



Worldwide NBC Mask Handbook



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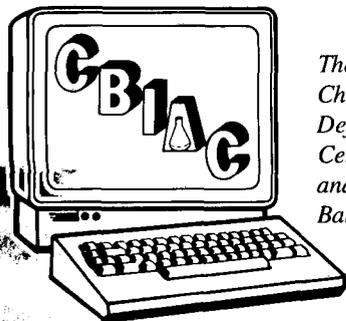
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FOREWORD

This is the first edition of the Chemical Biological Information Analysis Center's (CBIAC) Worldwide NBC Mask Handbook. The Worldwide NBC Mask Handbook highlights physical and performance specifications of current inventory NBC masks and corresponding canisters from over twenty countries. In an effort to keep the NBC community abreast of the most current trends in NBC mask technologies the CBIAC will produce periodic updates to this handbook.

We invite the handbook users to contribute information on newly fielded masks and canisters and modifications to existing systems as it becomes available. Further, we ask users to fill vacant information fields. User contributions will ensure that future editions of the handbook will be comprehensive and of optimal quality. For your convenience, forms have been included at the end of this handbook for comments and ordering additional copies. Please mail to the following address:

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1.0 INTRODUCTION

A number of countries around the world have the capability to use chemical and biological (CB) weapons. In fact, within the past decade several instances of their use in combat have been well documented. During this same time, intensive negotiations have been underway to ratify a treaty to prohibit development, production, storage, transfer, and use of chemical weapons. The completion of this comprehensive treaty is in sight with negotiations expected to be finalized in 1992. Full implementation of this treaty, however, is expected to take a number of years with destruction of existing stockpiles scheduled to require at least ten years after the treaty comes into force. A necessary part of the treaty is maintaining an adequate protective posture which includes detection and warning, medical prophylaxis and treatment, and personal protective equipment. Effective personal protective equipment that does not seriously degrade human performance is of primary importance in the event of a breach of the treaty or the use of CB weapons by non-signatories.

One of the most important items of personal protective equipment is the protective mask and associated filters. These items vary widely in construction, protection factors, and human performance characteristics. This handbook results from a survey of NBC respiratory protection equipment available in current inventories of countries throughout the world and will serve as a single, authoritative source for data pertaining to this equipment. The information provided should help to:

- Convey the wide variety of personal respiratory protection available
- Explain the features of each piece of equipment and their advantages and disadvantages
- Encourage an understanding of the availability and the need for continued improvements in respiratory protection
- Promote transfer of new technology.

The report is generally divided by participating country and includes Belgium, Bulgaria, Canada, Commonwealth of Independent States, Czechoslovakia, France, Germany, Greece, Hungary, Iraq, Israel, Italy, People's Republic of China, Poland, Romania, South Korea, Spain, Sweden, Switzerland, United Kingdom, United States and Yugoslavia. We are hopeful that additional countries may wish to participate in any future updates and welcome any information they want to provide to make the handbook more complete.

All participants provided information based on military specifications and manufacturers' data. However, all included testing data is not based on a universal protocol; it is information provided by the country or manufacturer, therefore should not be used for comparative purposes. We have

attempted to provide information from all sectors that responded to the survey request, although the responses varied widely both in content and level of detail.

Within each country two general categories are developed, filtration and respirators. Within each major section the item name, general description, physical characteristics, performance specifications, manufacturer, and stock number are noted. Information related to materials of construction, components, breathing resistance, airflow, communication enhancement, protection afforded, human factors information, physical factors information, and deployment is also included. In addition, the reference list for each country allows the handbook user to make an independent evaluation of the validity of the data presented in that section. A glossary is included to provide a common basis for the terminology used throughout the manual.

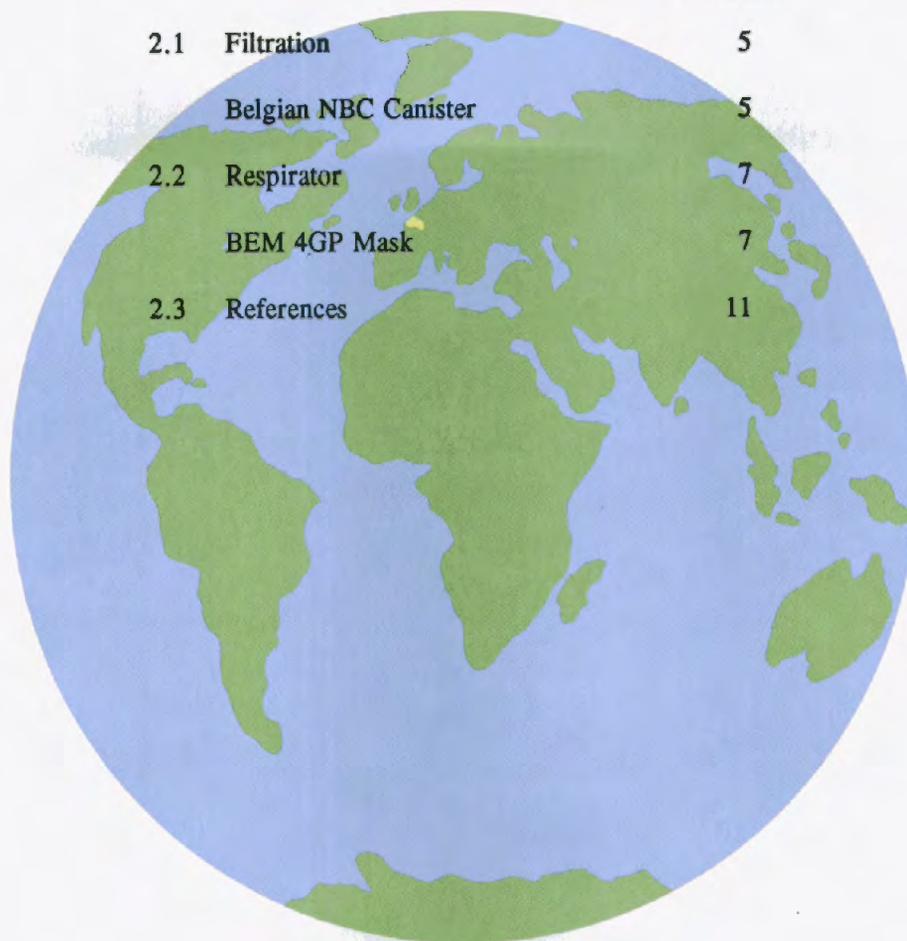
It is important to note that at the time that this handbook was compiled, several of the participating nations were experiencing internal civil conflicts which may lead to the changing of country designation. Since this survey originally commenced, the country once known as Czechoslovakia has been divided into two countries: Czech and Slovak Federal Republic. We recognize the nations of Czech and Slovak Federal Republic; however, for the purpose of this handbook, all equipment from these two nations was consolidated under the former Czechoslovakia since it is as of yet unclear what NBC equipment these nations will adopt. We expect that in coming months, Yugoslavia will experience boundary and/or name changes as well.



Chapter 2 – Belgium

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2.1 FILTRATION

- **Item Name(s):** Belgian NBC Canister
- **Use(s):** A canister complying to these specifications will be used with the Belgian BEM 4GP Mask. ⁽⁴⁾
- **Physical Characteristic(s):**

Aerosol Filter Filter paper consisting of at least 90% glass fibers. ⁽⁴⁾

Canister Aluminum. ⁽⁴⁾

Diameter (maximum) 115 mm. ⁽⁴⁾

Gas Filter TEDA-treated activated ASC carbon. ⁽⁴⁾

Height (maximum) 105 mm. ⁽⁴⁾

Magnetic Field Strength Maximum value is 0.02 A/m (25 nanotesla). ⁽⁴⁾

Thread NATO standard, conforms to STANAG 4155. ⁽⁴⁾

Thread Size 40 x 3.63 mm, conforms to DIN 3182. ⁽⁴⁾

Weight (maximum) 330 g. ⁽⁴⁾

- **Performance Specification(s):**

Aerosol Efficiency Greater than 99.997% for paraffin oil or DOP. ⁽⁴⁾

Airflow resistance (maximum) 23.45 mm of H₂O at an airflow of 30 L/min.* ⁽⁴⁾

81.58 mm of H₂O at an airflow of 80 L/min after accumulation of aerosol.* ⁽⁴⁾

Gas Life

AC Life 120 minutes at an airflow of 30 L/min, concentration of 2.0 ± 0.2 g/m³, RH of $80 \pm 2\%$, temperature of $23 \pm 1^\circ\text{C}$ for both dry conditions and after preconditioning with humidity. ⁽⁴⁾

30 minutes at an airflow of 30 L/min, concentration of 2.0 ± 0.2 g/m³, RH of $80 \pm 2\%$, temperature of $23 \pm 1^\circ\text{C}$, after accelerated aging at 45°C and 80% RH for 20 days. ⁽⁴⁾

*Data originally reported in millibars.

CG Life 160 minutes at an airflow of 30 L/min, concentration of 4.0 ± 0.3 g/m³, RH of $80 \pm 2\%$, temperature of $23 \pm 1^\circ\text{C}$, under dry conditions. ⁽⁴⁾

CK Life 200 minutes at an airflow of 30 L/min, concentration of 2.0 ± 0.2 g/m³, RH of $80 \pm 2\%$, temperature of $23 \pm 1^\circ\text{C}$, under dry conditions. ⁽⁴⁾

160 minutes at an airflow of 30 L/min, concentration of 2.0 ± 0.2 g/m³, RH of $80 \pm 2\%$, temperature of $23 \pm 1^\circ\text{C}$, after preconditioning with humidity. ⁽⁴⁾

25 minutes at an airflow of 80 L/min, concentration of 2.0 ± 0.2 g/m³, RH of $80 \pm 2\%$, temperature of $23 \pm 1^\circ\text{C}$, after accelerated aging at 45°C and 80% RH for 20 days. ⁽⁴⁾

PS Life 200 minutes at an airflow of 30 L/min, concentration of 5.0 ± 0.3 g/m³, RH of $80 \pm 2\%$, temperature of $23 \pm 1^\circ\text{C}$, under dry conditions. ⁽⁴⁾

60 minutes at an airflow of 30 L/min, concentration of 5.0 ± 0.3 g/m³, RH of $80 \pm 2\%$, temperature of $23 \pm 1^\circ\text{C}$, after preconditioning with humidity. ⁽⁴⁾

40 minutes at an airflow of 30 L/min, concentration of 2.0 ± 0.2 g/m³, RH of $80 \pm 2\%$, temperature of $23 \pm 1^\circ\text{C}$, after accelerated aging at 45°C and 80% RH for 20 days. ⁽⁴⁾

- **Deployment:** Not available.
- **Manufacturer(s):** A vendor has not yet been selected for the production of the canister to be worn with the BEM 4GP. ⁽⁴⁾
- **Stock Number(s):** 4240-12-140-8146 (NATO). ⁽⁵⁾
- **Miscellaneous:** A storage temperature of between -35°C and $+50^\circ\text{C}$ under dry conditions is recommended. ⁽⁴⁾

2.2 RESPIRATOR



Photo courtesy of Engicom S.A.N.V.

The Belgian BEM 4GP

- **Designator(s):** BEM 4GP
- **Item Name(s):** BEM 4GP Mask
- **Item Description:** The Belgian BEM 4GP features a facepiece made of bromobutyl rubber, a one-piece visor made of polycarbonate, an internal nosecup, and a six-point adjustable head harness suspension. The BEM 4GP has a unique component, a monoblock, located in the mouth region that houses all essential functions: canister interface, inhalation valve, two exhalation valves, communication enhancement, and drinking system. The unique design allows the canister position to be changed by simply rotating the canister to the right, center or left. ^(1, 2)

The BEM 4GP replaces the obsolete ANP 51M53, a French conception respirator whose technology dates from before World War II, and which has been in service with the Belgian forces since the beginning of the 1950s. ⁽²⁾

- **Total Weight:** ± 520 g. ⁽⁵⁾
- **Stock Number(s):** Not available.
- **Sizes Available:** Small, medium, and large. ⁽²⁾
- **Use(s):** Used by the Belgian armed forces as a general purpose respirator. ⁽¹⁾
- **Component(s):**

Canister A vendor has not yet been selected for the BEM 4GP canister. However, the selected canister will comply with the specifications outlined in Section 2.1. ⁽⁴⁾

Canister Mount The BEM 4GP is the only respirator that permits the canister to be positioned to three positions (center, left, right) without compromising protection. The canister is moved to the desired position by automatic ratcheting and then locking of the canister. ^(1, 2)

Another comfort factor is the very short distance between the center of gravity of the canister and the wearer's face. This minimizes the rocking torque that generates muscular aches. ⁽²⁾

NATO standard. ⁽⁴⁾

**Drinking and
Perspiration
Drain-Off Systems**

This device, compact and integrated in the monoblock, allows the wearer to drink liquids using an ordinary straw. Guiding the straw through an internal sheath, the respirator avoids any risk of contamination of the inside of the mask by the absorbed liquid. ⁽²⁾

The design of the system ensures the continuity of respiratory protection, even when introducing or removing the straw, as well as during drinking. ⁽²⁾

The same subcomponent is designed for draining off excessive perspiration collected at the lowest point of the respirator. This operation occurs safely, since the respirator remains on the face. ⁽²⁾

- Exhalation Valve(s) Two exhalation valves significantly reduce air resistance. ⁽²⁾
- Eyepiece(s) The one-piece panoramic visor in scratchproof, coated polycarbonate ensures an exceptionally wide field of vision, particularly for binocular field. The visor allows the use of light weapons and permits wearing traditional spectacles. ⁽²⁾
- This feature eliminates the need for supplying the soldier with two different kinds of spectacles and also allows for quick donning, even for users wearing spectacles. Spectacle wearers represent about 30% of personnel in the Belgian forces. ⁽²⁾
- Facepiece The material of the facepiece, bromobutyl rubber, is impermeable to chemical warfare agents and easy to decontaminate. The bromobutyl composition was selected for its chemical, mechanical, and antiallergenic properties, as well as for its compatibility with the skin. It ensures the wearer is secure and comfortable. ⁽²⁾
- Monoblock Single component combining inhalation, exhalation, communication, drinking, prevention of misting, and draining of excessive perspiration. Manufactured in polyacetal, chosen for its high resistance to shock and attrition. ⁽²⁾

- **Breathing Resistance:** Low. ⁽¹⁾
- **Airflow:** The mask may be attached to a blower unit providing positive airflow. ⁽⁵⁾
- **Communications Enhancement:** Optimized acoustic performance due to the location and the design of the high-performance speech diaphragm provides excellent voice transmission. ⁽¹⁾

The selected position of the membrane ensures compatibility with the classical telecommunication devices like microphones, telephones, etc. Engicom is now studying the integration of a microphone directly into the mask. ⁽²⁾

- **Protection Afforded:** Impermeable to chemical warfare agents. ⁽²⁾
- **Manufacturer(s):**

Registered Office Engicom S.A.N.V.
Emile Jacqmainlaan 162, Box 55
B-1210 Brussels
Belgium ⁽¹⁾

Offices Binnensteenweg 172
 B-2530 Boechout
 Belgium
 Tel: 032 3 4600490
 Fax: 032 3 4600390 ⁽¹⁾

- **Compatibility:** Compatible with combat spectacles. ⁽¹⁾
- **Storage Life:** Not available.
- **Donning Time:** Less than 9 seconds. ⁽⁵⁾
- **Field of Vision:** Greater than 80% binocular field. ^(1, 2)
- **Accessories:** (Under development). ⁽⁵⁾

Carrying Box/Bag. ⁽²⁾
Integrated Microphone. ⁽²⁾
Safety Cap (for water bottle). ⁽²⁾
Spectacles. ⁽¹⁾

- **Decontaminability:** Not available.
- **Fogging Characteristic(s):** The inhalation valves deflect air over the eyepiece to ensure a fog-free lens. ⁽³⁾
- **Deployment:** Not available.
- **Miscellaneous:** Main spare parts: ⁽²⁾

Exhalation valves
Head harness
Head harness buckles
Inhalation valve
Monoblock
One-piece panoramic visor
Speech diaphragm

2.3 REFERENCES

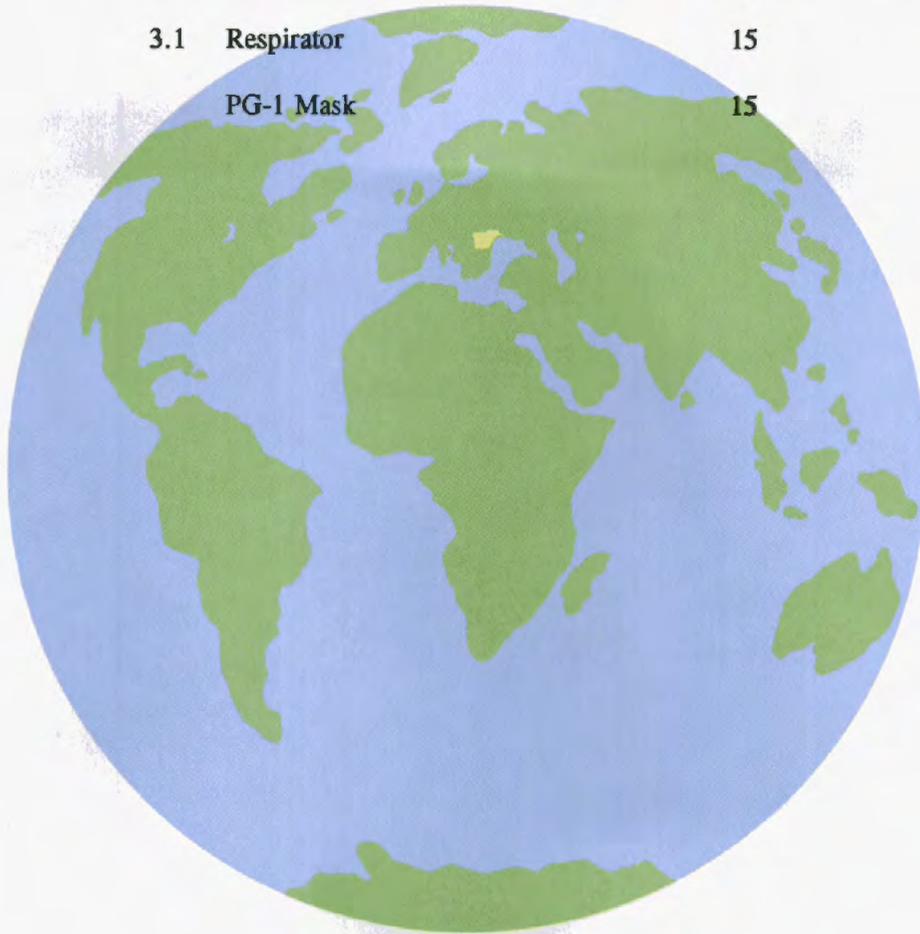
1. "The General Purpose Respirator BEM 4GP." Brochure from Engicom S.A.N.V.
2. "BEM 4GP Protection Respirator." Specifications from Engicom S.A.N.V.
3. Analysis based on photo evaluation of the mask by CBIAC personnel.
4. Specification for the Belgian NBC Canister. Provided by Service Technique de la Force Terrestre, Centre des Applications Technologiques.
5. Correspondence from Service Technique de la Force Terrestre, Centre des Applications Technologiques.



