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Defence nationale

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NOTICE

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**PERFORMANCE SPECIFICATION
FOR THE
INTERIM CANADIAN FORCES
EXTREME COLD WEATHER MUKLUK ASSEMBLY
(ECWM)**

PSCN 8430-20-A0F-5856

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Canada

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1.0 SCOPE

1.1 Scope: This document defines the performance criteria required for the manufacture and procurement of an Interim Extreme Cold Weather Mukluk (ECWM) Assembly for use by the Canadian Forces. This item is intended for wear by CF members while in garrison, in the field, and while conducting combat operations in extreme cold weather environments from 0 to -60 C.

1.2 Definitions:

1.2.1 Extreme Cold Weather Mukluk Assembly: For the purpose of this document, the extreme cold weather mukluk assembly is defined as a left and right boot (a pair) and includes all the following parts and components, all of which are required for the item to be functional:

- **Mukluk Shell:** For this requirement, the mukluk shell consists of the upper, vamp, outsole, heel and all sub-components such as, but is not limited to, the toe cap, counter, eyelet stay and facings, back strap, lasting insole, shank, midsole, cushion midsole. It is understood that some sole attachment methods, manufacturing processes, or overall designs may not utilize all of these sub-components;
- **Removable Liner:** Removable component that is inserted into the mukluk shell to contribute in overall fit and provide performance characteristics such as, but not limited to, thermal insulation and moisture management;
- **Footbed Components:** Removable or permanent component(s) that are found at the bottom of the inside of the mukluk shell to contribute to overall fit and provide performance characteristics such as, but not limited to, ventilation, insulation, cushioning, and moisture management;
- **Bottoming Components:** Permanent component(s) of the boot located below the footbed components that add to the structure and functionality of the boot. This may include, but not be limited to the following: lasting insole, shank, midsole, cushion midsole, and outsole.
- **Laces:** Removable components of the boot that is used in the adjustment/closure system.

1.3 Performance Requirements: In specifying the different performance requirements, two levels of measurement will be used. These are defined as follows:

- **Essential:** An essential requirement is a criterion that **must** be met. The word "**must**" will be considered synonymous with essential; and
- **Desirable:** A desirable criterion describes a performance requirement where performance better than the stated essential level is deemed to have significant operational value. The word "**should**" will be considered synonymous with desirable.

1.3.1 Performance criteria in this document have been organized as the following:

- Performance Requirements – Whole Boot (Section 2);
- Performance Requirements – Upper Materials (Section 3);
- Performance Requirements – Bottoming Components, Outsole, and Footbed Components (Section 4);
- Performance Requirements – Removable Liner (Section 5);
- Performance Requirements – Mandatory Components / Design Elements (Section 6); and
- Performance Requirements – Compatibility With Equipment and Clothing (Section 7).

1.3.2 **Conformance of materials and performance:** Conformance of materials and performance to certain performance requirements of this specification will require the submission of test results from accredited independent laboratories or Certificates of Compliance (C of C). Refer to Annex F and Annex C for details. When certificates of compliance are submitted, the Government reserves the right to inspect and test such items to determine the validity of the certification.

2. PERFORMANCE REQUIREMENTS – WHOLE BOOT

2.1 **General:** The Interim ECWM design **must** incorporate fabrics and materials to ensure the foot (to ankle height) remains dry from exterior sources. Materials used in the production of this item are expected to be of standard commercial practice but shall be modified, if necessary, in order to meet the needs and requirements of CF members in the environment for which the item is intended. It is expected that all materials used to meet the Performance Specification will hold up under the extreme conditions found in Field, Garrison and Combat operations conducted under extreme conditions described below. Materials should be selected to optimize the overall boot performance for the given environment, not specifically address a single measure of performance (i.e., weight, comfort, water absorption, etc). The quality and workmanship of the item is expected to exceed that found in the commercial market, given the environment for which the item is intended. Any design utilized must be production-ready utilizing conventional mass production methods.

