

**OPERATIONAL PERFORMANCE AND TECHNICAL REQUIREMENTS  
FOR THE  
LIGHTWEIGHT PROTECTIVE RESPIRATOR**

## 1.0 SCOPE

### 1.1 Scope

This specification details the operational performance and technical requirements for the Lightweight Protective Respirator.

### 1.2 Applicable Documents

The following documents form part of this specification to the extent specified and are supportive of this specification when referenced; all other document references are to be considered supplemental information only. In the event of a conflict between the documents referenced and the contents of this specification, then the contents of this specification takes precedence.

- DRDC-RDDC-2015-R186 - 2012 Canadian Forces Anthropometric Survey (pubs.rddc-drdc.gc.ca)
- FED-STD-595C - Colors Used in Government Procurement (www.everyspec.com)
- ASTM D 6413 Flame Resistance of Textiles (Vertical Test) (www.astm.org)
- MIL-STD-810G - Test Method Standard for Environmental Engineering Considerations and Laboratory Tests (www.everyspec.com)

### 1.3 Definitions

5th Percentile Female	Defined, in accordance with DRDC-RDDC-2015-R186, as follows: <ul style="list-style-type: none"> <li>• Stature (Height): 153.9 cm (5 ft 7.2 in)</li> <li>• Weight: 52 kg (114.4 lb)</li> <li>• Head (Length – Brow to Back of Head): 17.8 cm (7.01 in)</li> <li>• Head Breadth (Above Ears): 13.7 cm (5.39 in)</li> <li>• Head Breadth (Cheekbone to Cheekbone): 12.2 cm (4.80 in)</li> <li>• Head Coronal Arch (Ear to Ear): 31.9 cm (12.56 in)</li> <li>• Inter-Pupil Breadth: 5.5 cm (2.17 in)</li> <li>• Height (Center of Eyes to Chin): 10.2 cm (4.02 in)</li> </ul>
95th Percentile Male	Defined, in accordance with DRDC-RDDC-2015-R186, as follows: <ul style="list-style-type: none"> <li>• Stature (Height): 188.1 cm (6 ft 2.0 in)</li> <li>• Weight: 116 kg (255.2 lb)</li> <li>• Head (Length – Brow to Back of Head): 21.2 cm (8.35 in)</li> <li>• Head Breadth (Above Ears): 16.2 cm (6.38 in)</li> <li>• Head Breadth (Cheekbone to Cheekbone): 15.1 cm (5.94 in)</li> <li>• Head Coronal Arch (Ear to Ear): 37.4 cm (14.72 in)</li> <li>• Inter-Pupil Breadth: 6.8 cm (2.68 in)</li> <li>• Height (Center of Eyes to Chin): 13.3 cm (5.24 in)</li> </ul>
Earth Tone	By definition, earth tone is considered a color scheme that draws from a color palette of browns, tans, grays, greens, oranges, whites and some reds. The colors in an earth tone scheme are muted and flat in an emulation of the natural colors found in soils, moss, trees and rocks. For the purpose of this specification, the earth tone color (where specified) must be based on the predominantly brown, tan and gray color series

	(lusterless) within FED STD-595C, where those colors do not include any elements of orange, red and white.
Shelf Life	The amount of time that equipment can be continually stored without use in the OEM-defined environmental conditions without degradation to the performance of the equipment.
P100 Filter	Offers at least 99.97% filtration efficiency against airborne particulates and has a high resistance to oil-based contaminants.
No Melt, No Drip Materials	Materials that will not melt or fuse to the skin when exposed to flame in accordance with ASTM D 6413.

#### 1.4 Acronyms

ASTM	American Society for Testing and Materials
DND	Department of National Defence
DRDC	Defence Research and Development Canada
FED-STD	Federal Standard
MIL-STD	Military Standard
NIOSH	National Institute of Occupational Health and Safety
OEM	Original Equipment Manufacturer

#### 1.5 Concept

DND has a requirement for a NIOSH certified half-mask respirator designed to provide respiratory protection due to inhalation of particulate contaminants resulting primarily from explosive gunfire residue. This includes both oil and non-oil based contaminants such as lead, asbestos, fentanyl and lubricant mist. The respirator must permit wearing with and without a helmet, and must integrate seamlessly with in-service equipment including helmets (both ballistic and bump-caps with and without night vision devices and battery packs installed), eye protection and over the ear hearing protective devices (e.g., 3M™ Peltor).