Chapter 3 – Bulgaria

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3.1 RESPIRATOR



Sketch courtesy of Banelle.

The Bulgarian PG-1

The Bulgarian PG-1 has two quasitriangular eyepieces, a centrally located canister mount, an internal nosecup, voicemitter, and a five-point head harness suspension. The respirator is also provided with a neck strap to allow it to be carried on the chest when not on the face. The mask does not permit drinking. *

*Analysis based on photo evaluation of the mask by CBIAC personnel.



Chapter 4 – Canada

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A circular world map with green continents and blue oceans. The country of Canada is highlighted in yellow.

4.1 FILTRATION

- **Item Name(s):** C1 Canister

- **Use(s):** Used with the Canadian C3 respirator. ⁽⁵⁾

- **Physical Characteristic(s):**

Aerosol Filter Pleated paper. ⁽⁵⁾

Canister Aluminum, black in color. ⁽⁵⁾

Gas Filter Activated impregnated charcoal. ⁽⁵⁾

Thread The thread is a North American standard that was used by U.S. DOA and DND before the NATO thread was adopted. ⁽¹⁹⁾

Thread Size 2.335 inch x 8 TPI. ⁽¹⁹⁾

- **Performance Specification(s):**

Gas Life

CG Life Minimum requirement is 9.5 minutes at an airflow of 30 L/min, concentration of 20 g/m³, RH of less than 15%. Typical lifetime is 15 to 20 minutes. ⁽¹⁹⁾

CK Life Minimum requirement is 30 minutes at an airflow of 30 L/min, concentration of 4 g/m³. Typical lifetime is 50 minutes. ⁽¹⁹⁾

- **Deployment:** The Canadian C1 canister is used in the U.S. with the M9A1 mask. ⁽⁸⁾

- **Manufacturer(s):** No longer manufactured. ⁽¹⁰⁾

Formerly Racal Filter Technologies, Ltd.
Manufactured by 1175 California Avenue
 P.O. Box 665
 Brockville, Ontario K6V 5V8
 Canada
 Tel: (613) 345-0111
 Fax: (613) 345-2639 ⁽¹⁰⁾

- **Stock Number(s):** 4240-21-111-2230 (now cancelled). ⁽¹⁹⁾

- **Miscellaneous:** A sealing cap and rubber sealing plugs are provided to prevent moisture from entering the canister during storage. ⁽¹⁴⁾

This canister is no longer in service with the Canadian forces. ⁽¹⁹⁾

- **Item Name(s):** C2 Canister
- **Use(s):** Used with the Canadian C4 and AC4 respirators and may be used with the Canadian C3 respirator if canister adapter is available. ^(9, 10)

- **Physical Characteristic(s):**

Aerosol Filter	Paper. ⁽²⁾
Canister	Anodized black or custom color. ⁽²⁾
Diameter	106 mm. ⁽¹⁶⁾
Gas Filter	Activated ASC/TEDA or charcoal, 170 cm ³ . ^(2, 19)
Height	77 mm. ⁽²⁾
Thread	NATO standard, conforms to STANAG 4155. ⁽²⁾
Thread Size	40 x 3.63 mm. ⁽²⁾
Weight	265 g. ⁽²⁾

- **Performance Specification(s):**

Aerosol Efficiency	99.99% for DOP particles of 0.3 microns. ⁽³⁾ 0.006% penetration DOP at an airflow of 32 L/min (using ASC/TEDA charcoal). ⁽¹⁰⁾
Airflow Resistance	Between 8.5 and 15.5 mm H ₂ O at an airflow of 32 L/min (using ASC/TEDA charcoal). ⁽¹⁰⁾ C2 canister filter averages 13 mm H ₂ O. ⁽¹⁹⁾

Gas Life

CG Life	Minimum requirement is 9.5 minutes at an airflow of 30 L/min, concentration of 20 g/m ³ , RH of less than 15%. Typical lifetime is 15 minutes. ⁽¹⁹⁾
CK Life	Minimum requirement is 60 minutes at an airflow of 30 L/min, concentration of 4 g/m ³ . Typical lifetime is 80 minutes. ⁽¹⁹⁾

- **Deployment:** The C2 was developed under an MOU between DND and U.S. DOA; under the agreement DND transferred the technology to the U.S. ⁽¹⁹⁾

The Canadian C2 canister is used in the U.S. with the M40, M42, M43 series, MCU-2/P, and MCU-19/P. ⁽¹⁸⁾

The C2 canister design is manufactured to a common Technical Data Package (TDP) for both the U.S. and Canadian versions. Minor differences in specification result from the use of ASC charcoal (U.S. specification) and TEDA-treated ASC charcoal (Canadian specification).⁽¹⁰⁾

- **Manufacturer(s):** Racal Filter Technologies, Ltd.
1175 California Avenue
P.O. Box 665
Brockville, Ontario K6V 5V8
Canada
Tel: (613) 345-0111
Fax: (613) 345-2639⁽²⁾

- **Stock Number(s):**

4240-21-871-7842 with ASC charcoal (NATO).^(2, 19)
4240-21-900-4744 with ASC/TEDA charcoal (NATO).^(10, 19)
4240-01-119-2315 with ASC charcoal (NSN, U.S.).⁽¹⁹⁾

- **Miscellaneous:** The Racal C2 family of NBC canisters consists of a variety of models designed for use with face masks for individual protection or with blower units for collective protection in vehicles, aircraft, or ships. The C2, C3, C4, C5, and C6 canisters use a Racal-developed paper particulate filter and a bed of activated charcoal to protect personnel against chemicals, biological toxic agents, and radioactive dust particles. The C2, C4, and C6 designs incorporate the NATO standard threads, but vary in canister weight and size of the charcoal bed. Of these models the C4 provides the longest protection. The C3 is designed for collective protection in a marine environment. The C5 model is intended for use with older face masks that do not incorporate the NATO standard thread.^(2, 19)

- **Item Name(s):** C3 Canister
- **Use(s):** The C3 canister is not typically used on respirators. This filter is in service with the Canadian Navy as a part of a multifilter collective protection air filtration unit. ⁽¹⁹⁾
- **Physical Characteristic(s):**

Aerosol Filter	Paper. ⁽²⁾
Canister	Anodized black or custom color. ⁽²⁾
Diameter	106 mm. ⁽¹⁶⁾
Gas Filter	Activated ASC/TEDA charcoal, 300 cm ³ . ^(2, 19)
Height	86 mm (minus cap and plug). ⁽¹⁹⁾
Thread	The thread is a North American standard that was used by U.S. DOA and DND before the NATO thread was adopted. ⁽¹⁹⁾
Thread Size	2.335 inch x 8 TPI. ⁽²⁾
Weight	350 g. ⁽²⁾
- **Performance Specification(s):**

Aerosol Efficiency	0.010% penetration DOP at an airflow of 32 L/min. ⁽¹⁰⁾
Airflow Resistance	Between 13 and 22 mm H ₂ O at an airflow of 32 L/min. ⁽¹⁰⁾
Gas Life	
CG Life	Minimum requirement is 19 minutes at an airflow of 50 L/min, concentration of 20 g/m ³ , RH of less than 15%. Typical lifetime is 25-32 minutes. ⁽¹⁹⁾
CK Life	Minimum requirement is 20 minutes at an airflow of 100 L/min, concentration of 4 g/m ³ . Typical lifetime is 23 minutes. ⁽¹⁹⁾
- **Deployment:** The Canadian C3 canister is used with the U.S. M40 and M42 masks. It is not compatible with the U.S. M43 due to the motor blower on this mask. ⁽⁸⁾
- **Manufacturer(s):** Racal Filter Technologies, Ltd.
1175 California Avenue
P.O. Box 665
Brockville, Ontario K6V 5V8
Canada
Tel: (613) 345-0111
Fax: (613) 345-2639 ⁽²⁾

- **Stock Number(s):** 4240-21-894-3710 (NATO). ⁽²⁾

- **Miscellaneous:** The Racal C2 family of NBC canisters consists of a variety of models designed for use with face masks for individual protection or with blower units for collective protection in vehicles, aircraft, or ships. The C2, C3, C4, C5, and C6 canisters use a Racal-developed paper particulate filter and a bed of activated charcoal to protect personnel against chemicals, biological toxic agents, and radioactive dust particles. The C2, C4, and C6 designs incorporate the NATO standard threads, but vary in canister weight and size of the charcoal bed. Of these models the C4 provides the longest protection. The C3 is designed for collective protection in a marine environment. The C5 model is intended for use with older face masks that do not incorporate the NATO standard thread. ^(2, 19)

- **Item Name(s):** C4 Canister
- **Use(s):** Used with the Canadian C4 and AC4 respirators, or the Canadian C3 respirator if canister adapter is available. ^(2, 9)

The C4 canister is not currently in service use. ⁽¹⁰⁾

- **Physical Characteristic(s):**

Aerosol Filter	Paper. ⁽²⁾
Canister	Anodized black or custom color. ⁽²⁾
Diameter	106 mm. ⁽¹⁶⁾
Gas Filter	Activated ASC/TEDA charcoal, 295 cm ³ . ^(2, 19)
Height	91 mm (minus cap and plug). ⁽¹⁹⁾
Thread	NATO standard, conforms to STANAG 4155. ⁽²⁾
Thread Size	40 x 3.63 mm. ⁽²⁾
Weight	350 g. ⁽²⁾

- **Performance Specification(s):**

Aerosol Efficiency	0.010% penetration DOP at an airflow of 32 L/min. ⁽¹⁰⁾
Airflow Resistance	Between 13 and 22 mm H ₂ O at an airflow of 32 L/min. ⁽¹⁰⁾
Gas Life	
AC Life	Typical lifetime is 107 to 133 minutes at an airflow of 30 L/min, concentration of 4 g/m ³ . ⁽¹⁹⁾
CG Life	Typical lifetime is 56 to 64 minutes at an airflow of 30 L/min, concentration of 20 g/m ³ , RH of 80%. ⁽¹⁹⁾
CK Life	Typical lifetime is 171 to 221 minutes at an airflow of 30 L/min, concentration of 4 g/m ³ . ⁽¹⁹⁾

- **Deployment:** The Canadian C4 canister is used with the U.S. M40 and M42 masks. It is not compatible with the U.S. M43 due to the motor blower on this mask. ⁽⁸⁾

- **Manufacturer(s):** Racal Filter Technologies, Ltd.
1175 California Avenue
P.O. Box 665
Brockville, Ontario K6V 5V8
Canada
Tel: (613) 345-0111
Fax: (613) 345-2639 ⁽²⁾

- **Stock Number(s):** 4240-21-903-2027 (NATO). ⁽¹⁹⁾

- **Miscellaneous:** The Racal C2 family of NBC canisters consists of a variety of models designed for use with face masks for individual protection or with blower units for collective protection in vehicles, aircraft, or ships. The C2, C3, C4, C5, and C6 canisters use a Racal-developed paper particulate filter and a bed of activated charcoal to protect personnel against chemicals, biological toxic agents, and radioactive dust particles. The C2, C4, and C6 designs incorporate the NATO standard threads, but vary in canister weight and size of the charcoal bed. Of these models the C4 provides the longest protection. The C3 is designed for collective protection in a marine environment. The C5 model is intended for use with older face masks that do not incorporate the NATO standard thread. ^(2, 19)

- **Item Name(s):** C5 Canister
- **Use(s):** The C5 canister model is intended for use with older face masks that do not incorporate the NATO standard threads. ⁽²⁾
- **Physical Characteristic(s):**

Aerosol Filter	Paper. ⁽²⁾
Canister	Anodized black or custom color. ⁽²⁾
Diameter	106 mm. ⁽¹⁶⁾
Gas Filter	Activated ASC/TEDA or ASC charcoal, 170 cm ³ . ^(2, 19)
Height	72 mm (minus cap and plug). ^(2, 19)
Thread	Non-NATO. ⁽²⁾
Thread Size	2.335 inch x 8 TPI. ⁽²⁾
Weight	265 g. ⁽²⁾
- **Performance Specification(s):**

Aerosol Efficiency	0.006% penetration DOP at an airflow of 32 L/min. ⁽¹⁰⁾
Airflow Resistance	Between 8.5 and 15.5 mm H ₂ O at an airflow of 32 L/min. ⁽¹⁰⁾
Gas Life	
CG Life	Minimum requirement is 9.5 minutes at an airflow of 30 L/min, concentration of 20 g/m ³ , RH of less than 15%. Typical lifetime is 15 minutes. ⁽¹⁹⁾
CK Life	Minimum requirement is 60 minutes at an airflow of 30 L/min, concentration of 4 g/m ³ . Typical lifetime is 80 minutes. ⁽¹⁹⁾
- **Deployment:** The C5 canister is in service with the Netherlands and Danish armed forces. ⁽¹⁰⁾
- **Manufacturer(s):**

Racal Filter Technologies, Ltd.
1175 California Avenue
P.O. Box 665
Brockville, Ontario K6V 5V8
Canada
Tel: (613) 345-0111
Fax: (613) 345-2639 ⁽²⁾

- **Stock Number(s):**

4240-21-902-3767 with ASC charcoal (NATO). ^(2, 19)

4240-17-055-9938 with ASC charcoal (NSN, Netherlands). ^(10, 19)

- **Miscellaneous:** The Racal C2 family of NBC canisters consists of a variety of models designed for use with face masks for individual protection or with blower units for collective protection in vehicles, aircraft, or ships. The C2, C3, C4, C5, and C6 canisters use a Racal-developed paper particulate filter and a bed of activated charcoal to protect personnel against chemicals, biological toxic agents, and radioactive dust particles. The C2, C4, and C6 designs incorporate the NATO standard threads, but vary in canister weight and size of the charcoal bed. Of these models the C4 provides the longest protection. The C3 is designed for collective protection in a marine environment. The C5 model is intended for use with older face masks that do not incorporate the NATO standard thread. ^(2, 19)

- **Item Name(s):** C6 Canister
- **Use(s):** Used with the Canadian C4 and AC4 respirators, or the Canadian C3 respirator if canister adapter is available. ^(2, 9)

The C6 canister is not currently in service use. ⁽¹⁰⁾

- **Physical Characteristic(s):**

Aerosol Filter	Paper. ⁽²⁾
Canister	Anodized black or custom color. ⁽²⁾
Diameter	106 mm. ⁽¹⁶⁾
Gas Filter	Activated ASC/TEDA or ASC charcoal, 220 cm ³ . ^(2, 19)
Height	82 mm (minus cap and plug). ⁽¹⁹⁾
Thread	NATO standard, conforms to STANAG 4155. ⁽²⁾
Thread Size	40 x 3.63 mm. ⁽²⁾
Weight	299 g. ⁽²⁾

- **Performance Specification(s):**

Gas Life

AC Life	Typical lifetime is 70 to 106 minutes at an airflow of 30 L/min, concentration of 4 g/m ³ . ⁽¹⁹⁾
CG Life	Typical lifetime is 84 to 112 minutes at an airflow of 30 L/min, concentration of 4 g/m ³ . ⁽¹⁹⁾
CK Life	Typical lifetime is 34 to 38 minutes at an airflow of 30 L/min, concentration of 20 g/m ³ , RH of 80%. ⁽¹⁹⁾

- **Deployment:** Not available.
- **Manufacturer(s):** Racal Filter Technologies, Ltd.
1175 California Avenue
P.O. Box 665
Brockville, Ontario K6V 5V8
Canada
Tel: (613) 345-0111
Fax: (613) 345-2639 ⁽²⁾

- **Stock Number(s):** Not available.
- **Miscellaneous:** The Racal C2 family of NBC canisters consists of a variety of models designed for use with face masks for individual protection or with blower units for collective protection in vehicles, aircraft, or ships. The C2, C3, C4, C5, and C6 canisters use a Racal-developed paper particulate filter and a bed of activated charcoal to protect personnel against chemicals, biological toxic agents, and radioactive dust particles. The C2, C4, and C6 designs incorporate the NATO standard threads, but vary in canister weight and size of the charcoal bed. Of these models the C4 provides the longest protection. The C3 is designed for collective protection in a marine environment. The C5 model is intended for use with older face masks that do not incorporate the NATO standard thread. (2, 19)

4.2 RESPIRATORS



**Top: The Canadian AC4 with
ACDVS Filter/Blower**

**Bottom Left: The Canadian AC4
with Drinking
System**

**Bottom Right: Left-side view of
the Canadian AC4**

Photo courtesy of SNC Industrial Technologies, Inc.



Bottom photos courtesy of Canadian Forces Liaison Officer to U.S. Army TECOM and DREO personnel.