2.1.1 The Interim ECWM **must** meet the requirements of Canadian Forces operating in consistently changing terrain, such as snow, sleet, slush, wet snow and immersion in streams, puddles, marshes or swamps, and dry, sub and high arctic winter conditions, with temperatures ranging from 0°C to -60°C with extreme winds (from 15 m/s (54 km/h) to 75 m/s (270 km/h)) and humidity (tending to saturation).

2.1.2 The Interim ECWM **must** allow the user to carry out a full range of tasks, including, but not limited to, dismounted mobility (marching with/without the aid of snowshoes, or skis and bindings) and the safe operation of multiple pattern military vehicles and over-snow machines.

2.1.3 The Interim ECWM **must** prevent the foot (to ankle height) from becoming wet from exterior sources such as slush, wet snow or snow when worn for eighteen (18) hours per day and must provide protection from the elements while permitting the transfer of body moisture to the outside of the boot.

2.1.4 Removable materials used in the Interim ECWM **must** allow the soldier to replace wet components during operations and dry out the complete system in a tent using limited heat sources such as a lantern and portable cooking stove.

2.2 **Colour:** Colour of finished product **must** meet requirements as detailed below. If visual colour matching is a requirement, it must be done in accordance with AATCC Visual Procedure 9 under conditions that approximate artificial daylight D75 illuminant. Metamerism must be no greater than that exhibited by the referenced Sealed Pattern.

2.2.1 **Upper:** The colour requirements for the upper components **must** be CADPAT™ WO (Winter Ops) in accordance with DSSPM 2-2-80-502 and in accordance with sealed pattern DSSPM 258-09P. The near infra-red reflectance should conform to the minimum acceptable requirements in accordance with DSSPM 2-2-80-502. The ultra-violet reflection should conform to the minimum acceptable requirements in accordance with DSSPM 2-2-80-502.

2.2.2 **Bottoming components:** The bottoming components of the Interim ECWM must be either white or grey. If white, the finish **must** not contain optical brighteners.

2.2.3 **Fittings:** The colour of any of the fittings (laces, eyelets, webbing, thread) of the Interim ECWM must be either white or grey. If white, the finish **must** not contain optical brighteners.

2.2.4 **Components:** The colour of any components used on the inside of the Interim ECWM **should** be white or grey to visually match those colours in accordance with sealed pattern DSSPM 258-09P. If white, the finish **must** not contain optical brighteners.

2.3 **Weight:** The maximum weight of one boot of a pair, including its associated components **must** not exceed 1350 grams for a size 9M Interim ECWM. Weighing **must** be completed on left and right boots of a pair and the result averaged. The sample must be pre-conditioned at 20 degrees Celsius (tolerance (+/- 2 degrees Cel.) with a 65% relative humidity (+/- 2.0%) for a minimum of 24 hours.

2.4 **Height:** The minimum height **must** be 13-1/2 inches (34.3 cm) and the maximum height **must** be 16 inches (40.6 cm), not including the adjustable closure system as defined in para 2.4.1, below. Height will be measured on a 9M-sized Interim ECWM on the outside of the boot from the bottom of the heel to the top of the boot. The height is allowed to be graded proportionally to the size.

2.4.1 **Adjustable Snow Cuff:** The Interim ECWM **must** include a snow cuff with an adjustable closure system at the upper edge of the shaft that **must** keep snow from entering the inside of the boot. The height of the cuff must not interfere with the movement at the knee. The adjustable closure must ensure easy adjustment and consistent closure to ensure a good seal to prevent the ingress of

snow. The height requirements stated in paragraph 2.4 do not include any addition to the height caused by this snow cuff.

2.5 Water Ingress / Water Egress:

2.5.1 Whole Boot Leakage Test: Finished boots **must** be tested and pass in accordance with the whole boot leakage test outlined in paragraph 8.2.

