AirBoss Defense
The Ultimate Protection

MOULDED AIRBOSS CBRN LIGHTWEIGHT OVERBOOT

MALO

COMMERCIAL SPECIFICATION

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1. PRODUCT DESCRIPTION

This specification refers to a CBRN Overboot, which is made from butyl rubber for use by military personnel and first responders in a CBRN environment. This ambidextrous, antistatic overboot provides protection against chemical warfare agents and can be decontaminated to a safe level. It is designed to provide optimum fit and performance.

The material used to manufacture the MALO is soft. It will not cause any pressure points to the feet or ankle. The MALO is available in 5 different sizes covering US sizes 3 to 17.5 (Mondopoint 210 to 330).

The overboot is available in 5 sizes to fit more than the 5th through 95th percentile of the population (Both male and female). Size Breakdown is shown in Table A.

TABLE A - SIZING CHART

MALO	US sizing	EC sizing	UK Size
Small (S)	Up to 6	Up to 38	Up to 5
Medium (M)	6.5 to 9	38.5 to 43	5.5 to 8
Large (L)	9.5 to 12	43.5 to 46	8.5 to 11
Extra-Large (XL)	12.5 to 15	46.5 to 50	11.5 to 14
2X-Large (2XL)	15.5 to 17.5	50.5 to 53.5	14.5 to 16.5

Note: Corresponding boot size is for reference only. Boot designs vary and will have different outer dimensions. It is recommended to conduct a fit trial for best fit results.

2. PRODUCT PERFORMANCE

TABLE B - OVERBOOT PROPERTIES

Property	Test Method	Performance
Protection		
Chemical Warfare Agent Resistance (HD, GD, TGD, VX) Challenge: 10 g/m^{2}M	TOP 8-2-501	< 2.0 µg/cm^2 24 hrs>
	DEF STAN 93-55 (A)	>24 hrs
	Finabel	>24 hrs
Toxic Industrial Chemical (TIC) Resistance	ASTM F739	Resistant to many TICs. List available upon request.
	EN 13832	
Biological Warfare Agent Resistance	--	Impermeable to biological warfare agents.
Antistatic	EN ISO 20347 (6.2.2.2)	>> 100 kΩ, ≤ 1000 MΩ
Cut Resistance	EN ISO 20347 (6.2.7.3)	Cut Index > 2.5
Abrasion Resistance (Sole)	EN ISO 20345 (5.8.3)	≤ 350 mm^3 volume loss
Functionality		
Slip Resistance	EN ISO 20345 (5.3.4)	Forward Heel Slip ≥0.28 Forward Flat Slip ≥0.32
Material Properties		
Hardness	ASTM D2240	60 ± 5
Tensile Strength at Break	ASTM D412	≥ 10 MPa
Tear Strength	ASTM D624	≥ 26 kN/m
Elongation at Break	ASTM D412	≥ 420 %
Stiffness at Cold Temperatures	ASTM D1053	Material adequately flexible for use to -32°C
	MIL STD 810G	

The table below shows the change in physical properties following an aging simulation conducted according to ASTM D573, which requires conditioning for 48 hrs at 100 °C. While actual ageing of the product will depend significantly on storage conditions, this data provides an indicator of the expected ageing properties of the rubber over time.

TABLE C - PHYSICAL PROPERTIES AFTER AGEING (ASTM D573)

Property	Test Method	Performance
Hardness	ASTM D2240	≤ 70
Tensile strength at break	ASTM D412	≥ 9.6 MPa
Elongation at break	ASTM D412	≥ 350 %

3. PROTECTION

Chemical Agent Protection – The MALO protects against vapour, liquid and aerosol chemical warfare agents (CWAs). Extensive testing has been conducted at several test facilities around the world (Batelle, ProQares, DRDC Suffield) using many different chemical agents. Under standard test conditions and concentrations, the MALO offers more than 24 hours of protection against traditional CWAs. In addition, the MALO protects against a wide range of toxic industrial chemicals (TICs). The complete list of protection against TICs is available upon request.

Biological Agent Protection – The MALO is impermeable to biological warfare agents. The smooth, injected butyl rubber surface allows for easy decontamination from biological contaminants.

Nuclear Fallout Protection –The MALO is impermeable to nuclear fallout. The smooth surface is easily decontaminable from the dust particles.

Integration – The MALO is designed to be with a long boot shaft in order to integrate with many protective ensembles. The excellent integration of the MALO with multiple suits (including the JSLIST and the MKIVa) has been demonstrated through the Man-In-Simulant-Test (TOP 10-2-022, VAPRO) conducted at both the Royal Military College of Canada and North Carolina State University.