- **Designator(s):** AC4
- **Item Name(s):** NBC AC4 Aircrew Respirator
- **Item Description:** The Canadian AC4 respirator consists of a modified C4 gas mask and a hose assembly. The modifications to the C4 mask include: a low-profile, head harness attachment to allow for the comfortable wearing of the aircrew helmet, an internal microphone, a noise blanking plug to improve electronic communications in a noisy environment, and a valsalva device. The bonnet style head harness is adjustable on the modified C4. The AC4 assembly may be connected on either the right or left side of the mask via a hose assembly. It is used in conjunction with the ACDVS filter/blower and a power source. However, the mask can function with or without powered ventilation. ^(4, 19)

Like the C4, the AC4 consists of a black bromobutyl rubber facepiece with in-turned peripheral face seal. The mask has an internal silicone nose cup. The one-way valve located on the nose cup deflects incoming air over the eyepieces to eliminate fogging. There are two uniquely shaped, circular, convex eyepieces made of polycarbonate. The voicemitter is located in the center front of the mask just below the eyepieces and has a black plastic covering. The outlet valve and its cover are found just below the voicemitter. This mask also has an integral drinking device. ^(4, 19)

- **Total Weight:**

925 g.	⁽¹⁹⁾
AC4 Mask	470 g.
Canister	265 g.
Hose Assembly	190 g.
- **Stock Number(s):** Not available.
- **Sizes Available:** Extra-small, small, medium, and large. ⁽⁴⁾
- **Use(s):** Developed for Canadian aircrew including helicopter, transport, and patrol aircraft. ⁽⁴⁾
- **Component(s):**

Canister	Uses the Canadian C2 canister attached to the AC4 assembly. May be used with any NATO standard thread canister including the Canadian C4 and C6 canisters. ^(4, 15)
Canister Mount	NATO standard. The AC4 assembly may be worn on either the right or left side canister mount with the Canadian C2 canister attached to it. ⁽⁴⁾
Drinking Device	The drinking device meets NATO standards and permits safe and easy drinking of fluids and liquid foods from a canteen. It is compatible with the U.S. M1 canteen cap or Canadian designed canteen caps. ⁽⁴⁾

Eyepiece(s) The shatterproof polycarbonate lenses with antiscratch coating are uniquely shaped and positioned for optimum field of view. They are compatible with spectacles and optical equipment. ⁽⁴⁾

Facepiece The facepiece is injection molded from bromobutyl rubber and is fitted with an in-turned peripheral face seal to provide maximum protection against field concentration of all known NBC agents, screening smoke, and particulates. Resists thermal radiation and maintains a high degree of user comfort. ⁽⁴⁾

Head Harness The bonnet style head harness is adjustable. ⁽¹⁵⁾

Nosecup Soft black silicone rubber. ⁽¹⁹⁾

- **Breathing Resistance:** Low. ⁽⁴⁾
- **Airflow:** The AC4 assembly is used in conjunction with the ACDVS filter/blower and a power source. The respirator has a lung-powered de-mist and can function with or without powered ventilation. The ventilator however, improves chemical protection, reduces breathing effort, provides pressure for increased chemical protection, and creates a cooling effect. ⁽⁴⁾
- **Communications Enhancement:** The modified Canadian C4 allows an inside microphone to be installed on either side of the mask; the microphone can be connected through a jump wire to the helmet communication system. Additionally, a voicemitter is located on the center front of the mask. ^(4, 19)
- **Protection Afforded:** The assembled mask (with hood) is designed to protect the eyes, nose, throat, lungs, and facial skin against military nuclear, chemical, and biological agents, inhalation of radioactive dust, screening smoke, and riot-control agents. ⁽⁴⁾
- **Manufacturer(s):**

NBC AC4 Aircrew
Respirator

ARO Canada, Inc.
51 Worcester Road
Rexdal, Ontario
Canada M9W 4K2
Tel: (416) 675-5611
Fax: (416) 675-6920 ⁽⁴⁾

NBC C4 Gas Mask

SNC Industrial Technologies, Inc.*
5 Montee des Arsenaux
Le Gardeur, Québec J5Z 2P4
Canada
Tel: (514) 581-3080
Fax: (514) 581-0231 ⁽⁴⁾

*Previously trading as Canadian Arsenals Limited.

- **Compatibility:** Eyepieces are compatible with combat spectacles and optical equipment. ⁽⁴⁾

Drinking device is compatible with the U.S. M1 canteen cap and Canadian designed canteen caps. ⁽⁴⁾

The AC4 may be connected to aircraft oxygen; all components are oxygen compatible. ⁽⁴⁾

- **Storage Life:** 10 years. ⁽¹⁹⁾
- **Donning Time:** Less than 9 seconds. ⁽¹⁹⁾
- **Field of Vision:** Circular wide-angle. ⁽⁴⁾
- **Accessories:** Not available.
- **Decontaminability:** The AC4 is resistant to the absorption of chemical agents and can be sanitized and decontaminated using in-service decontaminants and procedures. ⁽⁴⁾
- **Fogging Characteristic(s):** The mask design allows air circulation, and a one-way valve on the nosecup virtually eliminates lens fogging. ⁽⁴⁾
- **Deployment:** Not available.
- **Miscellaneous:** The respirator materials are resistant to oils, fuels, and lubricants. All metal parts are nonmagnetic. ⁽⁴⁾

The Canadian C3



Photos courtesy of CBIAC personnel.



**The Netherlands GTR75,
an Export Model of the
Canadian C3**

- **Designator(s):** C3
- **Item Name(s):** Cml-Bio C3 Mask
- **Item Description:** The Canadian C3 mask features a black facepiece made of an elastomeric material and incorporates a flat peripheral design. The two round eyelenses are approximately 60 mm in diameter. Masks are available with a left-side or right-side canister mount. This mask also has an internal nose cup, an integral speech transmitter/exhalation valve assembly, and a six-point head harness suspension with adjustable elastic straps attached to a head pad. The C3 does not permit drinking. ^(15, 19)
- **Total Weight:**

	715 g. ⁽³⁾
Canister	280 g. ⁽⁵⁾
Facepiece	435 g. ⁽³⁾
- **Stock Number(s):**

Bromobutyl rubber	4240-21-896-5848 (NATO). ⁽²⁾
Natural rubber	4240-21-882-8010 (NATO). ⁽²⁾
- **Sizes Available:** Small, medium, and large. ⁽³⁾
- **Use(s):** Used by the Canadian armed forces as a general purpose respirator. Not intended for tanks or aircrews. ^(3, 6)
- **Component(s):**

Canister	Uses the Canadian C1 canister. A canister adapter is available allowing the mask to accommodate NATO standard thread canisters such as the C2, C4, and C6. ⁽⁵⁾
Canister Mount	Non-NATO. ⁽⁵⁾
Exhalation Valve/Voicemitter Assembly	Large circular exhalation valve ensures low breathing resistance, and a double layer of polyester film permits clear transmission of speech. ⁽³⁾
Eyepiece(s)	Two eyepiece assemblies, each consisting of a shatter-proof flat glass lens, 63.5 mm in diameter, with appropriate inner and outer rims, washer, and clamp assembly, are attached to the facepiece. Positioned close to the wearer's eyes, the circular eyepieces give a wide-angle field of vision, allowing the use of optical instruments such as binoculars and gun sights. The eyepiece provides distortion-free vision across the entire surface. ⁽³⁾
Facepiece	Injection molded from bromobutyl rubber or natural rubber. ^(3, 9)

Head Harness Six-point suspension with adjustable elastic straps. ⁽¹⁵⁾

Nosecup Its one-way valve is made of natural rubber and ensures that the eyepieces stay fog free. ⁽³⁾

● **Breathing Resistance:** Low. ⁽³⁾

Inhalation Resistance 65.5 mm of H₂O at an airflow of 85 L/min. ⁽¹³⁾

Exhalation Resistance 23.9 mm of H₂O at an airflow of 85 L/min. ⁽¹³⁾

● **Airflow:** No positive airflow available. ⁽¹⁵⁾

● **Communications Enhancement:** Two-ply polyester film speech diaphragm is bypassed peripherally by exhaled air. ⁽³⁾

● **Protection Afforded:** With an approved canister, protects wearer's respiratory tract, face, and eyes against field concentrations of all known NBC chemical and biological warfare agents, radioactive dust, and camouflage smoke. ^(3, 19)

Protection factor of 10⁵ has been recorded with spores. ⁽⁹⁾

● **Manufacturer(s):** SNC Industrial Technologies, Inc.*
5 Montée des Arsenaux
Le Gardeur, Québec J5Z 2P4
Canada
Tel: (514) 581-3080
Fax: (514) 581-0231 ⁽³⁾

● **Compatibility:** Combat spectacles and ear clips are designed to be compatible with the mask. ⁽³⁾

● **Storage Life:** 5 years. ⁽³⁾

● **Donning Time:** Less than 9 seconds. ⁽¹⁹⁾

● **Field of Vision:** Circular wide angle. ⁽³⁾

Restricts downward and peripheral vision. ⁽¹⁸⁾

● **Accessories:**

Carrier A rugged fabric bag with quick opening device for fast access to the mask. Pockets on the inside and outside of the bag store accessories as required. ^(3, 9)

Combat Spectacles ⁽³⁾

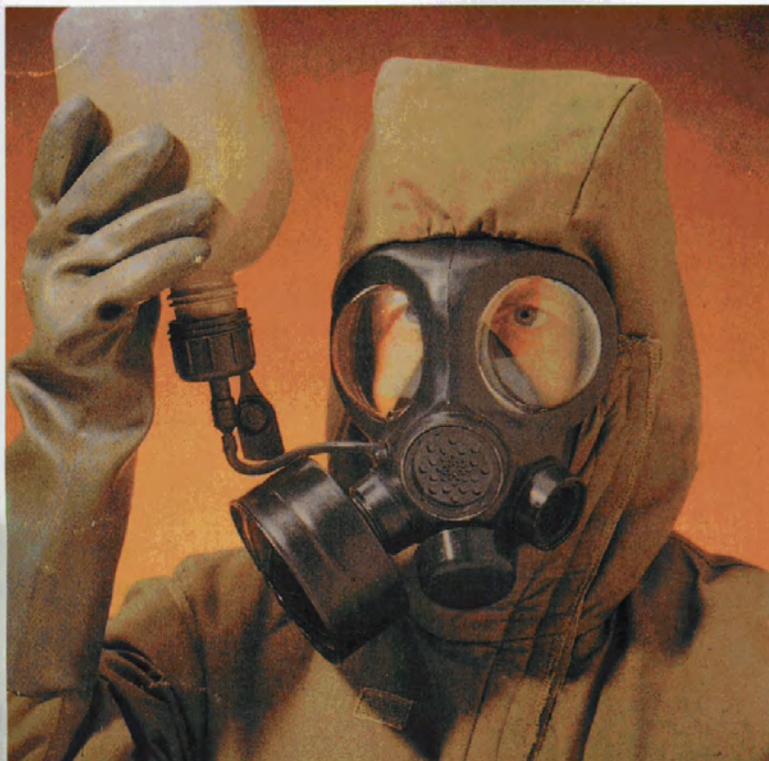
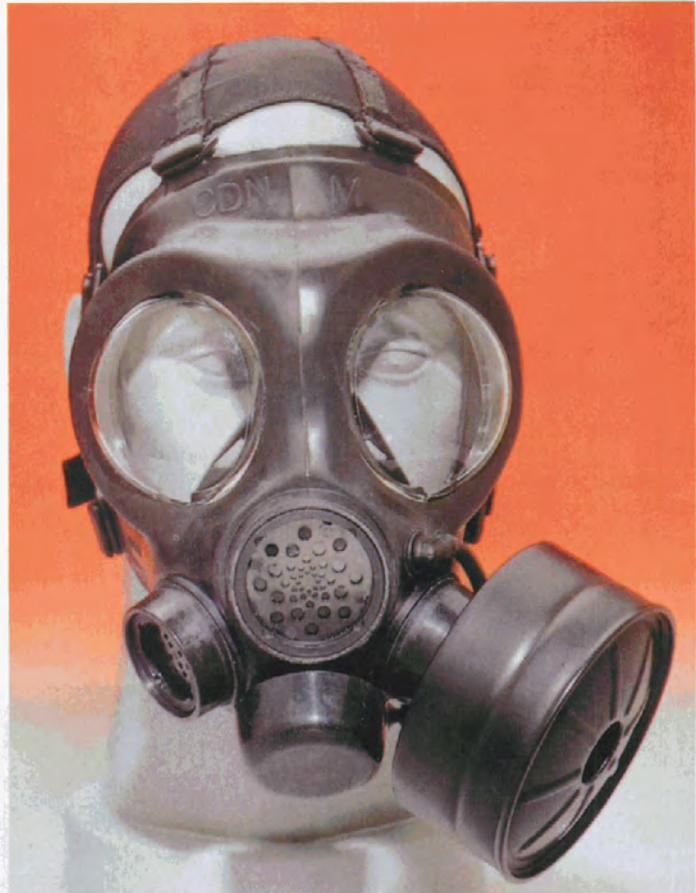
*Previously trading as Canadian Arsenals Limited.

- **Decontaminability:** The C3 mask can be easily disassembled into its component parts, all of which can be immersed in water for cleaning, except the canister. ⁽³⁾
- **Fogging Characteristic(s):** One-way valve in nose cup ensures fog-free lenses. ⁽³⁾
- **Deployment:** The C3 was purchased by the Netherlands and Denmark for use as a general purpose respirator. The Netherlands designates this mask as the GTR75 and currently is seeking a replacement for the C3. ^(7, 8, 19)

The Royal Netherlands Air Force uses the C3 and the S10. ⁽¹¹⁾

- **Miscellaneous:** Store between 55° F and 70° F. ⁽¹⁹⁾

The Canadian C4



Photos courtesy of SNC Industrial Technologies Inc.

**The Canadian C4 with
Drinking System**

- **Designator(s):** C4
- **Item Name(s):** Cml-Bio C4 Mask
- **Item Description:** The Canadian C4 mask consists of a bromobutyl rubber facepiece with in-turned peripheral face seal. The mask has an internal silicone noseclip. The one-way valve located on the noseclip deflects incoming air over the eyepieces to eliminate fogging. There are two uniquely shaped, circular, convex eyepieces made of polycarbonate. Either the right- or left-side canister mount may be used. The primary voicemitter is located in the center front of the mask just below the eyepieces and has a black glass-filled nylon protector plate. A secondary voicemitter is attached to the unused canister mount. An outlet valve is found just below the center voicemitter. It is composed of a black metal, circular ring and has a detachable rubber covering to provide dead air space and access to the outlet valve. This mask also has an integral drinking device. The mask is held in place by a six-point elastic mesh bonnet that needs to be adjusted only at the two lower positions. ^(1, 15, 19)

The C4 mask was developed by the Defence Research Establishment, Ottawa (DREO). DREO holds five patents for the design of the C4 and its components. ⁽¹⁸⁾

Following field trial testing in Canada and Europe and during Operation Desert Storm, a number of minor engineering changes were made to the C4 including the development of a corrective lens insert system for export models. Canada still intends to wear the C4 with combat spectacles, and new combat spectacles are being developed by DREO. ^(17, 19)

- **Total Weight:**

705 g.	⁽¹⁾
Canister	265 g (C2 canister). ⁽²⁾
Facepiece	440 g. ⁽¹⁾
- **Stock Number(s):**

Black	4240-21-908-1095 (NATO). ⁽¹⁹⁾
Green	4240-21-908-1096 (NATO). ⁽¹⁹⁾
- **Sizes Available:** Extra-small, small, medium, and large. These sizes fit 94 percent of the population. ^(1, 12)
- **Use(s):** Used by the Canadian armed forces as a general purpose respirator. The basic C4 mask with modifications is also used for tanks and aircrews. ^(1, 19)
- **Component(s):**

Canister	May be used with any NATO standard thread canister including the Canadian C2, C4, and C6 canisters. ^(2, 19)
Canister Mount	NATO standard. ⁽¹⁾

Drinking Device The drinking device meets NATO standards and permits safe and easy drinking of fluids and liquid foods from a canteen without removing the gas mask. Compatible with the M1 and Canadian design canteen caps. ⁽¹⁾

Made from "supertoughened glass reinforced nylon 6/6" (Zytel 8018). ^(17, 19)

Eyepiece(s) The shatter-proof polycarbonate lenses with antiscratch coating are uniquely shaped and positioned for optimum field of view. They are compatible with combat spectacles and optical equipment. The mask design allows air circulation to virtually eliminate any fogging of the lenses. ⁽¹⁾

Patented coating passes mustard and nerve agent smear test and durability requirements. ^(17, 19)

Facepiece Injection molded from bromobutyl rubber, with an in-turned peripheral face seal providing maximum protection against field concentrations of all known NBC agents, screening smoke and particulates. Resists thermal radiation and maintains a high degree of user comfort. The facepiece design allows any NATO standard canister (STANAG 4155) to be adapted easily to the right or left side. ⁽¹⁾

The facepiece color is olive green or black. ^(12, 19)

Head Harness Nylon/lycra net with a six-point suspension. ⁽¹³⁾

Nosecup Soft black silicone rubber provides comfort. A one-way valve on the nosecup ensures the eyepieces stay fog free. ^(1, 19)

Other Plastic Components Zytel 80G-33. ⁽¹⁷⁾

● **Breathing Resistance:**

Inhalation Resistance 4 mm H₂O at an airflow of 30 L/min. ⁽¹⁾

52.7 mm H₂O at an airflow of 85 L/min. ⁽¹³⁾

Exhalation Resistance 4 mm H₂O at an airflow of 30 L/min. ⁽¹⁾

22.5 mm H₂O at an airflow of 85 L/min. ⁽¹³⁾

● **Airflow:** No positive airflow available. ⁽¹⁵⁾

- **Communications Enhancement:** Two speech transmitters consisting of a membrane under tension provide maximum intelligibility. The primary speech transmitter is for person-to-person communication; the side speech transmitter is compatible with telecommunication equipment. ⁽¹⁾
- **Protection Afforded:** With an approved canister, offers protection for the wearer's respiratory tract, face and eyes against chemical and biological agents, radioactive dust, and camouflage smoke. Protection provided against all particulates. ⁽¹⁾

The C4 meets NATO, Canadian Armed Forces, and Triptych protection requirements. ⁽¹⁾

- **Manufacturer(s):** SNC Industrial Technologies, Inc.*
5 Montee des Arsenaux
Le Gardeur, Québec J5Z 2P4
Canada
Tel: (514) 581-3080
Fax: (514) 581-0231 ⁽¹⁾
- **Compatibility:** Compatible with optical equipment including combat spectacles and telecommunications equipment. ⁽¹⁾

Compatible with all items of combat clothing and equipment. ⁽¹²⁾
- **Storage Life:** 10 years. ⁽¹⁹⁾
- **Donning Time:** Less than 9 seconds. ⁽¹⁹⁾
- **Field of Vision:** Vision is 90% of normal. ⁽¹²⁾

Improved vision over the Canadian C3. ⁽¹⁸⁾
- **Accessories:** The carrier is a rugged agent-resistant, polymer-coated fabric bag with a quick opening device for fast access to the mask. Pockets on the inside and outside of the bag store accessories as required. ⁽¹⁾
- **Decontaminability:** The C4 features a streamlined design for easy decontamination and can be easily disassembled into its component parts, all of which may be immersed in water for cleaning, except for the canister. Reassembly requires few tools, and refurbishing can be done in the field (leak tester is required). ⁽¹⁾
- **Fogging Characteristic(s):** Design of nose cup valve system ensures air circulation to prevent fogging. ⁽¹⁾
- **Deployment:** Not available.

*Previously trading as Canadian Arsenals Limited.