2.5.2 Water Repellence and Resistance: Performance requirements for water repellence and water resistance of the upper material(s) are outlined in paragraphs 3.1.4 and 3.1.5 **must** be met.

2.5.3 Moisture Vapour Transmission Rate: The materials used in the Interim ECWM **must** provide protection from the elements while permitting the transfer of body moisture to the outside of the boot. When tested in accordance with the whole boot moisture vapour transmission rate (MVTR) test outlined in paragraph 8.3, the minimum MVTR **must** be 2.5 grams/hour.

2.6 Drying Rate:

2.6.1 Mukluk Shell and Footbed Components: When tested in accordance with the drying rate test outlined in paragraph 8.4, the materials used in the mukluk shell and footbed components of the Interim ECWM **must** be 90% dry in less than ten (10) hours.

2.6.2 Removable Liner: When tested in accordance with the drying rate test outlined in paragraph 8.4, the materials used in removable liner **must** be 85% dry in less than six (6) hours.

2.7 Thermal Rating: In accordance with the whole boot foot thermal rating test CTT/PTC-1 (refer to paragraph 8.5 for additional details), the average test results **must** be a minimum -50° Celsius to -60° Celsius.

2.8 Ease of Ignition:

2.8.1 Removable Liner: When tested in accordance with CAN/CGSB-4.2 No. 27.4, the removable liner **must** have a mean ignition time of not less than 4 seconds.

2.9 Microbial Resistance: The materials used in the removable liner as well as the materials used in the footbed components **must** have anti-bacterial and anti-fungal protective properties that last through out the life span of the components. The active ingredient and concentrations of the bactericide **must** be such that once applied to the materials, it **must** not be hazardous to the health of users. The product used to impart the anti-microbial finish **must** have a Pest Control Product Registration Number that has been issued by the Pest Management Regulatory Agency of Health Canada or must be an Environmental Protection Agency (EPA) -registered antimicrobial.

2.10 Exposure to Chemicals:

2.10.1 After limited exposure (i.e. splashing) from the following chemicals, the materials used in the Interim ECWM **must** not dissolve, disintegrate or be absorbed, resulting in changes to appearance (see definition in paragraph 2.10.2) or minimally affecting end item/component performance.

- a. Salt Water in accordance with CAN/CGSB-4.2 Method 21 (paragraph 4.5);
- b. Road Salt Mixture (solid, 77% minimum calcium chloride (type S, Grade 1) in accordance with ASTM D98, dissolved in water to make a 1:4 ratio mixture of road salt to water;
- c. Degreasers, cleaning agent (methyl ethyl ketone 99.8% assay); and
- d. Lubricating Oil: SAE Grade 50 (military grade 1100, commercial grade 100) in accordance with SAE J1966*6.

2.10.2 **Definitions of changes to appearance.** Examples of changes to appearance include, but are not limited to, pitting, removal of finish, decomposition, clouding, crazing, cracking, delamination of materials (defined as separation, bubbling, cracking, or holes between layers of material), and abnormal discolouration. Refer to paragraph 8.6 for additional details on number of specimens, amount of test chemical, and test procedure.

2.10.3 Seams.

2.10.3.1 **Seams.** Seams **must** be tested after exposure to chemicals for leakage. Test conditions are maintained at 68.95 kPa (10.0 psi) for ten minutes using the equipment required for CAN/CGSB-4.2 Method 26.5. For all chemicals tested, there **must** be no leakage.

3.0 PERFORMANCE REQUIREMENTS – UPPER MATERIALS

3.1 Performance - General

3.1.1 **Upper Material(s):** The material(s) used in the uppers must retain its' fit, form and function characteristics after cycles of exposure to the climatic conditions outlined in paragraph 2.1.1 throughout the service life of the Interim ECWM.