4. USAGE CHARACTERISTICS

Dressing and Undressing with Uncontaminated Clothing – The MALO is designed for easy donning and doffing. The ambidextrous design, easy-to-adjust straps and powdered finish aids in quick dressing and undressing.

Changing Protective Regimes – The MALO is designed integrate into the full protective ensemble at both Dress Stage 3 (MOPP III) and Dress Stage 4 (MOPP IV). The MALO will not interfere will transition from MOPP III to MOPP IV.

Removing Contaminated Clothing – The MALO is an overboot that can be doffed using gloves. Contaminated MALO must be doffed using protective gloves. Contaminated MALOs will not cross-contaminate the wearer's body if correct undressing procedures are used.

Magnetic Properties – The MALO will not interfere with any magnetic components or equipment.

5. DURABILITY

Durability - The MALO is designed to be worn for up to 45 days while maintaining the same level of protection.

Climate - The MALO will remains functional at a temperature range from -45°C to 70°C (-49°F to 158°F). The MALO compound has been laboratory tested to ASTM D1053 for stiffness at low temperatures.

6. MAINTENANCE, STORAGE AND DISPOSAL

Contamination Control Area Procedure - The MALO can be decontaminated to a safe level prior to doffing using approved decontamination procedures.

Maintenance - The MALO should be washed regularly with soap and water to remove dirt and other non-NBC contaminants. The MALO cannot be repaired by the end user. Any tear or leak in the boot indicates that the integrity of the product has been compromised and the boot should be disposed of appropriately.

Shelf Life - The MALO has a storage life of 15 years when kept in its original packaging and stored out of direct sunlight in a storage room whose ambient temperature is between -50ºC to 60ºC (-58ºF to 140ºF) and whose relative humidity is anywhere from 0 to 100% RH.

Disposal - Contaminated overboots can be incinerated for disposal in appropriate facilities and in accordance with local regulations. Uncontaminated boots can be disposed of through the appropriate local channels.

7. CERTIFICATION

The MALO complies with the EEC Directive for Personal Protective Equipment (89/686/EEC) and is CE certified. Reference: SAI Global notified body number 2056.

8. MARKING

As per end user requirements (most in stock items are identified with standard marking including: manufacturer name, NSN, size and lot number/date of manufacture). Special marking may require minimum order quantity.

9. PACKAGING

Overboots are flat packaged in pairs and are vacuum sealed in an easy-to-open package.

Package Volume (Large) …… 1950 cm^3 (0.07 ft^3)

Package Weight (Large)…….. 1.19 kg (2.62 lbs)

Box Weight…… 12.5 kg (27.6 lbs)

10 pairs of overboots preserved as above shall be packed into a glued Type CF (Corrugated Fiberboard) box.

Note: Special packaging requests can be accommodated and should be made at the time of order. Minimum quantities may apply.

10. QUALITY ASSURANCE

The MALO is 100% inspected for leaks and other defects at multiple stages in the production process. Deficient product is rejected.

All production follows a Quality Assurance Plan and a Test Inspection Plan.

AirBoss Defense's Quality Assurance System is certified to ISO 9001:2008.

11. SPECIFICATION AUTHORITY

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Additional test data and product information is available upon request.

Annex A: Relevant Standards

DEF STAN 93-55/2, Annex A…… Method of Test for Penetration of Mustard Gas.

DEF STAN 93-55/2, Annex B…… Method of Test for Penetration of Mustard Gas Decontamination

TOP 8-2-501……..... Permeation and Penetration Testing of Materials with Chemical Agents or Simulants (Swatch Testing)

TOP 10-2-022…….. Chemical Vapor and Aerosol System Level Testing of Chemical/ Biological Protective Suits

EN 20344..…… Personal Protective Equipment – Test Methods for Footwear

EN 20345..…… Personal Protective Equipment – Safety Footwear

EN 20347..…… Personal Protective Equipment – Occupational Footwear

ASTM D412…….. Vulcanized Rubber and Thermoplastic Elastomers - Tension

ASTM D624…….. Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers

ASTM F739…….. Permeation of Liquids and Gases through Protective Materials

ASTM D1053…… Stiffening at Low Temperatures: Flexible Polymers and Coated Fabrics

ASTM F1342……..... Test Method for Protective Clothing Material Resistance to Puncture

ASTM F1790……..... Test Method for Measuring Cut Resistance of Materials used in Protective Clothing

ASTM D2240…… Rubber Property, Durometer Hardness