● **Miscellaneous:**

Cost	Less than \$150 based on 1992 estimates. ⁽¹⁷⁾
Operational Life	7 years. ⁽¹²⁾
Storage Temperature	-55°C to 60°C. ⁽¹⁾
Operational Temperature	-25°C to 52°C. ⁽¹⁾

Manufactured, tested and inspected to the following specifications:

Leakage rate	Maximum 10 ml/min at 75 mm of H ₂ O. ⁽¹⁾
Ozone Resistance	Greater than 336 hrs at 50 parts per 10 ⁸ . ⁽¹⁹⁾
Permanent Set at 500%	12% maximum. ⁽¹⁾
Tensile Stress at 5%	0.079 to 0.128 MPa (11.5 to 18.5 PSI). ⁽¹⁾
Tensile Stress at 500%	6.2 to 11.0 MPa (900 to 1600 PSI). ⁽¹⁾
Thermal Radiation	Resists 15 cal/cm ² /s. ⁽¹⁾
Ultimate Elongation	550% minimum. ⁽¹⁹⁾

4.3 REFERENCES

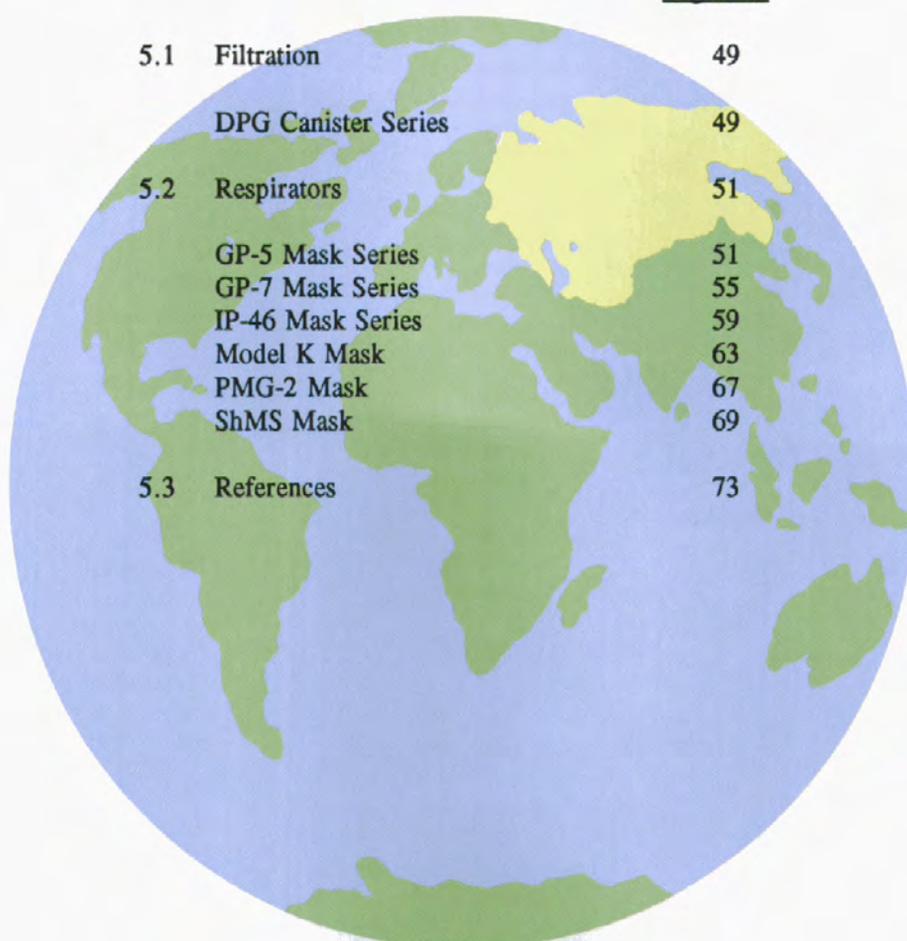
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Chapter 5 – Commonwealth of Independent States

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5.1 FILTRATION

- **Item Name(s):** DPG Canister Series
- **Use(s):** Used with the GP-5, GP-7, and PDF mask series. The DPG-1 provides protection against toxic agents including nitrogen dioxide, ethylene oxide, methyl chloride, and carbon monoxide. ⁽¹⁾
- **Physical Characteristic(s):**

Weight

DPG-1 Canister 500 g. ⁽¹⁾

DPG-3 Canister 350 g. ⁽²⁾

- **Performance Specification(s):**

Airflow Resistance 5 mm H₂O at an airflow of 15 L/min. ⁽¹⁾
10 mm H₂O at an airflow of 30 L/min. ⁽¹⁾

Gas Life

NH₃ Life 60 minutes at a concentration of 2.3 g/m³, temperature between -20°C and +40°C (DPG-1 Canister). ⁽¹⁾

60 minutes at a concentration of 5.0 g/m³, temperature between -20°C and +40°C. (DPG-3 Canister). ⁽³⁾

- **Deployment:** Not available.
- **Manufacturer(s):** NPO Neorganica
144 000 Electrostal
K. Marx Street 4
Commonwealth of Independent States
Tel: 07 5171
07 5135
07 5105 ^(1, 3, 4)

- **Stock Number(s):** Not available.
- **Miscellaneous:** The DPG series includes the DPG-1 and DPG-3 canisters. They are intended for use by adults and children of at least 18 months. ^(1, 3)

5.2 RESPIRATORS

The CIS GP-5



Photos courtesy of CBIAC Personnel.

The CIS ShM

- **Designator(s):** GP-5 Series
- **Item Name(s):** GP-5 Mask
GP-5M Mask
Shlem (ShM-1) Protective Mask
ShM Helmet Type Protective Mask
- **Item Description:** This series of masks includes several variations of the ShM Helmet Type mask. The GP-5 mask is the civilian counterpart to the ShM, the CIS military mask. The GP-5 does not have a voicemitter, whereas the ShM does. The GP-5M is an updated version of the GP-5, which includes a voicemitter. The model K communication mask, the ShMS optical mask, and the ShR head wound mask are all variants of the ShM protective mask. ^(2, 7, 10)

These masks feature an elastomeric material that extends over the entire face and head. The GP-5 extends over the ears as well as the head, but the Shlem and ShM have cut-outs for the ears. The canister mount is located at the chin position, and the exhalation valve is located directly behind it. The ShM has a voicemitter located just below the eyepieces and over the mouth area (the GP-5 does not). The circular eyepieces have an opening of approximately 50 mm in diameter and are held in place by metal clamps. None of the masks in the GP-5 series permit drinking or optical inserts. ^(2, 10)

- **Total Weight:** 825 g (GP-5 mask and DPG-1 canister). ^(1, 2)
1,274 g (largest ShM mask and MO-4U canister). ^(2, 10)

Canister

DPG-1	500 g. ⁽¹⁾
DPG-3	350 g. ⁽²⁾
MO-4U	840 g. ^(2, 10)

Facepiece

GP-5	325 g. ⁽²⁾
ShM	368 to 434 g (dependent on size). ⁽²⁾

- **Stock Number(s):** Not available.
- **Sizes Available:** Five sizes are available. ⁽³⁾
- **Use(s):** The GP-5 is a general purpose civilian mask, and the ShM is the standard protective mask for the CIS Army. ⁽¹⁰⁾
- **Component(s):**

Canister Chin-mounted canister can be connected directly to the mask or a canister hose. The GP-5 mask series uses the DPG canister series. In addition, the ShM uses the MO-4U filter canister weighing 840 g

alone or in combination with the MO-2 canister, which provides the added benefit of protection against carbon monoxide. Canisters from China and any former Warsaw Pact country will work with these masks. (1, 2, 3, 10)

Connecting Hose	This hose is a cloth-covered elastomer, and connects the canister to the facepiece. It weighs 170 to 219 g (depending on the size), is 530 mm long and 320 mm in diameter. At very low temperatures this hose may stiffen and crack. (2, 10)
Exhalation Valve	The ShM-1 may be found with either a double or single outlet valve. (2, 10)
Eyepiece(s)	Two small circular glass eyepieces are clamped to the mask by metal rings. (2)
Facepiece	Black or olive in color and composed of rubber, which may stiffen and crack at very low temperatures. (2)
Voicemitter	Vocal range of the mask is approximately 10 meters. (2)

- **Breathing Resistance:** Not available.
- **Airflow:** No positive airflow available. (2)
- **Communications Enhancement:** The voicemitter of the GP-5M and the ShM has a vocal range of nearly 10 meters; however, the helmet type mask impairs the hearing of the wearer. (2)
- **Protection Afforded:** The ShM mask with the MO-4U canister provides protection for the head, eyes, and respiratory system against all known CB agents. When the MO-4U canister is worn in combination with the MO-2, the wearer is provided with the additional benefit of protection against carbon monoxide. The facepiece will remain impervious to mustard and sarin for at least 24 hours at a temperature of 45°C. (2, 10)
- **Manufacturer(s):** Not available.
- **Compatibility:** Not available.
- **Storage Life:** Not available.
- **Donning Time:** The hose and the canister make donning difficult. (2)
- **Field of Vision:** This mask has a very limited field of vision, impairing 68% to 79% of the field. (2)
- **Accessories:**

Anti-Fogging Lenses Removable, specially coated lenses are issued with the mask. (2, 10)

Carrier Made of fabric and weight varies from 241 to 510 g depending on the size. ⁽²⁾

- **Decontaminability:** Not available.
- **Fogging Characteristic(s):** Lens fogging is inhibited in two ways: a specially coated antifog lens can be inserted inside the regular lens, or deflector tubes inside the facepiece draw inhaled air over the lenses to reduce fogging. ⁽²⁾
- **Deployment:** The ShM-1 is designated as the SCHM-41 in the former East Germany, and in Poland it is known as the P-GAZ. ⁽¹⁰⁾
- **Miscellaneous:** The ShM-1 causes a build-up of heat that may effect the amount of time the mask can be worn. ⁽²⁾

The GP-5 is being replaced by the GP-7. ⁽⁵⁾



Photo courtesy of CBIAC personnel.

The CIS GP-7WM

- **Designator(s):** GP-7 Series
- **Item Name(s):** GP-7 Mask
GP-7W Mask
GP-7WM Mask ^(8, 13)
- **Item Description:** The GP-7 series features a black elastomeric facepiece with two eyepieces held in place by metal collars. Two variants in this mask series, the GP-7W and the GP-7WM, differ in the eyepiece shape: in the GP-7W, the eyepieces are round, whereas the GP-7WM has more squared-off eyepieces. Both masks have a voicemitter located over the mouth position, a drink device below the voicemitter that allows drinking from a canteen, and an exhalation valve at the chin position. The GP-7W has only one canister mount located over the left cheek, whereas the GP-7WM has canister mounts located over both the left and right cheeks to accommodate both right- and left-handed wearers. Both masks have adjustable five-point head harness suspensions. ^(4, 7, 8)
- **Total Weight:**

GP-7W	900 g.	⁽⁸⁾
GP-7WM	950 g.	⁽⁴⁾

Canister 250 g. ⁽⁶⁾

Facepiece GP-7W 650 g. ^(6, 8)
 GP-7WM 700 g. ^(4, 6)
- **Stock Number(s):** Not available.
- **Sizes Available:** Available in three sizes; the size is marked on the right side of the chin area of the mask in a molded arabic numeral in a 12-mm-diameter circle. ⁽⁶⁾
- **Use(s):** Used as both a civilian and military NBC respirator. ⁽⁵⁾
- **Component(s):**

Canister	Uses the GP-7K filter unit. The canister is covered with a knitted fabric to protect it from rain, dust, snow, and dirt. ⁽⁵⁾ May be used with the DPG canister series. ^(1, 3)
Eyepiece(s)	Two circular eyepieces. ⁽⁷⁾ The mask comes equipped with a goggle unit. ⁽⁵⁾
Facepiece	The GP-7 uses a rubber facepiece designated as the MGP. ⁽¹⁾ A thin rubber strip on the periphery of the mask ensures a reliable seal between the face component and the head. The seal lies tightly against the face and expands independently of the mask body. ⁽⁵⁾
Head Harness	A five-point adjustable suspension is used with this mask. ⁽⁷⁾

- **Breathing Resistance:**
 - GP-7W 18.35 mm of H₂O at an airflow of 30 L/min.* ⁽⁸⁾
 - GP-7WM 15.29 mm of H₂O.* ⁽⁴⁾
- **Airflow:** No positive airflow available. ⁽⁷⁾
- **Communications Enhancement:** Uses a membrane type voicemitter. ⁽⁵⁾
- **Protection Afforded:** Designed to provide protection of the eyes and respiratory tract against chemical warfare agents, radioactive dust, and biological aerosols. ⁽⁵⁾

Provides up to six hours of protection against nerve gas vapors such as GB and GD, poison gases such as CK and HCN, and radioactive materials such as methyl iodide. ⁽⁸⁾

The breakthrough time for HD at ambient temperatures between -40°C and +40°C is two hours. ⁽⁸⁾
- **Manufacturer(s):** NPO Neorganica
144 000 Electrostal
K. Marx Street 4
Commonwealth of Independent States
Tel: 07 5171
07 5135
07 5105 ^(4, 8)
- **Compatibility:** Not available.
- **Storage Life:** The mask is stored with an insert in the facepiece to preserve its shape and placed in a polyethylene package. Masks are then stored in wooden boxes (20 per box) in a warehouse. ⁽⁶⁾

May be stored in manufacturer's packages under dry conditions at temperatures between -40°C and +50°C. ⁽⁸⁾
- **Donning Time:** Not available.
- **Field of Vision:** Not available.
- **Accessories:** A carrying case is provided with this mask. ⁽⁵⁾
- **Decontaminability:** Not available.
- **Fogging Characteristic(s):** The mask has snap-on clamping rings for fastening the nonfogging films. ⁽⁶⁾

*Data originally reported in Pascals.

- **Deployment:** Not available.
- **Miscellaneous:** The GP-7 series will gradually replace the GP-5 series. ⁽⁵⁾

The principles of the protective capability of the GP-7 protective mask, as well as the intended use of its main components, are the same as for the GP-5 mask. However, compared to the GP-5, the GP-7 has a number of advantages. The airflow resistance of the filter and absorption cartridge is reduced, thereby making breathing easier. The "independent" seal is more reliable and the pressure of the mask on the head is reduced allowing a longer time of use. These properties allow the mask to be used without difficulty by people over 60 years of age. And, for the first time, a protective mask may be used as a personal protective device for those suffering from lung and cardiovascular diseases of moderate severity. ⁽⁵⁾



Photo courtesy of CBIAC Personnel.

The CIS IP-46

- **Designator(s):** IP-46 Series
- **Item Name(s):** Insulating Protective Mask IP-46
CIS Model IP-46M Breathing Apparatus
- **Item Description:** The CIS IP-46M, which appears very similar to the CIS ShM mask, features a silver-grey, elastomeric facepiece that extends to cover the head and ears completely. Two circular eyepieces are clamped to the mask by metal collars, a molded nose region, and an air hose. ⁽⁷⁾

The IP-46M is an updated version of the IP-46 and is used underwater to a depth of 7M, to provide its user with a completely self-contained, regenerating oxygen supply for brief periods of time. The permissible temperature range for using the IP-46 and IP-46M is -20°C to +40°C. ^(2, 9, 10)

- **Total Weight:** Not available.
- **Stock Number(s):** Not available.
- **Sizes Available:** Not available.
- **Use(s):** The IP-46M is used by tank crews during snorkeling operations to provide a means of escape from submerged tanks. It also used by chemical reconnaissance and combat engineer personnel when operating in oxygen deficient or highly toxic environments. ^(2, 10)
- **Component(s):**

Air Hose This connects the facepiece and the breathing apparatus. ⁽²⁾

Breathing Apparatus The apparatus consists of an oxygen regenerating canister, a starting device, a U-shaped breathing bag, and four outlet valves. ^(2, 10)

The oxygen produced by the regeneration canister is sufficient to last 45 minutes during a high level of physical exertion, 50 minutes during moderate exertion or 180 minutes during light exertion. Up to eight hours of uninterrupted work is permissible if the canister is changed. A twelve-hour recovery period is required before the mask is put back on. For temperatures near 40°C, the time of use is not limited by the amount of available oxygen, but by physical capacity of the user. During extreme physical exertion, the upper limit is 30 minutes. ⁽⁹⁾

Eyepiece(s) Two circular glass eyepieces are clamped to the facepiece. ⁽²⁾

Facepiece An elastomeric material is used for the facepiece; it covers the face, head, and ears. ⁽²⁾

- **Breathing Resistance:** Not available.

- **Airflow:** The operational principle of the breathing apparatus is the regeneration of a certain volume of breathing air in a closed system. Oxygen is added and carbon dioxide and water are removed. ⁽⁹⁾
- **Communications Enhancement:** Not available.
- **Protection Afforded:** The IP-46M provides oxygen for its user in a toxic or oxygen deficient environment for approximately two hours. This apparatus will protect the respiratory system, eyes and face from poisonous gases and bacteriological agents. The rubber nose clamp and mouthpiece found in the face mask permit the apparatus to be used underwater for a short period of time. ^(2, 10)
- **Manufacturer(s):** Not available.
- **Compatibility:** Not available.
- **Storage Life:** Not available.
- **Donning Time:** Not available.
- **Field of Vision:** Not available.
- **Accessories:** Located in the two external pockets of the carrying bag are:
 - Ampules Four extra sulfuric acid ampules are provided. ^(2, 10)
 - Lenses Additional face mask lenses are provided. ^(2, 10)
 - Rubber Plug This is used to seal the regenerating canister at the air hose opening when it is charged, but not in use. ^(2, 10)
 - Screwdriver This is used to loosen the screw holding the breathing bag to the metal case. ^(2, 10)
 - Starting Device ^(2, 10)
- **Decontaminability:** Not available.
- **Fogging Characteristic(s):** Not available.
- **Deployment:** Not available.
- **Miscellaneous:** The IP-46M breathing apparatus works as follows: ^(2, 9, 10)

The IP-46M is placed into operation by donning the mask and depressing a striker or starting device on the glass ampule of sulfuric acid, allowing it to react with the briquette (possibly composed of sodium carbonate). Oxygen is not immediately available from the mask; a short interval of time is required for the starting device to produce the necessary chemical reaction. This chemical reaction takes longer at temperatures below 25°C (77°F). However, this

reaction will produce the necessary heat and carbon dioxide to cause another reaction with the metal peroxides inside the regenerating canister. It is from this second reaction that a supply of oxygen is produced in the reaction canister. Regeneration of oxygen occurs later in the canister when moisture and carbon dioxide from exhaled air comes in contact with the metal peroxides.