3.1.2 **Breaking Strength:** When tested in accordance with CAN/CGSB-4.2 Method 9.2, the minimum breaking strength of the upper materials **must** be 1500 Newtons (warp) and 1000 Newtons (fill).

3.1.3 **Tearing Strength:** When tested in accordance with CAN/CGSB-4.2 Method 12.1, the minimum tearing strength of the upper materials **must** be 150 Newtons in both the warp and fill directions.

3.1.4 **Water Repellence:** When tested in accordance with CAN/CGSB-4.2 Method 26.2, the minimum spray rating for the shell fabric **must** be the following:

Initial: 100 minimum
After five (5) washes: 80 minimum

3.1.5 Water Resistance: When the shell fabric is tested in accordance with CAN/CGSB-4.2 Method 26.5 after exposure to a pressure of 10 psi for ten (10) minutes, the results **must** show no leakage.

3.1.6 Seam Sealing Tape: If seam sealing tape is used, it must be compatible with the upper materials and support the performance requirements for the whole boot. It must not unduly increase the stiffness of seams and/or whole boot. The same applies to seam joints and crossover points. The boot manufacturer must work with the seam sealing tape supplier to insure that application of the tape follows their recommended procedures.

4.0 PERFORMANCE REQUIREMENTS - BOTTOMING COMPONENTS, OUTSOLE, AND FOOTBED COMPONENTS

4.1 Performance – General: Outsoles **must** be made using compounds and a tread pattern which provides traction and stability to the user on all surfaces under temperature conditions ranging from 0°C to -60°C. The tread pattern **must** be a design which provides traction in snow (with soft and hard packed surfaces), mud, and gravel/dirt, which facilitates movement on steep angles while ascending or descending, on uneven, loose and soft surfaces, which enhances both traction and breaking control, which has an anti print-through bottom design for ascending or descending ladders and vehicles, and which minimizes the clinging and build-up of snow, ice, and mud and prevents the collection and dispersion of small objects (stones, nails, screws, etc) that can contribute to Foreign Object Damage (FOD). The area directly under the foot/heel **must** be finished smooth, free of voids or material, which may collect moisture.

4.2 Slip resistance: Whole boots must be tested in accordance with SATRA TM144 or ASTM F2913 using rough ice as the surface. Footwear **must** be tested in two modes; forward flat slip and forward heel slip. When the footwear is tested, the average test results for both modes of slip resistance (added together and divided by two) **must** be a minimum of 0.20 μ . Each boot (left and right) of two pairs of finished boots **must** be tested.

4.3 Non-Marking: The bottoming material **should** be non-marking when tested in accordance with SATRA TM223.

4.4 Lug Depth: When measured in accordance with the Figure 1, the lug depth or cleat height (d_2) for any part of the sole **must** be a minimum of 4.0 mm. The measurement **must** be taken at the widest point in the outsole.