## 2.0 **REQUIREMENTS**

### 2.1 Operational Performance Requirements

The Operational Performance Requirements for the Lightweight Protective Respirator are detailed in the following sections.

#### 2.1.1 Components

The Lightweight Protective Respirator must be comprised of the following components:

- (a) Half-Mask Respirator in accordance with Section 2.2.1;
- (b) Filter in accordance with Section 2.2.2; and
- (c) Harness in accordance with Section 2.2.3.

#### 2.1.2 Materials

The Lightweight Protective Respirator must:

- (a) Have a shelf life when stored in the manufacturer's original packaging of not less than ten (10) years;

- (b) Be delivered in a protective wrapping designed to protect the respirator from environmental degradation for the duration of the shelf life;
- (c) Be composed of non-hazardous materials.
- (d) Be composed of no melt, no drip materials;
- (e) Require minimal user maintenance (less than one hour per month); and
- (f) Be easily cleaned using liquid disinfectant (dish soap) and water and/or isopropyl alcohol.

#### 2.1.3 Sizing

The standard OEM sizes (e.g., S, M, L, XL) of the Lightweight Protective Respirator must provide an airtight fit for the 5<sup>th</sup> Percentile Female to the 95<sup>th</sup> Percentile Male as defined in DRDC-RDDC-2015-R186.

#### 2.1.4 Color

The Lightweight Protective Respirator must be earth tone or black in color with a non-reflective (matte) finish when the material is either dry or wet.

#### 2.1.5 Environmental

The Lightweight Protective Respirator must:

- (a) Operate under the climatic conditions A1 to A3, B1 to B3 and C1, as described in MIL-STD-810G, within the following environmental conditions:
  - i. Temperature: -32°C to +49°C;
  - ii. Humidity: Up to 100%;
  - iii. Precipitation including rain, snow, hail and freezing rain;
  - iv. Desert sand;
  - v. Salt and fresh water spray; and
  - vi. Fog and salt fog;
- (b) Be designed with a service life of not less than five (5) years.

### 2.2 Technical Requirements

The Technical Requirements for the Lightweight Protective Respirator are detailed in the following sections.

#### 2.2.1 Half-Mask Respirator

The half-mask respirator must:

- (a) Be a NIOSH certified respiratory protective device under the provisions of Title 42 of the US *Code of Federal Regulations*, Part 84 (42 CFR 84);
- (b) Weigh no more than 350 grams (0.77 pounds) for the size Medium mask without a filter;
- (c) Not restrict the movement of the head or impact the visibility of the user to the extent that would interfere with conduct of operational tasks (e.g., shooting);
- (d) Permit use with and without a helmet; and

- (e) Permit full and partial removal from the face with a single hand, without removal of the helmet if worn.

#### 2.2.2 Filter

The respirator filter must:

- (a) Be a NIOSH P100 certified filter;
- (b) Be located at the front of the half-mask respirator such that it does not interfere with the proper sighting of a weapon (e.g., carbine) shouldered on either the left or right side; and
- (c) Permit adjustment and rapid replacement utilizing a single hand while wearing a shooting glove.

#### 2.2.3 Harness

The harness must:

- (a) Secure the half-mask respirator to the operator's face when worn on a bare head (no helmet or other interference items other than eye and ear protection); and
- (b) Be adjustable on the head utilizing a single or both hands without removal of the respirator or a helmet if worn (i.e., no external assistance required).

#### 2.3 Accessories

Each Lightweight Protective Respirator must include the following:

- (a) Quantity two (2) spare filters;
- (b) Quantity one (1) spare harness set; and
- (c) Quantity one (1) operator manual in hard copy, in English, that includes fit, use and user maintenance of the respirator.