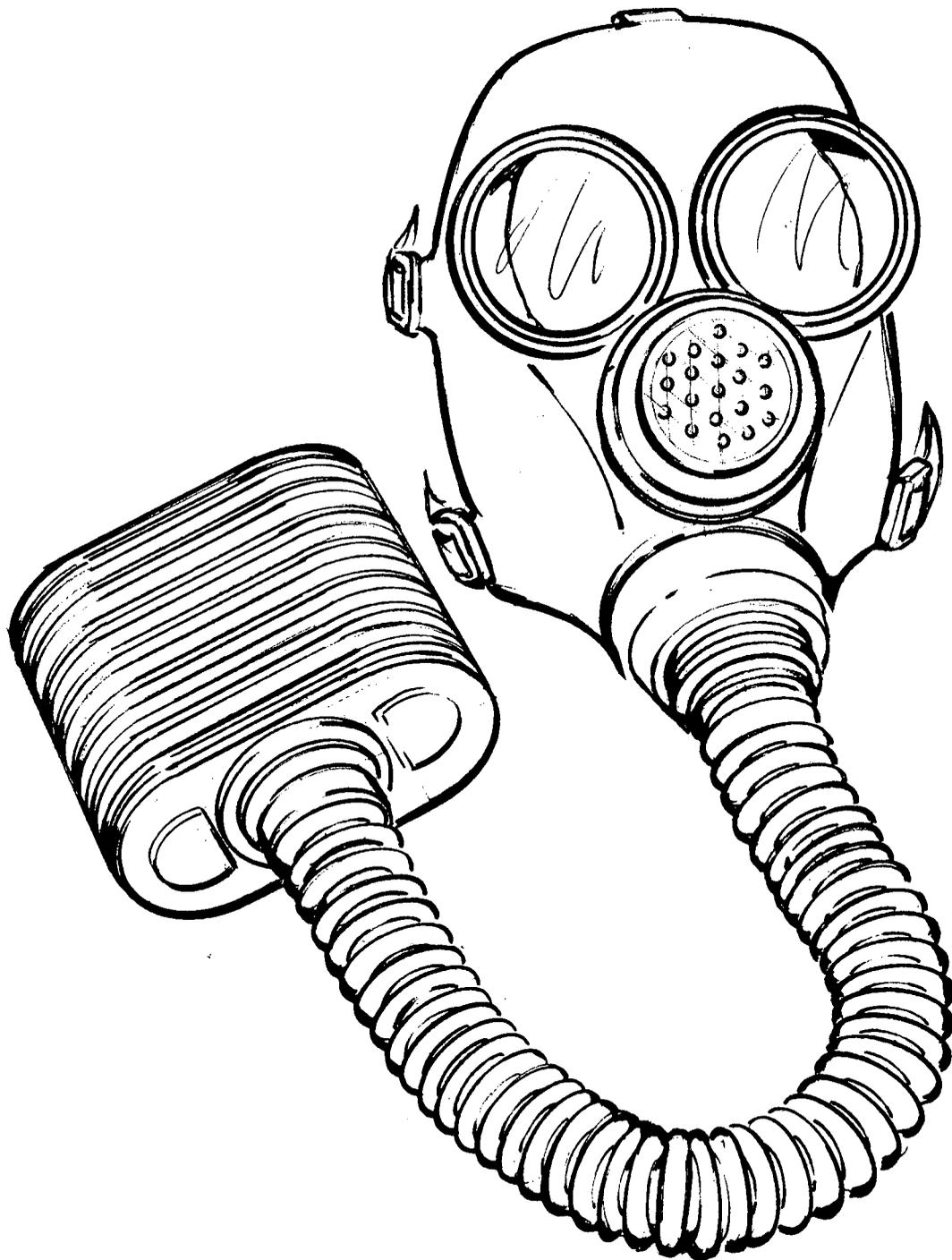
The regeneration canister has three openings: one for the face mask air hose, one for the starting device, and one for the U-shaped breathing bag. A pressure relief valve is located at each end of the breathing bag. Both the regenerating canister and breathing bag are secured to the metal case and covered with the waterproof canvas carrying bag.

The starting briquette disintegrates very rapidly under the influence of water, oil, or heat and consequently must be stored in a hermetically sealed container.

A problem in the use of the mask is the unpleasant odor of the generated air, which causes some wearers to become nauseated.

Overall dimensions of the breathing apparatus are:

Depth	189 mm.
Height	343 mm.
Weight	4,500 g.
Width	284 mm.



Sketch courtesy of Battelle.

The CIS Model K

- **Designator(s):** Model K
- **Item Name(s):** Model K Mask
- **Item Description:** The CIS Model K mask features a facepiece composed of an elastomeric material and two circular eyepieces held to the facepiece by metal clamps. A voicemitter is located directly below the eyepieces. The canister mount is located in the chin area with the exhalation valve behind it. The integral canister mount/exhalation valve assembly is surrounded by a metal housing. Unlike other masks in the GP-5 series, which use a rubber "skull cap" to hold the mask in place, the Model K has a five-point adjustable head harness suspension. Additionally, a hose connects the inhalation valve to a canister. The Model K does not have a drink device or provisions for optical inserts. ⁽⁷⁾

The Model K mask is a modification of the ShM mask. ⁽¹⁰⁾

- **Total Weight:** 1,330 g. ^(2, 10)
Canister 840 g (MO-4U). ^(2, 10)
Facepiece 490 g. ⁽¹⁰⁾

- **Stock Number(s):** Not available.

- **Sizes Available:** The mask is available in three sizes. ⁽¹⁰⁾

- **Use(s):** The mask is issued to those in the CIS Army that are required to use radio/telephone equipment and to commanders and signal personnel in ground forces. ⁽¹⁰⁾

- **Component(s):**

Canister The standard MO-4U filter canister weighing 840 g is used with this mask and is separated from the facepiece by means of a connecting hose attached to the inhalation valve. If necessary, the canister can be threaded directly onto the facepiece; however, when attached in this manner it exerts a steady downward pull on the head and neck, hastening fatigue. ⁽¹⁰⁾

The MO-4U filter canister may be used alone or in combination with the MO-2 canister, which provides the added benefit of protection against carbon monoxide. ⁽¹⁰⁾

Canisters from any former Warsaw Pact country or China may be used with the Model K. ⁽¹⁰⁾

**Canister Mount/
Exhalation Valve
Assembly** This assembly is integrally attached to the facepiece at the chin position in a metal housing. ⁽¹⁰⁾

Connecting Hose	The connecting hose used to attach the canister to the inlet valve is made of rubber and varies in weight from 170 to 219 g depending on the size. Use of the hose with the canister restricts movement. ⁽¹⁰⁾
Eyepiece(s)	The mask has two circular glass eyepieces that are 6.9 cm in diameter and held in place by metal clamps. ⁽¹⁰⁾
Facepiece	The facepiece is composed of natural rubber and is issued in two colors, beige and black. The facepiece may stiffen and crack in cold weather. ⁽¹⁰⁾
Head Harness	There is a five-point adjustable suspension. ⁽⁷⁾
Voicemitter	The mask comes equipped with a voicemitter made up of a clear plastic disk in a metal housing with a perforated screw-on cover. It is reported that significant leakage may occur here. ⁽¹⁰⁾

- **Breathing Resistance:** Not available.
- **Airflow:** No positive airflow available. ⁽⁷⁾
- **Communications Enhancement:** This mask comes equipped with a voicemitter that allows a communication range of about 15 meters. ⁽¹⁰⁾
- **Protection Afforded:** The Model K mask with the MO-4U canister provides adequate protection from chemical and biological warfare agents for the eyes and respiratory system. When the MO-4U canister is worn in combination with the MO-2, the wearer is provided with the additional benefit of protection against carbon monoxide. ⁽¹⁰⁾
- **Manufacturer(s):** Not available.
- **Compatibility:** Not available.
- **Storage Life:** Not available.
- **Donning Time:** Not available.
- **Field of Vision:** This mask has a very limited field of vision impairing approximately 80%. ⁽¹⁰⁾
- **Accessories:**

Antidim Disk ⁽⁸⁾

Carrying Bag A canvas carrying bag is provided whose weight varies between 241 and 510 g depending on the size. ⁽¹⁰⁾

● **Decontaminability:** Not available.

- **Fogging Characteristic(s):** The mask is equipped with internal antifogging deflector tubes for the eyepieces. ⁽¹⁰⁾
- **Deployment:** The Model K mask is known in former East Germany as the MM-1. ⁽¹⁰⁾
- **Miscellaneous:** The Model K mask has no provisions for drinking. ⁽¹⁰⁾

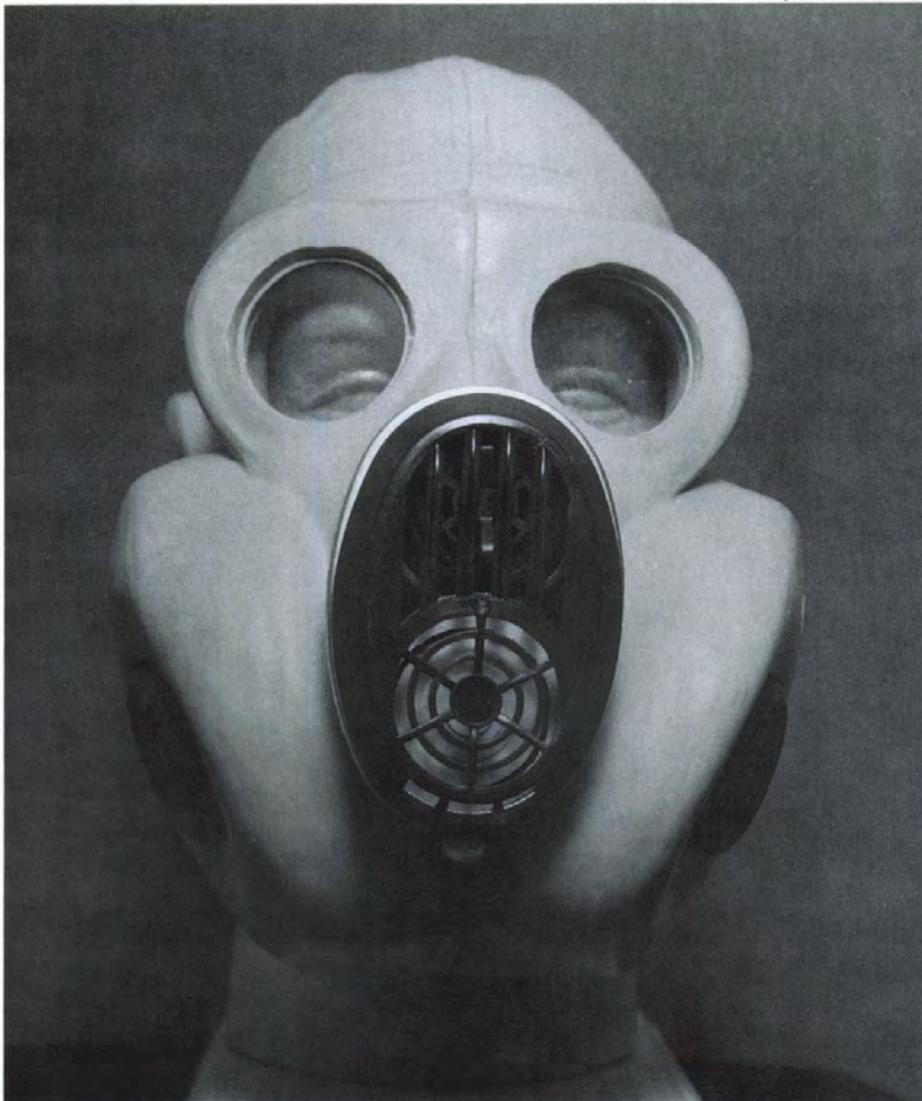


Photo courtesy of CBLAC Personnel.

The CIS PMG-2

The PMG-2, weighing 715 g, is one of the newest additions to the CIS mask family. As is consistent with the other CIS designs, the mask is made of an elastomeric material that covers both the face and head and does not have a head harness. An integral exhalation valve/voicemitter assembly is located below the eyepieces within a hard plastic housing. Specifically, the voicemitter is located just below the eyepieces and the exhalation valve is located directly over the mouth area. This mask has two internal canisters (under the faceblank) located over the right and left cheeks. The two small circular eyepieces are roughly 45 mm in diameter. The mask also has an internal nosecup. This mask does not have a drink device. ⁽²⁾

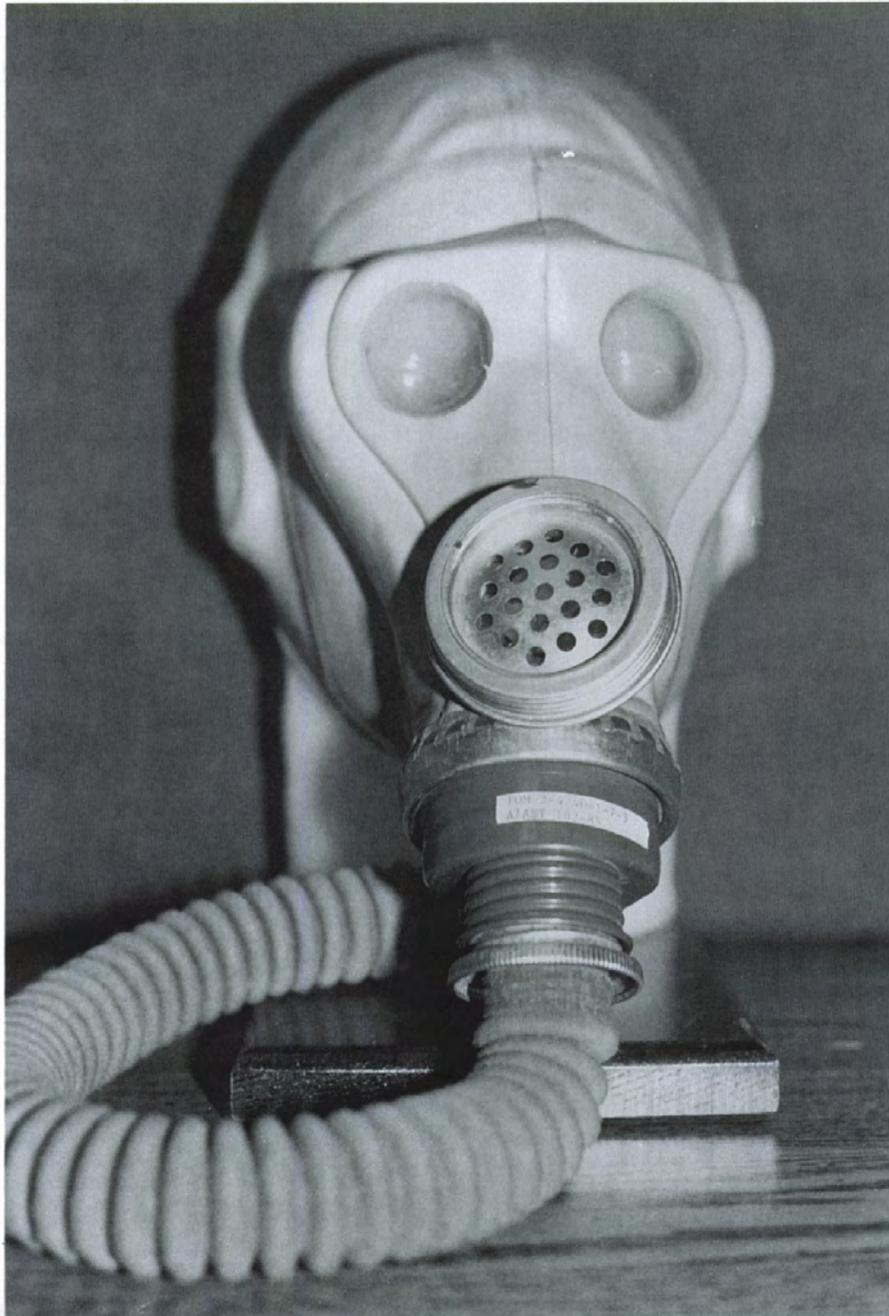


Photo courtesy of CBIAC personnel.

The CIS ShMS

- **Designator(s):** ShMS
- **Item Name(s):** ShMS Special Protective Mask
- **Item Description:** The ShMS helmet type mask features a elastomeric facepiece that extends over the head and ears. The mask has very small eyepieces approximately 40 mm in diameter. The voicemitter is located over the mouth, with an integral canister mount/exhalation valve assembly made of metal located at the chin position. Specifically, the exhalation valve is located behind the canister mount. A cloth-covered hose is used to connect the canister to the mask. The ShMS has very distinctive integral tubes that run from the eyepiece area to the hose connection. This mask does not have a drinking device. ⁽²⁾
- **Total Weight:** 1,272 g. ^(2, 10)
 - Canister 840 g (MO-4U). ^(2, 10)
 - Facepiece 432 g (dependent on size). ⁽²⁾
- **Stock Number(s):** Not available.
- **Sizes Available:** Five sizes are available. ⁽¹⁰⁾
- **Use(s):** This mask is the standard protective mask issued to CIS Army armor personnel that are required to use optical sights (i.e., binoculars) of any kind. ⁽¹⁰⁾
- **Component(s):**
 - Canister Depending on the need, this mask uses the MO-4U canister alone or combined with the MO-2 canister, the MO-2 provides the additional benefit of protection against carbon monoxide. ⁽¹⁰⁾

Canisters from any former Warsaw Pact country or the People's Republic of China will work with this mask. ⁽¹⁰⁾
 - Connecting Hose The canister connecting hose is made of a cloth-covered elastomer. The hose is 530 mm long, 320 mm in diameter, and weighs 170 to 219 g depending on the size. ^(2, 10)
 - Exhalation Valve The ShMS may be found with either a double or single outlet valve. ^(2, 10)
 - Eyepiece(s) Two small circular eyepieces, 40 mm in diameter, are fitted to the mask. ⁽²⁾
 - Facepiece This helmet type mask is composed of rubber and extends over the head and ears. ⁽²⁾

The facepiece may be gray, beige, or black. ⁽¹⁰⁾

- **Breathing Resistance:** Not available.
- **Airflow:** No positive airflow available. ⁽²⁾
- **Communications Enhancement:** A voicemitter is an integral part of the mask and has a range of about 15 meters. This helmet type mask impairs the hearing of the wearer. ⁽²⁾
- **Protection Afforded:** The ShMS with the MO-4U canister provides adequate protection for the head, eyes, and respiratory system against all known chemical and biological warfare agents. The MO-2 canister provides the wearer with protection from carbon monoxide when used with the MO-4U canister. The facepiece will remain impervious to mustard and sarin for at least 24 hours at a temperature of 45°C. ^(2, 10)
- **Manufacturer(s):** Not available
- **Compatibility:** Not available.
- **Storage Life:** Not available.
- **Donning Time:** Not available.
- **Field of Vision:** This mask has a very limited field of vision and no peripheral vision due to the placement of the lenses. ⁽²⁾
- **Accessories:** The ShMS is issued with optically flat lenses that are fitted into internal or external grooves, according to the circumstance, and then the corrective lenses fitting into the other groove. ⁽³⁾

Carrying Bag The carrying bag issued with the ShMS mask weighs 241 to 510 g depending on the size. ^(2, 10)

Optical Inserts This mask is the only known CIS mask that has special provision optical inserts. The corrective lenses may be installed in two different ways: trained personnel would replace the normal outer lenses with optical inserts, or the wearer would remove the inner (antidim) lenses and replace them with the optical inserts. ⁽¹⁰⁾

- **Decontaminability:** Not available.
- **Fogging Characteristic(s):** Antifogging lenses can be placed in the inner annular groove of the lens apertures, and the mask is equipped with deflector tubes to aid in the prevention of fogging. The chances of fogging the eyepieces are increased when the wearer removes the inner (antidim/antifog) lenses and replaces them with optical inserts. ^(2, 10)
- **Deployment:** Not available.