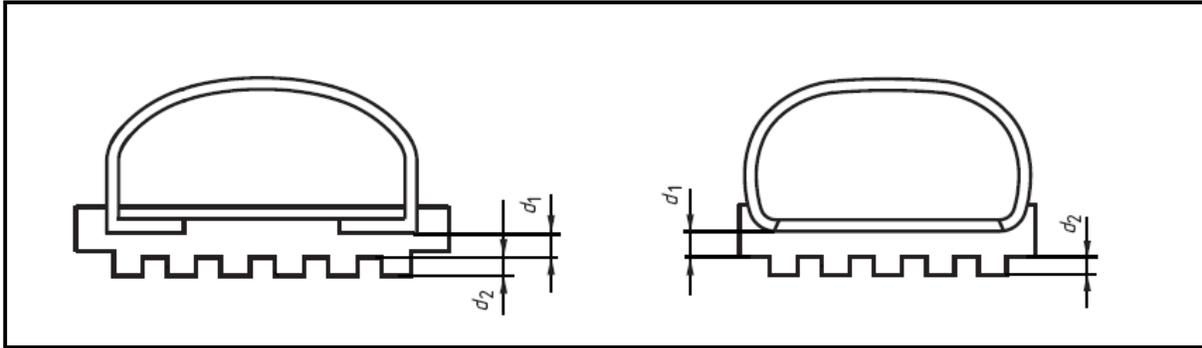


Figure 1 - Lug Depth/Cleat Height

4.5 Performance Requirements – Footbed

4.5.1 General - Footbed: The footbed is defined as the inner part of the shoe that is located below the foot but not considered the bottoming components or the outsole. For this requirement, the footbed components could consist of (but is not limited to) a combination of ventilating, insulating, or cushioning insoles.

4.5.2 Performance: The design and materials used in the footbed **must** provide the following features and performance:

- a. Footbed components **must** allow for the absorption and quick dissipation of any excess perspiration in both liquid and solid (frozen) forms;
- b. The components **must** provide protection from possible heat loss via the bottoming components and outsole; and
- c. Those components that are removable **should** be washable with minimum shrinkage (maximum of five per cent (5%) in either direction) on wetting.

5.0 PERFORMANCE REQUIREMENTS – REMOVABLE LINER

5.1 General – Removable Liner: The Interim ECWM **must** incorporate materials that provide insulation and moisture management to the foot. The removable liner **must** aid in preventing skin maceration, irritation, and blisters on the foot. The foot entrance/openings of the removable liner **must** be large enough to avoid tearing and ensuring easy donning in the dark with limited or no light source. All joints and seams **must** be finished using a method that has high seam strength, however does not cause any discomfort to the user.

5.2 Performance: The design and materials used in the removable liner **must** provide the following features and performance:

- a. If a two layer system, each layer of the removable liner **must** be able to detach from each other;

- b. The removable liner **must** be flexible to facilitate packing of a spare set into the limited space of a soldiers' large field pack assembly. The overall measurements of the rucksack portion of the assembly are 27 inches (68.6 cm) in height, 17 inches (43.2 cm) in width, and 10 inches (25.4 cm) in depth;
- c. The removable liner **must** incorporate a method of quick attach/detach from the Interim ECWM shell, allowing it to be interchangeable, launderable, and expedite drying under operational field conditions with minimal to no heat sources. The materials and method used in attaching/detaching system **must** prevent a pressure point in the course of operational issue.

6.0 PERFORMANCE REQUIREMENTS – MANDATORY COMPONENTS / DESIGN ELEMENTS

6.1 **Adjustment:** The Interim ECWM **must** include an adjustment/closure system that includes the use of eyelets and laces. The Interim ECWM **must** have round laces of sufficient length to ensure firm closure and easy adjustment. The design of the Interim ECWM **must** allow for adjustment to secure the user's foot in place and provide support to the instep, heel, skin, Achilles tendon and ankle joint while not interfering with the range of motion required to complete operational tasks but not create any pressure points on the top of the foot when carrying out normal operations.

6.1.1 All adjustment systems **must** be functional with gloved hands. See paragraph 7.2 for additional information about hand wear.

6.2 **Heel bar.** In order to better secure the strap of the snowshoes at the back of the heel, the Interim ECWM **must** have a heel bar that provides a secure notch for the heel strap of a snowshoe.

7.0 PERFORMANCE REQUIREMENTS - COMPATIBILITY WITH EQUIPMENT AND CLOTHING

7.1 **Extended Combat Sock System:** During the conduct of winter operations, the Interim ECWM will be worn as daily footwear in conjunction with the extended Combat Sock System (CSS) consisting of a wicking liner, hot weather sock, temperate sock, and an extreme cold weather sock. This sock system allows the user to choose the level of thermal protection required to address personal variables in work rate and metabolism. Examples and technical information pertaining to the CSS are available upon request.

