide in production.

TABLE V - SIZE RANGE OF BOOTS, LAND OPERATIONS, TEMPERATE (NSN 8430-20-001-2410 A/A)

Mondopoint Size	NATO Stock Number	Mondopoint Size	NATO Stock Number	Mondopoint Size	NATO Stock Number
210/86	8430-20-006-1276	250/94	8430-20-001-2454	275/100	8430-20-001-2478
215/88	8430-20-001-2423	250/98	8430-20-001-2455	275/104	8430-20-001-2479
220/90	8430-20-001-2427	250/102	8430-20-001-2456	275/108	8430-20-001-24580
225/84	8430-20-001-2428	250/106	8430-20-001-2457	275/112	8430-20-001-2481
225/88	8430-20-001-2432	255/92	8430-20-001-2458	275/116	8430-20-001-2482
225/92	8430-20-001-2433	255/96	8430-20-001-2459	280/102	8430-20-001-2483
225/96	8430-20-001-2435	255/100	8430-20-001-2460	280/106	8430-20-001-2484
230/86	8430-20-001-2436	255/104	8430-20-001-2461	280/110	8430-20-001-2485
230/90	8430-20-001-2437	255/108	8430-20-001-2462	280/114	8430-20-001-2486
230/94	8430-20-001-2438	260/94	8430-20-001-2463	280/118	8430-20-001-2487
230/98	8430-20-001-2439	260/98	8430-20-001-2464	285/104	8430-20-001-2488
235/88	8430-20-001-2440	260/102	8430-20-001-2465	285/108	8430-20-001-2489
235/92	8430-20-001-2441	260/106	8430-20-001-2466	285/112	8430-20-001-2490
235/96	8430-20-001-2442	260/110	8430-20-001-2467	285/116	8430-20-001-2491
235/100	8430-20-001-2443	265/96	8430-20-001-2468	290/106	8430-20-001-2492
240/90	8430-20-001-2444	265/100	8430-20-001-2469	290/110	8430-20-001-2493
240/94	8430-20-001-2445	265/104	8430-20-001-2470	290/114	8430-20-001-2494
240/98	8430-20-001-2446	265/108	8430-20-001-2471	290/118	8430-20-001-2495
240/102	8430-20-001-2447	265/112	8430-20-001-2472	295/108	8430-20-001-2496
245/88	8430-20-001-2448	270/98	8430-20-001-2473	295/112	8430-20-001-2497
245/92	8430-20-001-2449	270/102	8430-20-001-2474	295/116	8430-20-001-2498
245/96	8430-20-001-2450	270/106	8430-20-001-2475	300/110	8430-20-001-2499
245/100	8430-20-001-2451	270/110	8430-20-001-2476	300/114	8430-20-001-2500
245/104	8430-20-001-2452	270/114	8430-20-001-2477	305/116	8430-20-001-2501
250/90	8430-20-001-2453			310/118	8430-20-006-1277