- **Miscellaneous:** The helmet type mask causes a build-up of heat that may affect wearing time. At very low temperatures the facepiece and the hose stiffen and may crack. ⁽²⁾

While the ShMS is being worn, the hose and filter canister create a constant downward pull on the wearer's head and neck, and head movement is severely restricted. ⁽²⁾

5.3 REFERENCES

1. "Additional Cartridge DPG-1." Data sheet from NPO Neorganica.
2. Analysis based on physical evaluation of the mask by CBIAC personnel.
3. "Additional Cartridge DPG-3." Data sheet from NPO Neorganica.
4. "Gasmask GP-7WM." Flyer from NPO Neorganica.
5. Translation of "The New Soviet Protection Mask GP-7." Allgemeine Schweizerische Militarzeitschrift (ASMZ), Volume 155, number 1, 1989, page 41.
6. Translation of "To Those Who Teach, Antigas GP-7." Voyenny Znaniya, number 9, 1988, page 45.
7. Analysis based on photo evaluation of the mask by CBIAC personnel.
8. "Gasmask GP-7W." Flyer from NPO Neorganica.
9. Translation of "Soviet Insulating Protective Masks." Militaertechnik, number 6, 1989.
10. Data obtained from Foreign Weapons Evaluation Office, APG, MD, 21005.



Chapter 6 – Czechoslovakia

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A circular world map with green continents and blue oceans. The country of Czechoslovakia is highlighted in yellow.

6.1 FILTRATION

- **Item Name(s):** MOF-4 Canister
- **Use(s):** Used with the Czechoslovak CM-4 and CM-5 series of masks. ^(2, 5)
- **Physical Characteristic(s):**

Aerosol Filter	Filter paper. ⁽⁵⁾
Canister	Magnesium-aluminum alloy. ⁽⁵⁾
Gas Filter	Medium grain sorbent. ⁽⁵⁾
Thread	East European standard. ⁽⁵⁾
Thread Size	40 x 4 mm. ⁽⁵⁾
Weight	260 g. ⁽⁵⁾
- **Performance Specification(s):**

Aerosol Efficiency	1×10^{-4} at an airflow of 30 L/min, concentration between 1 and 2.4 g/m ³ . ⁽⁵⁾
Airflow Resistance	18.35 mm of H ₂ O at an airflow of 30 L/min.* ⁽⁵⁾
- **Deployment:** Not available.
- **Manufacturer(s):**

Gumárny Zubří
Národní Podnik
75654 Zubří
Czechoslovakia
Tel: 042 651 55965
042 651 55966
042 651 55967
Fax: 042 651 54874 ^(5, 6)
- **Stock Number(s):** Not available.
- **Miscellaneous:** Complies with the tests and conditions outlined by the Czechoslovak Defense Authorities. ⁽⁶⁾

⁽⁵⁾Data originally reported in Pascals.

- **Item Name(s):** TYP 106/3 Canister
- **Use(s):** Used to protect the Czechoslovak civil population and soldiers against all military poisonous substances, toxic gases, and solid and liquid aerosols including radioactive and biological substances. ⁽⁴⁾

- **Physical Characteristic(s):**

Aerosol Filter	Glass. ⁽⁴⁾
Canister	Aluminum. ⁽⁴⁾
Diameter	110 mm. ⁽⁴⁾
Gas Filter	Treated, activated charcoal. ⁽⁴⁾
Height	87 mm. ⁽⁴⁾
Thread	East European is standard. NATO standard available. ⁽⁴⁾
Thread Size	40 x 4 mm or 40 x 3.63 mm. ⁽⁴⁾
Weight	320 g. ⁽⁴⁾

- **Performance Specification(s):**

Aerosol Efficiency	Greater than 99.995% at an airflow of 95 L/min. ⁽⁴⁾
Airflow Resistance	Less than 26.51 mm of H ₂ O at an airflow of 30 L/min.* ⁽⁴⁾ Less than 106.05 mm of H ₂ O at an airflow of 90 L/min.* ⁽⁴⁾

- **Deployment:** Not available.
- **Manufacturer(s):** KCM (Klimacentrum, A.S.)
108 03 Praha 10
Počernická 96
Czechoslovakia
Tel: 042 2 772097
Fax: 042 2 774124 ⁽⁴⁾
- **Stock Number(s):** Not available.

*Data originally reported in Pascals.

- **Miscellaneous:** Complies with the tests and conditions outlined by the Czechoslovak Defense Authorities. ⁽⁶⁾

The TYP 106/3 filter was used by the Czechoslovak Army during Operation Desert Shield/Storm. ⁽⁴⁾

6.2 RESPIRATORS

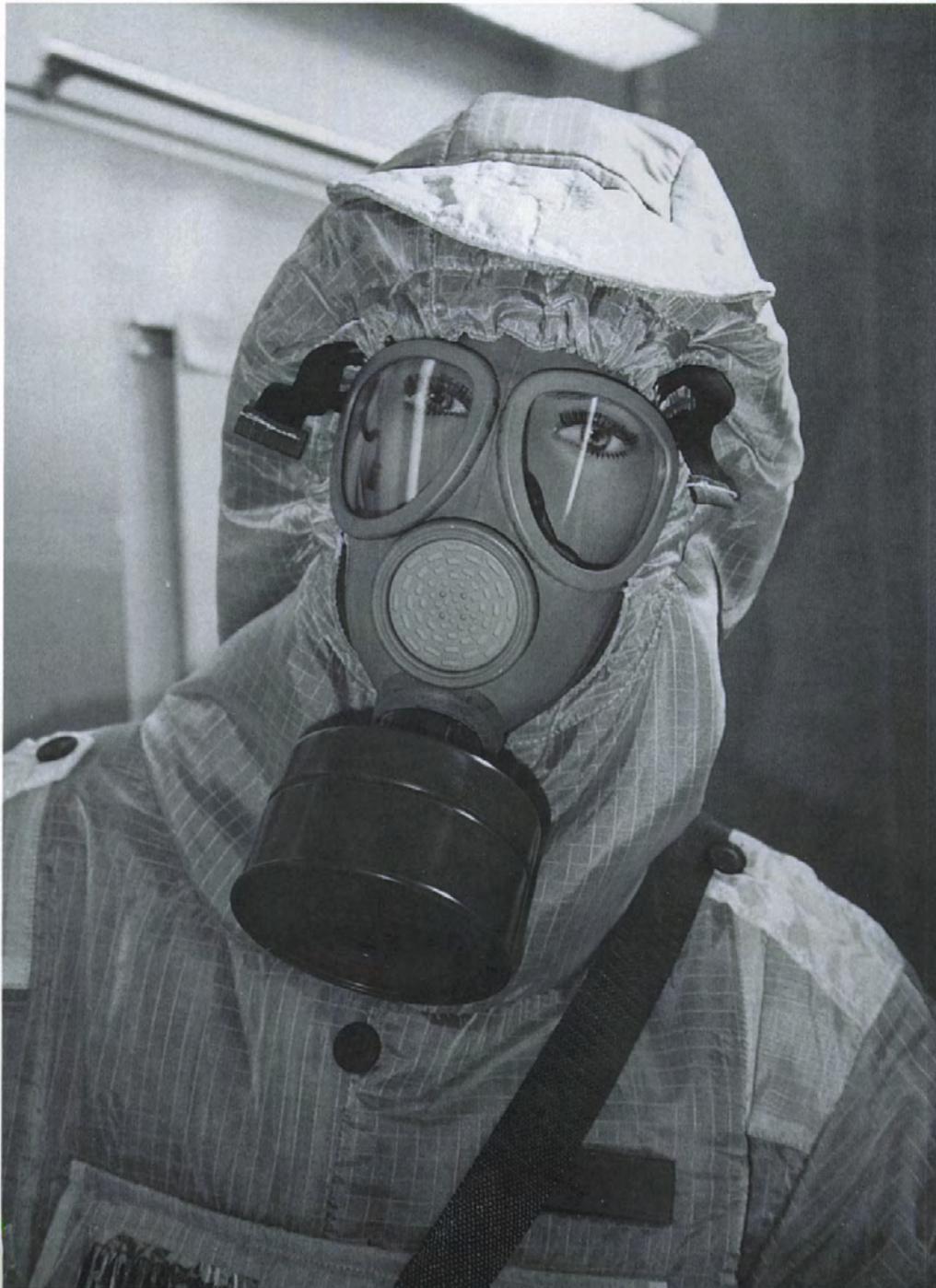


Photo courtesy of CBIAC personnel.

The Czechoslovak CM-4

- **Designator(s):** CM-4 Series
- **Item Name(s):** CM-4 Mask
CM-4K Mask
CM-4M Mask
- **Item Description:** The Czechoslovak CM-4 series of protective masks features a rubber facepiece with two eyepieces. The internal nosecup has check valves to help prevent the lenses from misting. A voicemitter is located over the mouth area. An integral canister mount/exhalation valve assembly is located at the chin position. This mask has a five-point adjustable head harness with elastic straps. ^(1, 5)

Variants in the CM-4 series include the CM-4K, which is designed for use by fire fighters and includes a special connector for external oxygen. The CM-4M features a drinking device which is identical to that found in the CM-5M mask and a more advanced communication system. It may also be used with the MOF-5 filter. ^(3, 6)

- **Total Weight:** 700 g. ⁽⁵⁾
680 g (CM-4M facepiece). ^(5, 8)

Canister 260 g. ⁽⁵⁾

Facepiece 440 g. ⁽⁵⁾
420 g (CM-4M). ⁽⁸⁾
- **Stock Number(s):** Not available.
- **Sizes Available:** Three sizes available, which are designated as 3, 4, and 5. ⁽⁵⁾
- **Use(s):** Used as a civilian protective mask to protect wearers against harmful substances used in war and in industry. ⁽⁶⁾
- **Component(s):**

Canister Uses the MOF-4 canister. ⁽⁵⁾

East European thread is standard (40 x 4 mm), however NATO standard thread is also available (40 x 3.63 mm). ⁽⁶⁾

Drinking Device The model CM-4M features a drinking device.

Eyepiece(s) Two eyepieces are used. Corrective lenses may be inserted inside the mask. ⁽⁵⁾

Facepiece The rubber facepiece is fitted with a face-sealing collar. ⁽⁵⁾

Head Harness Five-point adjustable harness with elastic straps. ⁽⁵⁾

Nosecup The internal nosecup has check valves to prevent exhaled air from fogging the lenses. ⁽⁵⁾

- **Breathing Resistance:**
 - Inhalation Resistance Less than 2.55 mm of H₂O at an airflow of 30 L/min.* ⁽⁵⁾
 - Exhalation Resistance Less than 10.19 mm of H₂O at an airflow of 30 L/min.* ⁽⁵⁾
- **Airflow:** No positive airflow available. ⁽¹⁾
- **Communications Enhancement:** The voicemitter provides speech intelligibility of at least 95%. ⁽⁵⁾
- **Protection Afforded:** Protects the face, eyes, and respiratory organs against chemical, biological and radioactive weapons and harmful industrial products in the form of vapor, gas, or aerosol. ⁽⁵⁾
- **Manufacturer(s):**
 - Gumárny Zubří
 - Národní Podnik
 - 75654 Zubří
 - Czechoslovakia
 - Tel: 042 651 55965
 - 042 651 55966
 - 042 651 55967
 - Fax: 042 651 54874 ^(5, 6)
- **Compatibility:** Not available.
- **Storage Life:** Not available.
- **Donning Time:** Not available.
- **Field of Vision:** 70% of normal. ⁽⁵⁾
- **Accessories:** Corrective lens inserts available. ⁽⁵⁾

The CM-4M has a canteen that integrates with the drinking device. ⁽⁸⁾
- **Decontaminability:** Not available.
- **Fogging Characteristic(s):** Check valves on the nosecup prevent exhaled air from fogging the eyepieces. ⁽⁵⁾
- **Deployment:** Not available.
- **Miscellaneous:** May be used in temperatures between -30°C and +50°C. ⁽⁵⁾

Complies with the tests and conditions outlined by the Czechoslovak Defense Authorities. ⁽⁶⁾

*Data originally reported in Pascals.



Photo courtesy of Gumárny ZubH.

The Czechoslovak CM-5

- **Designator(s):** CM-5 Series
- **Item Name(s):** CM-5 Mask
CM-5M Mask
- **Item Description:** The Czechoslovak CM-5 series features a facepiece made of butyl rubber and a one-piece eyelens. The internal nose cup has check valves to prevent exhaled air from fogging the eyepiece. A voicemitter is located over the mouth area. An integral canister mount/exhalation valve assembly is located at the chin position. This mask has a five-point adjustable head harness with rubber straps. ^(1, 2)

The CM-5M mask is a variant in the CM-5 series, which features a drink system identical to that found in the CM-4M mask. A version that integrates with external oxygen is also available. ⁽⁶⁾

- **Total Weight:** 735 g. ^(2, 5)
750 g (CM-5M facepiece). ^(3, 5)

Canister 260 g (MOF-4). ⁽⁵⁾

Facepiece 475 g. ⁽²⁾
490 g (CM-5M). ⁽³⁾
- **Stock Number(s):** Not available.
- **Sizes Available:** Not available.
- **Use(s):** Used to protect the civilian population and industrial sector. ⁽⁶⁾
- **Component(s):**

Canister Uses the MOF-4 or MOF-5 canister. ⁽⁶⁾

East European thread is standard (40 x 4 mm), however NATO standard thread is also available (40 x 3.63 mm). ⁽⁶⁾
- **Breathing Resistance:** The inhalation resistance is 18.35 mm of H₂O at 30 L/min.* ⁽²⁾
- **Airflow:** No positive airflow available. ⁽¹⁾
- **Communications Enhancement:** The voicemitter provides speech intelligibility of 95%. ⁽³⁾
- **Protection Afforded:** Not available.

*Data originally reported in Pascals.

- **Manufacturer(s):** Gumárny Zubří
Národní Podnik
75654 Zubří
Czechoslovakia
Tel: 042 651 55965
042 651 55966
042 651 55967
Fax: 042 651 54874 ^(5, 6)

- **Compatibility:** Not available.

- **Storage Life:** Not available.

- **Donning Time:** Not available.

- **Field of Vision:**

Binocular	70% ⁽²⁾
Total	79% ⁽²⁾

- **Accessories:** Not available.

- **Decontaminability:** Not available.

- **Fogging Characteristic(s):** Not available.

- **Deployment:** Not available.

- **Miscellaneous:** Complies with the tests and conditions outlined by the Czechoslovak Defense Authorities. ⁽⁶⁾



Photo courtesy of CBIAC personnel.

The Czechoslovak M-10M

- **Designator(s):** M-10M
- **Item Name(s):** M-10M Mask
- **Item Description:** The Czechoslovak M-10M resembles the U.S. M17 series of masks in that it has two internal kidney-shaped filter elements. The mask has two quasitriangular eyepieces, an internal nosecup, a centrally located exhalation valve/voicemitter assembly, and a five-point head hardness suspension. Check valves on the internal nosecup prevent exhaled air from fogging the lenses. A specially designed canteen integrates with the drink device. ⁽¹⁾
- **Total Weight:** Not available.
- **Stock Number(s):** Not available.
- **Sizes Available:** Three sizes available. ⁽⁷⁾
- **Use(s):** The M-10 mask is used in the Czechoslovak Army. ⁽⁶⁾
- **Component(s):** The M-10M mask uses two LF-10M canisters internally located in cheek pouches. ⁽⁶⁾
- **Breathing Resistance:** Not available.
- **Airflow:** No positive airflow available. ⁽¹⁾
- **Communications Enhancement:** The voicemitter assures 96% audibility. ⁽⁶⁾
- **Protection Afforded:** Protects the face, eyes, and respiratory tract against chemical, biological, and radioactive agents in vapor, gas, or aerosol form. ⁽⁶⁾
- **Manufacturer(s):**
Gumárny Zubří
Národní Podnik
75654 Zubří
Czechoslovakia
Tel: 042 651 55965
042 651 55966
042 651 55967
Fax: 042 651 54874 ^(5, 6)
- **Compatibility:** Not available.
- **Storage Life:** Not available.
- **Donning Time:** Not available.
- **Field of Vision:** Two additional eyepieces are available with the mask. Dioptical inserts can be mounted on the inside of the eyepieces. ^(6, 7)
- **Accessories:** Not available.

- **Decontaminability:** Not available.
- **Fogging Characteristic(s):** Check valves on the nosecup prevents the lenses from fogging. ⁽¹⁾
- **Deployment:** Not available.
- **Miscellaneous:** The M-10M was in service with the Czechoslovak chemical division, which participated as part of the multinational force in Saudi Arabia during Operation Desert Shield/Storm. It complies with the tests and conditions outlined by the Czechoslovak Defense Authorities. ⁽⁶⁾

6.3 REFERENCES

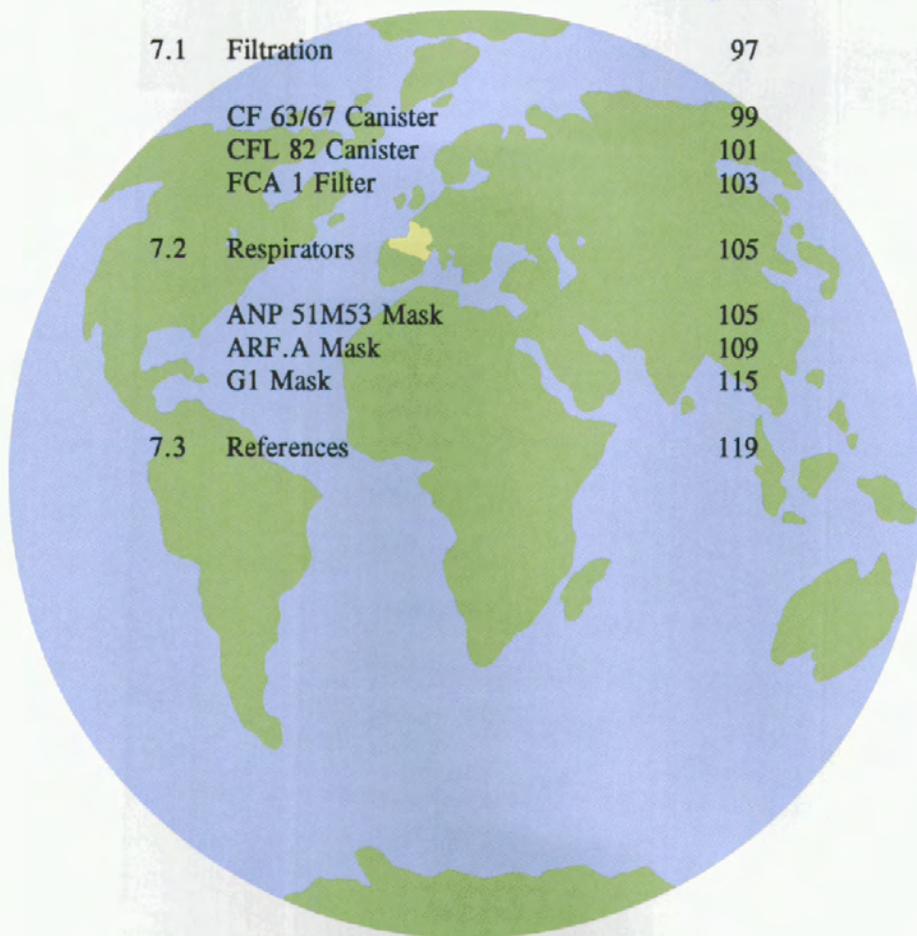
1. Analysis based on personal evaluation of the mask by CBIAC personnel.
2. "CM-5." Brochure from Gumárny Zubří.
3. "Protective Mask CM-5M." Flyer from Gumárny Zubří.
4. Data sheet on the TYP 106/3 canister from KCM (Klimacentrum, A.S.).
5. "Protection Respirator CM-4." Brochure from Gumárny Zubří.
6. "NBC Protection." Article from Gumárny Zubří.
7. "M-10M Protective Mask." Parts diagram of M10M.
8. "Protective Mask CM-4M." Flyer from Gumárny Zubří.