7.2 **Hand Wear:** Soldiers will be wearing the Extreme Cold Weather Mitten system with the Lightweight Thermal Glove worn as a liner glove. When adjusting the Interim ECWM, soldiers will remove the mitten system and wear only the lightweight thermal glove to increase tactility and dexterity. Examples and technical information pertaining to the Extreme Cold Weather Mitten system and Lightweight Thermal Glove are available upon request.

7.3 **Clothing:** The Interim ECWM **must** be able to be worn with the following clothing. Examples and technical information pertaining to the garments below are available upon request.

- Trousers, Converged Lightweight Combat;
- Trousers, Enhanced Combat Uniform;
- Trousers, Converged Combat Rainsuit;
- Sweatpants, Fleece, Integrated Clothing Ensemble;
- Trousers, Wet Weather, Integrated Clothing Ensemble,
- Bib Overalls, Extreme Cold Weather, Integrated Clothing Ensemble; and
- Trousers, Snow Camouflage.

7.4 **Commercial Snowshoe Bindings:** The Interim ECWM **must** be compatible with the bindings of commercially available snowshoes.

7.4.1. Key concerns:

- The straps may be attached to the basket via grommets or metal rivets. The basket and grommets may cause a pressure point and abrasion where they come in contact with the shell fabric; and
- The strap across the instep may cause a pressure point and abrasion where they come in contact with the shell fabric.

7.5 **Ski bindings.** The design of the Interim ECWM will be appropriate for Nordic and Alpine touring methods of skiing. The binding design of the ski will secure the Interim ECWM via a series of straps (one to secure at the toe area of the boot, another to secure at the instep, and another to secure from the instep to the heel) that adjust with either ratchets or buckles or both. In order to give support to the ankle/leg, the ski binding may have a moulded piece that will have an adjustable strap to secure around the shaft of the Interim ECWM.

7.5.1 Key concerns:

- The straps may be attached to the binding via grommets or metal rivets. The binding and grommets may cause a pressure point and abrasion where they come in contact with the shell fabric;
- The strap across the instep and toes may cause a pressure point and abrasion where they come in contact with the shell fabric.

8.0 ADDITIONAL INFORMATION FOR PERFORMANCE TESTS:

8.1 In addition to the performance testing outlined, the materials used in the Interim ECWM must be tested as per paragraphs 8.2 to 8.6.

8.2 **Whole Boot Leakage Test:** A whole boot leakage test to be performed on the finished boots as outlined in paragraph 8.2.2.

8.2.1 A minimum of one percent (1%) of each lot of finished boots during production must be tested for leakage in accordance with paragraph 8.2.2. It must be demonstrated that a minimum of ninety-five percent (95%) of the tested boots passed the leakage requirement.

8.2.2 **Apparatus.** A water bath, a supply of compressed air and a rubber collar through which compressed air must be fed via appropriate connections.

8.2.2.1 **Procedure.**

8.2.2.1.1 Carry out the test at a temperature of 23°C (tolerance of $\pm 2^\circ\text{C}$).

8.2.2.1.2 Seal the top edge of the test piece with a rubber collar through which compressed air must be fed via appropriate connections. Immerse the test specimen in a water bath up to the edge and apply a constant internal pressure of (10 ± 1) kPa for 30 seconds. Observe the test piece throughout the test and determine whether there is a continued formation of air bubbles, indicating leakage of air.

8.2.2.1.3 **Result.** A “pass” for this test means that no air bubbles have formed.

8.3 **Moisture vapour transmission.** Each boot (left and right) of two (2) pairs of finished boots **must** be tested in accordance with paragraph 8.3.1. One source of this test is Precision Testing Laboratories (313 Hill Avenue, Nashville, Tennessee, USA 37210, Telephone: (615) 254-3401, Fax: (615) 254-3488, Email: vpsales@precisiontesting.com).

8.3.1 **Moisture vapour transmission rate (MVTR) test.** The moisture vapour transmission rate through the boot must be indicated by means of determining the difference in the concentration of moisture vapour between the interior and the exterior environment.

8.3.1.1 **Conditioning and test apparatus:**

- a. The external test environment control system **must** be capable of maintaining 23 degrees Celsius ($\pm 1^\circ\text{C}$) 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 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, so that the folds that form do not create air gaps. It **must** have much higher MVTR than the boots to be tested and it **must** be waterproof so that only moisture vapour contacts the interior of the boots 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 degrees Celsius ($\pm 1^\circ\text{C}$); and
- e. The boot plug **must** be impervious to both liquid water and water vapour.

8.3.1.2 Procedure:

- a. Place boot in the test environment;
- b. Insert holding bag into boot opening and fill with water to a height of 12.5 cm (5.0 in) measured from inside sole;
- c. Insert the water heater and seal opening with boot plug;
- d. Heat water in boot to 35 degrees Celsius;
- e. Weigh boot sample and record as W_i .
- f. Hold temperature in boot after weighing for a minimum of six (6) hours.
- g. Reweigh boot sample and record weight as W_f and test duration as T_d .
- h. Compute whole boot MVTR in grams/hour from equation below:

$$MVTR = \frac{W_i - W_f}{T_d}$$

8.3.1.3 Result: The mean whole boot MVTR from the two boots of each test pair **must** be a minimum of 2.5 g/hr.

8.4 Drying Rate: Components (mukluk shell, footbed components, and removable liner) of each boot (left and right) of two (2) pairs of finished boots **must** be tested in accordance with CTT Drying Rate Test and paragraph 8.4.1. Manufacturers **must** instruct the test laboratory how the component is intended to be dried by the user in operational conditions (see paragraph 2.1.1). The test laboratory **must** note these instructions on the test report. The source of this test is Group CTT (3000, rue Boullé, St-Hyacinthe, Quebec Tel: (877) 288-8378).

8.4.1 Procedure: Pre-condition sample at 21° Celsius and 65% relative humidity. The inside of the mukluk shell must be wetted with 20 grams of sprayed, distilled water. The surface of the applicable footbed component and the removable liner that will touch the foot must be wetted with 20 grams of sprayed, distilled water.

8.4.2 The removable liner **must** be hung free in climatic chamber while the mukluk shell and footbed components **must** be placed flat. The chamber **must** be set at 5 degrees Celsius and 55% relative humidity. Minimum test duration is six (6) hours.

8.4.3 Results: The results **must** show the rate of drying (grams/hour) and the percentage of dryness by hour per component set.

8.5 Foot Thermal Rating: Each boot (left and right) of two pairs of finished boots **must** be tested in accordance with CTT/PTC-1 and the procedures outlined in paragraph 8.5.1. The source of this test is Group CTT (3000, rue Boullé, St-Hyacinthe, Quebec Tel: (877) 288-8378).

8.5.1 Procedure: Pressure applied to the foot model must be 35 kg. Target specific power must be 250 W/m (+/- 5%). Test duration must be 228 minutes. Starting temperature must be -1 degrees Celsius (+/- 1° Cel.) with air motion. Temperature must increase in steps to -61 degrees Celsius (+/- 1° Cel.). Cells 1 to 6 must be taken into consideration for test results. Cells 7 and 8 must be plugged.

8.5.2 Results: The average test results must be a minimum -50 degrees Celsius to -60 degrees Celsius.

8.6 Test Procedure For Changes To Appearance . Only materials utilized on the outside of the mukluk shell (including outsole materials) must be tested. Two (2) specimens of each material **must** be tested separately to each chemical. The chemicals **must** be placed on the side of the material that is intended to be the outer face side.

8.6.1 Size of the specimens must be 100 mm by 100 mm for the upper material(s) and 25 mm by 50 mm by 2.0 mm (tolerance +/- 0.1 mm) for all polymers. Size of the specimens for the seams must be as specified in CAN/CGSB-4.2 Method 26.5.