Chapter 7 – France

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7.1 FILTRATION

The French CF 63/67



The French CFL 82



The French FCA 1



Photos courtesy of GIAT.

- **Item Name(s):** CF 63/67 Canister (Cartouche Filtrante Modèle 63 Modifié 67) ⁽⁵⁾
- **Use(s):** Used with the ANP 51M53 mask by the French Army. ^(3, 14)
- **Physical Characteristic(s):**
 - Aerosol Filter Crimped paper. ⁽⁵⁾
 - Canister Aluminum, brown in color. ^(14, 5)
 - Gas Filter Activated charcoal. ⁽⁵⁾
 - Thread NATO standard, conforms to STANAG 4155. ⁽¹⁴⁾
 - Thread Size 40 x 3.63 mm. ⁽¹⁴⁾
 - Weight 250 g. ⁽³⁾
- **Performance Specification(s):**
 - Aerosol Efficiency 5 x 10⁵ for particles of 0.3 microns. ⁽⁵⁾
 - Airflow Resistance 13.26 mm of H₂O at an airflow of 30 L/min.* ⁽⁵⁾
- **Deployment:** Not available.
- **Manufacturer(s):** GIAT-Industrie
13 route de la Minière, Satory
78034 Versailles Cedex
France
Tel: 033 130 973747
Fax: 033 130 973900 ⁽⁶⁾
- **Stock Number(s):** 060301 L. ⁽¹⁴⁾
- **Miscellaneous:** A storage life of 15 years. ⁽¹⁴⁾

*Data originally reported in Pascals.

- **Item Name(s):** CFL 82 Canister
 - **Use(s):** This canister is used with the G1 mask. ⁽¹⁶⁾
 - **Physical Characteristic(s):**
 - Canister Blue in color. ⁽¹⁴⁾
 - Thread NATO standard, conforms to STANAG 4155. ⁽¹⁶⁾
 - Thread Size 40 x 3.63 mm. ⁽¹⁶⁾
 - Weight 130 g. ⁽²⁾
 - **Performance Specification(s):**
 - Aerosol Efficiency 10⁵ for aerosols of 0.3 microns. ⁽²⁾
 - **Deployment:** Not available.
 - **Manufacturer(s):** GIAT-Industrie
13 route de la Minière, Satory
78034 Versailles Cedex
France
Tel: 033 130 973747
Fax: 033 130 973900 ⁽⁶⁾
 - **Stock Number(s):** 962746 Y. ⁽¹⁴⁾
 - **Miscellaneous:** A storage life of 15 years. ⁽¹⁴⁾
- The G1 mask uses two CFL 83 canisters to filter the inhaled air. ⁽²⁾

- **Item Name(s):** FCA 1 Filter
- **Use(s):** This filter canister is used with the French ARF.A and the ANP/VP.F1. ⁽¹²⁾
- **Physical Characteristic(s):** This filter has been improved to ease breathing resistance. The pressure drop is reduced because this canister is shallower and wider. The cartridge contains a fine coconut-carbon 1830 with a granule size of 0.8 to 1.0 mm. The granules are impregnated with copper-chromium-silver salts (ASC carbon). ⁽⁸⁾

Aerosol Filter	Glass microfiber paper. ⁽⁷⁾
Canister	Black in color. ⁽¹⁴⁾
Diameter	110 mm. ⁽⁷⁾
Gas Filter	Impregnated charcoal, 240 cm ³ . ⁽⁷⁾
Height	73 mm. ⁽⁷⁾
Thread	NATO standard, conforms to STANAG 4155. ⁽¹⁴⁾
Thread Size	40 x 3.63 mm. ⁽¹⁴⁾
Weight	240 g. ⁽⁴⁾

- **Performance Specification(s):**

Aerosol Efficiency	5 x 10 ⁵ at an airflow of 30 L/min for aerosols of 0.15 microns. ⁽⁸⁾
Airflow Resistance	14.28 mm of H ₂ O at an airflow of 30 L/min.* ⁽⁷⁾

- **Deployment:** Not available.

- **Manufacturer(s):**

Coconut-Carbon 1830 PICA
16, rue Trézel
92309 Levallois Cedex
France
Tel: 033 147 396040
Fax: 033 147 393492 ⁽¹⁵⁾

*Data originally reported in Pascals.

FCA 1 Filter

GIAT-Industrie
13 route de la Minière, Satory
78034 Versailles Cedex
France
Tel: 033 130 973747
Fax: 033 130 973900 ⁽⁶⁾

- **Stock Number(s):** 028521 D. ⁽¹⁴⁾
- **Miscellaneous:** A storage life of 15 years. ⁽¹⁴⁾

7.2 RESPIRATORS



Photo courtesy of CBIAC Personnel.

**The French ANP 51M53 has been in service
with the French Army for more than 30 years.**

- **Designator(s):** ANP 51M53
- **Item Name(s):** Appareil Normal de Protection Modèle 51 Modifié 53
- **Item Description:** The French ANP 51M53 features an elastomeric facepiece composed of natural rubber and two round eyepieces approximately 55 mm in diameter made of triplex glass. There is a center front canister mount and a six-point head harness suspension with adjustable rubber straps. This respirator does not permit drinking. ^(9, 17)

A variant of this mask is the ANP 51M53b, which features an internal microphone. The ME82, another variant, is an export model with the option of mounting the filter canister at the normal chin position or at the end of a hose. It features an improved peripheral seal on the facepiece, a drinking device, an extra side mounted exhalation valve for increased airflow, and a larger voicemitter. This mask may be fitted with corrective lenses compatible with weapon sites or a built-in microphone for use with telecommunications equipment. ⁽⁵⁾

- **Total Weight:** 650 g. ⁽³⁾
 - Canister 250 g. ⁽³⁾
 - Facepiece 400 g. ⁽³⁾
- **Stock Number(s):**
 - Small 060156 N. ⁽¹⁷⁾
 - Medium 060162 X. ⁽¹⁷⁾
 - Large 060102 A. ⁽¹⁷⁾
- **Sizes Available:** Small, medium, and large. ⁽¹⁷⁾
- **Use(s):** In service with the French Army. ⁽³⁾
- **Component(s):**
 - Canister Uses the CF 63/67 canister. ⁽³⁾

The CFR 65 canister, using only the paper particulate filter of the CF 63/67, provides protection against radioactive dust and aerosols. This canister weighs 155 g. ⁽³⁾

Other similar canisters can be fitted for use in civilian defense situations (antigas conditions). ⁽³⁾
 - Canister Mount NATO standard. ⁽¹⁷⁾
 - Eyepiece(s) There are two circular eyepieces made of triplex glass with an intermediate of polyvinyl butyral. ⁽⁵⁾

Facepiece Composed of natural rubber and available in sand or black color. ⁽⁵⁾

Head Harness Six adjustable straps are made of butyl rubber. ⁽⁵⁾

● **Breathing Resistance:**

Inhalation Resistance 16 mm of H₂O at an airflow of 30 L/min. ⁽³⁾

Less than 17.33 mm of H₂O at an airflow of 30 L/min.* ⁽⁵⁾

Exhalation Resistance Between 18.35 and 19.37 mm of H₂O at an airflow of 60 L/min.* ⁽⁵⁾

- **Airflow:** Positive airflow may be provided by connecting the mask, via a hose, to vehicle collective protection systems. ⁽⁵⁾

- **Communications Enhancement:** The ANP 51M53b model is equipped with an internal microphone. ⁽³⁾

- **Protection Afforded:** Protects respiratory tract and eyes against NBC agents. ⁽³⁾

Protection factor greater than 10,000. ⁽⁵⁾

- **Manufacturer(s):** No longer manufactured after more than 30 years of use by the French Army. ⁽⁵⁾

Formerly manufactured by
GIAT-Industrie
13 route de la Minière, Satory
78034 Versailles Cedex
France
Tel: 033 130 973747
Fax: 033 130 973900 ⁽⁶⁾

- **Compatibility:** The respirator is compatible with communication systems and can be linked to regulation transmission equipment. ⁽³⁾

If required, the mask can be used by armored vehicle crews and be connected to a vehicle collective protection air system. This connection is achieved via a set of accessories including a ringed pipe, a peg, and a cartridge cover. ^(3, 5)

- **Storage Life:** At temperatures between -30°C and +70°C, the storage life exceeds 10 years. With regular maintenance and some overhauling, the mask can be kept for battlefield duty for up to 30 years. The operating temperature for this mask is between -30°C and +50°C. ⁽⁵⁾

- **Donning Time:** Less than 10 seconds. ⁽¹⁰⁾

*Data originally reported in Pascals.

- **Field of Vision:**
 - Binocular 55%. ⁽⁵⁾
 - Down 78%. ⁽⁵⁾
 - Lateral 76%. ⁽⁵⁾
- **Accessories:**
 - Carrying Bag Model 63 is used to carry the face mask and the filter canister. ⁽³⁾
 - Special Lenses Used with the weapon sights or other similar optical devices. ⁽⁵⁾
- **Decontaminability:** Not available.
- **Fogging Characteristic(s):** Not available.
- **Deployment:** The ANP 51M53 is currently being used by the Belgian armed forces. Belgium will replace it with the BEM 4GP. ⁽⁵⁾
- **Miscellaneous:** GIAT Industries will begin delivery of the ANP/VP.F1, the French Army version of the ARF.A (French Air Force respirator), in 1992. This will replace the ANP 51M53. ⁽⁵⁾



Photo courtesy of MG Pierre Ricaud.



Photo courtesy of CBIAC personnel.

The French ARF.A

**The French ARF.A with
quick disconnect coupling**



Photo courtesy of MG Pierre Ricaud.

The French ARF.A with accessories

- **Designator(s):** ARF.A
- **Item Name(s):** GIAT Model Appareil Respiratoire Filtrant des Armées (ARF.A)
NBC Respirator
- **Item Description:** The French ARF.A respirator has a black, polyurethane, ergonomic facepiece with an integrally molded unbreakable, flexible, wide-angle, one-piece visor. The respirator is fitted with a combined paper-charcoal filter canister screwed on the chin in a downward-facing position. A voicemitter is located over the mouth area. There are two exhalation valves located lateral to the voicemitter (right and left). This mask also has an entry port for drinking and a six-point adjustable head harness. An internal antimist deflector directs incoming air over the eyepiece to prevent fogging. ^(7, 9, 11)

A variant of the ARF.A, the ANP/VP.F1, is designed for issue to the French Army. All information for the ANP/VP.F1 respirator is the same as the ARF.A respirator supplied to the French Air Force ground servicing personnel with the exception of the head harness. The ARF.A respirator has an adjustable harness, and the ANP/VP.F1 respirator has a preset harness. A simplified version of the ARF.A, designated the ARF SC, is used for civil defense applications. The version designated ARF NATO fully complies with NATO recommendations and standards. An ANTI-RIOT version of the mask is similar to the ARF NATO version with the addition of retaining straps that hold police helmets in place. ^(7, 11)

Another variant, the ARF.A2, is similar to the ARF.A except that it is quipped with two detachable eyepieces for tank operators and personnel in charge of specific tasks. The version was still under development in 1990. ⁽⁸⁾

- **Total Weight:** 740 g. ⁽⁴⁾
 - Canister 240 g. ⁽⁴⁾
 - Facepiece 500 g. ⁽⁴⁾
- **Stock Number(s):** Not available.
- **Sizes Available:** The respirator is manufactured in four sizes and matches all face shapes. ⁽⁴⁾
- **Use(s):** The ARF.A is in service with the French Air Force for ground servicing personnel, and the ANP/VP.F1 is in service with the French Army as a general purpose respirator. ⁽⁷⁾
- **Component(s):**
 - Anti-Mist Deflector Deflects inhaled air over the eyepiece to reduce fogging. ⁽¹¹⁾
 - Canister Uses a combined chin-mounted FCA 1 filter. ⁽⁴⁾
 - Canister Mount NATO standard, conforms to STANAG 4155. ⁽⁷⁾

Drinking Device	Allows drinking without any risk of contamination or loss of protection. This entry port is made of a body, a protective cap, and a movable unit including a spring valve. ⁽⁷⁾
Eyepiece(s)	A flexible, one-piece panoramic eyepiece is integrally molded with the facepiece and is composed of polyurethane aromatic thermoplastic. Anticryptogamic and anti-UV agents have been added. ⁽⁷⁾
Facepiece	<p>An ergonomic facepiece with an inner nosecup is composed of aromatic thermoplastic polyurethane with added anticryptogamic and anti-UV agents. ⁽⁷⁾</p> <p>The face seal design is based on a three-dimensional anthropometric study and the design allows for prolonged wear (24 hours). ^(1, 4)</p>
Head Harness	<p>A set of six adjustable straps provides correct fitting over wearer's face. ⁽⁴⁾</p> <p>The head harness is made of rubber. ⁽⁷⁾</p>
Nosecup	The nosecup, made of a flexible hypoallergenic soft material, reduces the internal dead space and allows more comfortable breathing. Check valves on the nosecup prevent exhaled air from fogging the eyepiece. ⁽⁸⁾
Voicemitter	The voicemitter integrates with either a microphone assembly or cable-radio connector. ⁽¹¹⁾

- **Breathing Resistance:**

Inhalation Resistance 17.33 mm of H₂O at an airflow of 30 L/min.* ⁽⁴⁾

Exhalation Resistance 16.31 mm of H₂O at an airflow of 60 L/min.* ⁽⁸⁾

- **Airflow:** A quick-disconnect coupling allows the mask to interface with vehicle collective protection systems, thereby providing positive airflow. ⁽¹¹⁾

- **Communications Enhancement:** The respirator incorporates a speech diaphragm ensuring correct transmission of speech. ⁽⁴⁾

Additionally, the voicemitter allows voice transmission through the respirator for direct orders and use of transmission equipment and an external microphone. The acoustic pressure required for voice transmission is obtained by putting a terephthalate polyethylene thermoplastic film under tension. The frequency response of the moving membrane is between 800 and 1300 Hz. The transmission coefficient is better than 0.8 between 500 and 2,000 Hz. ⁽⁷⁾

*Data originally reported in Pascals.

- **Protection Afforded:** Provides protection of the respiratory system and eyes against NBC agents. ⁽⁴⁾
- **Manufacturer(s):** GIAT-Industrie
13 route de la Minière, Satory,
78034 Versailles Cedex,
France
Tel: 033 130 973747
Fax: 033 130 973900 ⁽⁶⁾
- **Compatibility:** The central position of the canister provides for compatibility with weapon systems, allows firing of all types of rifles, and added to the semirigid nature of the panoramic visor, allows use of all optical aiming systems. This visor, set close to the eyes, offers a wide field of vision. ⁽⁷⁾
- **Storage Life:** The storage life is approximately 20 years when stored under the following conditions: ⁽⁷⁾

Packaging Nontranslucent bag (fabric or plastic).

Storage Temperature -30°C to +70°C.

- **Donning Time:** From the carrying position the respirator can be donned in less than 10 seconds. ⁽⁷⁾
- **Field of Vision:** A single, wide-angle, panoramic eyepiece is integrally molded with the facepiece. ⁽⁸⁾

Visual efficiency of the panoramic visor: ⁽⁷⁾

Astigmatism +0.25 diopter.

Binocular (250°-315°) 90%.

Down (135°-180°) 65%.

Fuzzy Rate Less than 2%.

Lateral (76°-135°) 70%.

Light Transmission Rate 25%.

Power Factor +0.25 diopter.

Prismatic Effect +0.25 diopter.

- **Accessories:**

Accessory Kit for
Tank Crews ⁽⁷⁾

Carrying Bag Toxic-proof carrying bag. ⁽¹²⁾

Disposable Accessories A thin transparent film for the panoramic visor and a corrective lens holder. ⁽⁷⁾

External Microphone Chiefly intended for vehicle communication systems. ⁽⁷⁾

Fast Connector with
Sealing Capability Allows link-up of the filter elements to hybrid collective protection systems. ⁽⁷⁾

Optical Insert Made of a flexible material and may be fitted inside the mask in a few seconds without any special adaptation. ⁽¹¹⁾

- **Decontaminability:** The decontamination procedures are as follows: ⁽⁸⁾

On Contaminated
Areas Vapor contamination – No need to decontaminate the facepiece.

Liquid contamination – If caught in a toxic rain, upon leaving the area, immediately wipe the facepiece with a special glove (in service with the French Army) or with a soft paper or fabric with or without water.

At the Rear or
at the Barracks Use hypochlorite at 20° Baumé (SDSM F2 solution in service in the French Army).

Incubation at 70°C for 24 hours.

Use of SDSM F1 or boiling water may cause damage to the facepiece.

- **Fogging Characteristic(s):** An internally located antimist deflector directs incoming air over the eyepiece, thus preventing condensation. ⁽⁴⁾

Check valves on the nose cup prevent exhaled air from fogging the eyepiece. ⁽¹¹⁾

- **Deployment:** Not available.