8.6.2 For all chemicals, four (4) drops each of test chemical **must** be placed on the top of the test specimen. The whole test area **must** then be covered with a glass plate and weighted to a total pressure of 6.895 kPa (1 psi). This weighted cover **must** be left in place for one (1) hour.

8.6.3 The material sample **must** then be visually examined for changes to appearance in accordance with paragraph 2.10.2.

9.0 SIZING

9.1 Sizes Required: Size requirements for the delivery of Interim ECWM assemblies will be as detailed in the Request for Proposal (RFP) or other contractual/solicitation document issued by PWGSC.

9.1.1 The Interim ECWM Assembly (mukluk shells, removable insoles, footbed components, etc.) **must** cover the size range identified in the RFP.

9.2 Tooling: Patterns, grading, lasts, moulds, dies, and any associated equipment required to manufacture the Interim ECWM in accordance with the sizes and quantities designated in the contract **must** be the responsibility of the Contractor.

10.0 LABELLING

10.1 On the inside of each interim mukluk shell, the information prescribed below **must** be provided in English and French, legibly, indelibly, and in a method which does not jeopardize waterproof integrity, cause discoloration, or create any pressure point for the user. NATO Stock Numbers (NSN) or Permanent Stock Control Numbers (PSCN) will be forwarded at contract award. The marking must give the following information, printed in characters not less than 1/8-inch (3.2 mm) or more than 1/4-inch (6.4 mm) in height, with the exception of the size, which must be twice the size of the other characters:

- a. Short nomenclature (Interim CF Extreme Cold Weather Mukluk / Mukluk, Froid Extrême, FC, Intérim);
- b. NATO Stock Number (or PSCN) and Size;
- c. Contractors name, initials or recognized trademark;
- d. Contract number and month and Year of manufacture; and
- e. One line designated as "ID" appropriate for the users to write their name.

Example:

Interim CF Extreme Cold Weather Mukluk Mukluk, pour temps froid extrême, FC, Intérim NSN/NNO: 8430-20-A0F-5856 Size/Pointure: 9M Canadian Footwear Manufacturer Inc W1234-567890 Jan 2012 ID: _____
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10.2 Marking of removable pieces: The commercial size **must** be indelibly printed or embossed on the bottom of the removable pieces. Printed labels are acceptable as long as it does not create a pressure point for the user.

10.3 Interim ECWM Hang Tag: With each pair of Interim ECWMs, the manufacturer **should** provide a hang tag that describes design characteristics and care and cleaning instructions for the boot in both English and French.

10.4 Company Logo: The manufacturer's logo may be identified on the ECWM providing it is with subdued colours and in a location approved by the DND Technical Authority.

11.0 SHELF LIFE

11.1 Warehouse conditions could vary from 0°C to +35°C with a relative humidity level varying from 15% to 90%.

- a. The Interim ECWM system (mukluk shell and components) must not require any maintenance during a two-year storage period.
- b. New pairs of Interim ECWMs, packaged in their original conditions, should withstand normal storage for a period of two years without any degradation in performance.

12.0 PACKAGING:

12.1 Individual packaging:

12.1.1 Each unit of issue / box **must** be individually packaged to contain the following parts and components:

- One (1) pair of Interim Extreme Cold Weather Mukluks fully assembled with removable liner, insole(s), and laces;
- One (1) replacement pair of removable liners;
- One (1) replacement pair of all insoles; and
- One (1) replacement pair of laces.

12.1.2 Marking on individual packages must be in accordance with CFTPO-ECWM (paragraph 3).

12.2.1 **Quantity packaging:** Quantity packaging must be in accordance with CFTPO-ECWM (paragraphs 4 through 9 inclusive).

12.3 Unless otherwise specified, the preparation, packaging, and delivery of the Interim ECWM must be in accordance with the terms of the contract.