- **Miscellaneous:** The respirator can be efficiently used at temperatures from -20°C to +50°C. ⁽⁷⁾

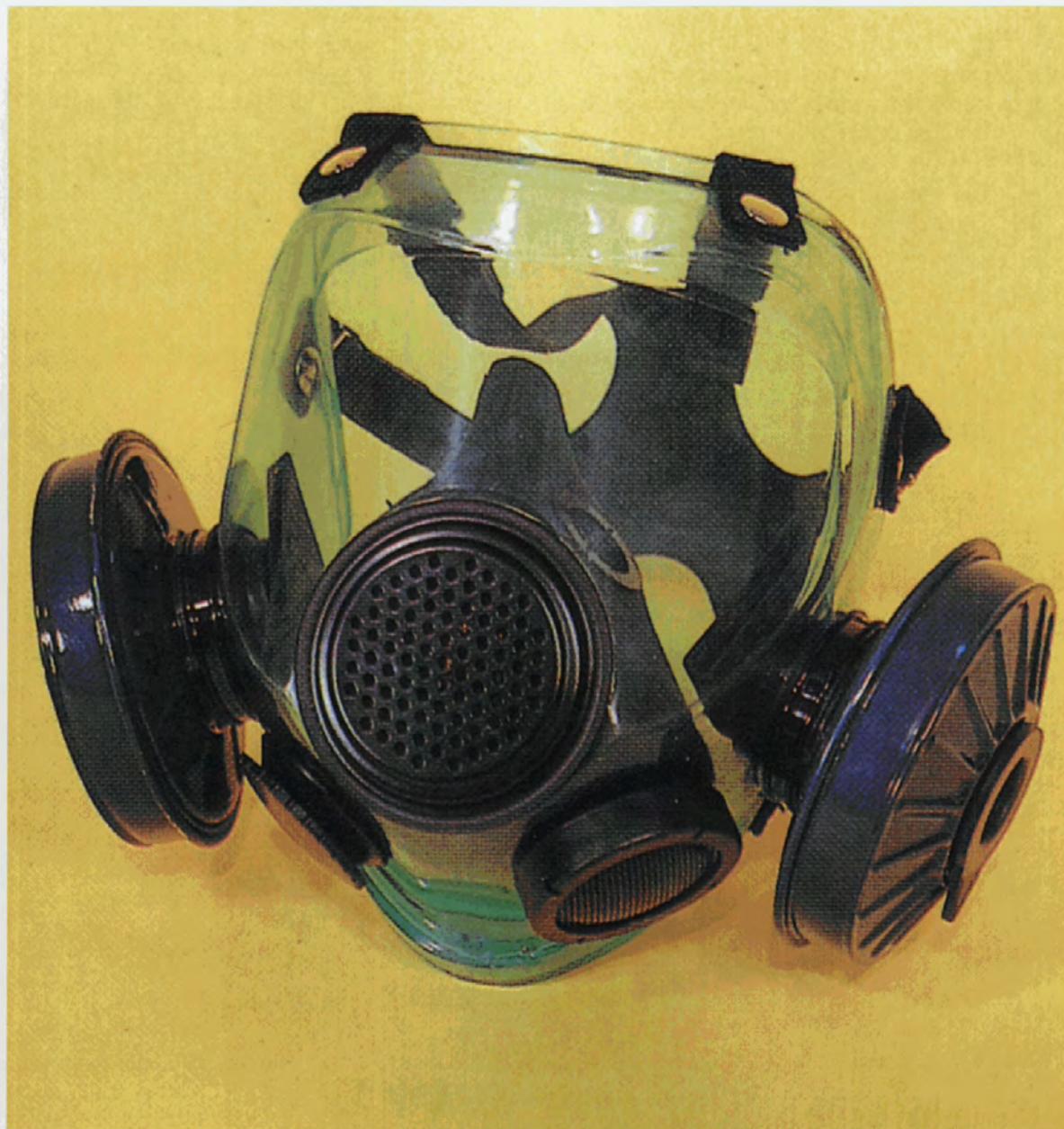


Photo courtesy of GIAT.

The French G1

- **Designator(s):** G1
- **Item Name(s):** Protective Mask Type Gendarmerie
- **Item Description:** The French G1 features a molded transparent facepiece/eyepiece and left- and right-side canister mounts. There is an internal noseclip, a voicemitter located over the mouth area, and a six-point adjustable head harness suspension. This mask does not have a drinking device. ⁽¹³⁾
- **Total Weight:** 760 g. ⁽²⁾
 - Canister 130 g each. ⁽²⁾
 - Facepiece 500 g. ⁽²⁾
- **Stock Number(s):**
 - Small 062763 S. ⁽¹⁶⁾
 - Medium 062701 T. ⁽¹⁶⁾
 - Large 062741 R. ⁽¹⁶⁾
- **Sizes Available:** Small, medium, and large. ⁽¹⁶⁾
- **Use(s):** The G1 has been in service with the French National Police for eight years. ^(2, 8)
- **Component(s):**
 - Canister Uses two CFL 82 canisters mounted on both the right and left side of the mask. ⁽¹⁶⁾
 - Canister Mount NATO standard. ⁽¹⁶⁾
 - Facepiece/Eyepiece(s) Made from a fully transparent injected molded polyurethane. ⁽¹⁶⁾
 - Head Harness A set of adjustable straps provide correct fitting. ⁽²⁾
 - Noseclip Internal noseclip has check valves that deflect exhaled air away from the eyepiece to prevent fogging. ⁽¹⁶⁾
- **Breathing Resistance:** An inhalation resistance of 4 mm of H₂O at an airflow of 30 L/min. ⁽²⁾
- **Airflow:** No positive airflow available. ⁽⁹⁾
- **Communications Enhancement:** An incorporated acoustical membrane, which is the front-mounted outlet valve for expelled air, also acts as a speech transmission device. ⁽²⁾

- **Protection Afforded:** Protection is supplied to the respiratory system and eyes against tear gases, antiriot gases, and radioactive dusts and aerosols. ⁽²⁾
- **Manufacturer(s):** GIAT-Industrie
13 route de la Minière, Satory
78034 Versailles Cedex
France
Tel: 033 130 973747
Fax: 033 130 973900 ⁽⁶⁾
- **Compatibility:** Not available.
- **Storage Life:** Estimated storage life of 20 years when stored in a nontranslucent bag at -30°C and +70°C. The operating temperature for this mask is between -20°C and +50°C. ⁽⁸⁾
- **Donning Time:** Less than 10 seconds. ⁽¹⁶⁾
- **Field of Vision:** The transparent face mask provides a wide field of vision. ⁽²⁾
- **Accessories:** Not available.
- **Decontaminability:** Not available.
- **Fogging Characteristic(s):** A nose cup serves to reduce internal dead space, and check valves located on the nose cup prevent exhaled air from fogging the eyepiece. ⁽⁸⁾
- **Deployment:** Not available.
- **Miscellaneous:** Not available.

7.3 REFERENCES

1. "A New Military Mask." Equipment data sheet from Établissement Technique Central de l'Armement.
2. "Protection Unit Gendarmerie Type." Data sheet from GIAT-Industrie.
3. "A.N.P. 51 M 53 and its accessories." Data sheet from GIAT-Industrie.
4. "NBC Individual Protection: Personal Filter-Type Respirator (ARF.A Personal Respirator)." Data sheet from GIAT-Industrie.
5. Specification sheet on the ANP 51M53 mask.
6. Correspondence with Ambassade de France Aux Etats-Unis.
7. "The French NBC Respiratory Protection Equipment." Data sheet from GIAT-Industrie.
8. Brochure on the ARF.A and G1 masks from GIAT-Industrie.
9. Analysis based on physical evaluation of the mask by CBIAC personnel.
10. Analysis based on conversation with CRDEC personnel, Edgewood Area, APG, MD, 21010-5423.
11. "ARFA: New Generation NBC Mask." Brochure from GIAT-Industrie.
12. "ARFA: NBC Military Mask." Data sheet from GIAT-Industrie.
13. Analysis based on photo evaluation of the mask by CBIAC personnel.
14. "Filtres Militaires Combine's Anti-Particules et Anti-gaz Pour Appareils de Protection Respiratoire." Brochure from GIAT-Industrie.
15. "PICA: World Leader in the Production of Coconut-Based Activated Carbon." Brochure from PICA.
16. "Masque de Protection Individuelle Pour Deux Filtres Latéraux CFL 82." Brochure from GIAT-Industrie.
17. "Masque de Protection Individuelle Pour Un Filtre Central." Brochure from GIAT-Industrie.



Chapter 8 – Germany

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8.1 FILTRATION

- **Item Name(s):** CO Fe Filter Canister
- **Use(s):** Used with the German Kareta M mask series. ⁽⁹⁾
- **Physical Characteristic(s):**

Aerosol Filter	Glass fibers (glass wool) or glass wool impregnated filter paper. ⁽⁹⁾
Air Inlet Valve	22 mm diameter. ⁽⁹⁾
Canister	Yellow olive (RAL 6014) in color. Provides a reflectometer value of 15-50 at an angle of 85°. The paint thickness is 0.035 mm. ⁽⁹⁾
Gas Filter	Activated charcoal. Also contains a carbon monoxide filter. ⁽⁹⁾
Magnetic Field Strength	Maximum value is 0.02 A/m (25 nanotesla) at a distance of 125 mm. ⁽⁹⁾
Thread	DIN 3183/CA standard (NATO standard). ^(5, 9)
Weight	620 g. ⁽⁹⁾

- **Performance Specification(s):**

Aerosol Efficiency	99.997% against paraffin oil fog. ⁽⁹⁾
Airflow Resistance	Less than 23.45 mm of H ₂ O at an airflow of 30 L/min.* ⁽⁹⁾
Gas Life	
CK Life	Greater than 100 minutes at a concentration of 2 ± 0.2 g/m ³ , under dry conditions. ⁽⁹⁾
CO Life	Greater than 120 minutes. ⁽⁹⁾
HCN Life	Greater than 80 minutes at a concentration of 2 ± 0.2 g/m ³ , under dry conditions. ⁽⁹⁾
PS Life	Greater than 100 minutes at a concentration of 5 ± 0.3 g/m ³ , under dry conditions. ⁽⁹⁾

● **Deployment:** Not available.

*Data originally reported in millibars.

- **Manufacturer(s):** Drägerwerk AG Lübeck
Moislinger Allee 53/55
D-2400 Lübeck 1
Germany
Tel: 049 451 8820 ⁽⁹⁾

U.S. Representative National Dräger, Inc.
101 Technology Drive
P.O. Box 120
Pittsburgh, PA 15230
Tel: (412) 788-5602
(412) 787-8383
Fax: (412) 787-2207 ⁽³⁾

- **Stock Number(s):** 4240-12-148-7105 (NSN). ⁽⁹⁾

- **Miscellaneous:** The visible markings on the filter canister consist of "CO Fe NM" and the manufacturers' name is engraved or stamped into the metal; the actual weight of the filter is painted on in black lettering. Additionally, "BUND" (owner), NSN, month and year of manufacture, and lot number are painted on. Other markings include a statement about the filter canister indicating that protection against carbon monoxide is at maximum two hours. This statement is painted in red on a white background. Therefore, the filter canister must be discarded following one usage or exposure to carbon monoxide even if the two-hour limit is not reached. ⁽⁹⁾

Operational Temperature Up to 63°C. ⁽⁹⁾

Storage Temperature -35°C to +63°C. ⁽⁹⁾

This filter canister is not required to be decontaminable or have IR requirements. ⁽⁹⁾

- **Item Name(s):** FE 55 NM Filter Canister
- **Use(s):** Used with the German Kareta M mask series. ⁽⁹⁾
- **Physical Characteristic(s):**

Aerosol Filter ⁽⁹⁾

Air Inlet Valve 22 mm diameter. ⁽⁹⁾

Canister Yellow olive (RAL 6014) in color. Provides a reflectometer value of 15-50 at an angle of 85°. The paint thickness is 0.035 mm. ⁽⁹⁾

Diameter 115 mm. ⁽⁹⁾

Gas Filter ⁽⁹⁾

Height 105 mm. ⁽⁹⁾

Magnetic Field Strength 0.02 A/m (25 nanotesla) at a distance of 125 mm. ⁽⁹⁾

Thread DIN 3183/CA standard (NATO standard). ^(5, 9)

Weight 320 g. ⁽⁹⁾

- **Performance Specification(s):**

Aerosol Efficiency Greater than or equal to 99.997% when measured with paraffin oil. ⁽⁹⁾

Airflow Resistance Less than 23.45 mm of H₂O at an airflow of 30 L/min.* ⁽⁹⁾

Less than 81.58 mm of H₂O at an airflow of 80 L/min, concentration of 900 mg of paraffin mist.* ⁽⁹⁾

Gas Life

CK Life Greater than 240 minutes at a concentration of 2 ± 0.2 g/m³, under dry conditions. ⁽⁹⁾

Greater than 200 minutes at a concentration of 2 ± 0.2 g/m³, RH of 80%. ⁽⁹⁾

*Data originally reported in millibars.

HCN Life Greater than 140 minutes at a concentration of $2 \pm 0.2 \text{ g/m}^3$, under dry conditions. ⁽⁹⁾

Greater than 140 minutes at a concentration of $2 \pm 0.2 \text{ g/m}^3$, RH of 80%. ⁽⁹⁾

PS Life Greater than 240 minutes at a concentration of $5 \pm 0.3 \text{ g/m}^3$, under dry conditions. ⁽⁹⁾

Greater than 100 minutes at a concentration of $5 \pm 0.3 \text{ g/m}^3$, RH of 80%. ⁽⁹⁾

- **Deployment:** Not available.

- **Manufacturer(s):** Drägerwerk AG Lübeck
Moislinger Allee 53/55
D-2400 Lübeck 1
Germany
Tel: 049 451 8820 ⁽⁹⁾

U.S. Representative National Dräger, Inc.
101 Technology Drive
P.O. Box 120
Pittsburgh, PA 15230
Tel: (412) 788-5602
 (412) 787-8383
Fax: (412) 787-2207 ⁽³⁾

- **Stock Number(s):** 4240-12-140-8146 (NSN). ⁽⁹⁾
- **Miscellaneous:** The canister is marked with "BUND", the stock number, date of manufacture, and lot number next to the thread of the canister. Fe NM is engraved or stamped into the canister. The manufacturers' name is stamped into the canister. ⁽⁹⁾

Operational 63°C. ⁽⁹⁾
Temperature

Storage -35°C to +63°C. ⁽⁹⁾
Temperature

This filter canister is not required to be decontaminable or have IR requirements. ⁽⁹⁾

- **Item Name(s):** KS 80 B-Reactor-P3 Filter Canister
- **Use(s):** This is a civil defense filter canister, used with the German Kareta M mask series. ^(2, 3)
- **Physical Characteristic(s):**

Canister	Aluminum, grey in color. ⁽²⁾
Diameter	109 mm. ⁽²⁾
Gas Filter	Activated charcoal. ⁽¹⁾
Height	95 mm. ⁽²⁾
Thread	NATO standard, conforms to STANAG 4155. ⁽³⁾
Thread Size	40 x 3.63 mm. ⁽³⁾
Weight	350 g. ⁽²⁾
- **Performance Specification(s):** An aerosol efficiency of 99.997% against oil mist droplets of 0.3 microns. ⁽¹⁾
- **Deployment:** Not available.
- **Manufacturer(s):** Drägerwerk AG Lübeck
Moislinger Allee 53/55
D-2400 Lübeck 1
Germany
Tel: 049 451 8820 ⁽⁹⁾

U.S. Representative: National Dräger, Inc.
101 Technology Drive
P.O. Box 120
Pittsburgh, PA 15230
Tel: (412) 788-5602
(412) 787-8383
Fax: (412) 787-2207 ⁽³⁾
- **Stock Number(s):** 67 30 960 (order number). ⁽²⁾
- **Miscellaneous:** A shelf life of four years for sealed filters stored under "correct conditions".*
Once opened, filters must be replaced within six months even if not used. ⁽²⁾

*"Correct conditions" not defined in manufacturer's pamphlet.

- **Item Name(s):** ZS 68 B-P3 Filter Canister
- **Use(s):** This is a civil defense filter canister for use with the German Karetta M mask series. ^(2, 3)

- **Physical Characteristic(s):**

Canister	Aluminum, grey in color. ⁽²⁾
Dimensions	109 x 95 mm. ⁽²⁾
Gas Filter	Activated charcoal. ⁽¹⁾
Thread	NATO standard, conforms to STANAG 4155. ⁽³⁾
Thread Size	40 x 3.63 mm. ⁽³⁾
Weight	350 g. ⁽²⁾

- **Performance Specification(s):**

Aerosol Efficiency 99.997% against oil mist droplets of 0.3 microns. ⁽¹⁾

Gas Life

CK Life 140 minutes at an airflow of 30 L/min (continuous flow), concentration 2 g/m³. ⁽¹⁾

HCN Life 120 minutes at an airflow of 30 L/min (continuous flow), concentration 2 g/m³. ⁽¹⁾

PS Life 200 minutes at an airflow of 30 L/min (continuous flow), concentration 5 g/m³. ⁽¹⁾

- **Deployment:** Not available

- **Manufacturer(s):** Drägerwerk AG Lübeck
Moislinger Allee 53/55
D-2400 Lübeck 1
Germany
Tel: 049 451 8820 ⁽⁹⁾

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101 Technology Drive
P.O. Box 120
Pittsburgh, PA 15230
Tel: (412) 788-5602
(412) 787-8383
Fax: (412) 787-2207 ⁽³⁾

- **Stock Number(s):** RM 7970 (order number). ⁽²⁾
- **Miscellaneous:** A shelf life of four years for sealed filters stored under "correct conditions".*
Once opened, filters must be replaced within six months even if not used. ⁽²⁾

*"Correct conditions" not defined in manufacturer's pamphlet.

8.2 RESPIRATORS



Photo courtesy of CBIAC Personnel.

**The German Kareta M
with Drinking Device**



Photo courtesy by National Dräger, Inc.

**The German Kareta M
without Drinking Device**

- **Designator(s):** Kareta M*
M65 Mask**
- **Item Name(s):** Kareta M NBC Mask
- **Item Description:** The German Kareta M mask features a green, elastomeric facepiece with two triangular eyepieces that are held in place by screw-tightened metal eyering clamps. The exhalation valve/voicemitter assembly is located in the center front of the facepiece just below the eyepieces. The canister mount is located at the chin position. The mask has two inhalation valve plates that lie in series. The mask has a nosecup with two check valves. It is held on the face by a five-point adjustable head harness suspension. ^(9, 10)

The German M65 mask was the predecessor to the German Kareta M mask. The German Kareta M has two versions, with and without a drinking device.

- **Total Weight:**
1,175 g (size 1 and CO Fe canister). ^(8, 9)
875 g (size 1 and FE 55 NM canister). ^(8, 9)
905 g (size 1 and KS 80 B-Reactor-P3 canister). ^(2, 8)
905 g (size 1 and ZA 68 B-P3 canister). ^(2, 8)

Facepiece
555 g (size 1). ⁽⁸⁾
535 g (size 2). ⁽⁸⁾
530 g (size 3). ⁽⁸⁾

Canister
620 g (CO Fe canister). ⁽⁹⁾
320 g (FE 55 NM canister). ⁽⁹⁾
350 g (KS 80 B-Reactor-P3 canister). ⁽²⁾
350 g (AZ 68 B-P3 canister). ⁽²⁾

- **Stock Number(s):**

The stock numbers for the Kareta M without drinking device are 4240-12-186-6586, 4240-12-186-6898, and 4240-12-186-6899. ⁽⁸⁾

The stock numbers for the Kareta M with drinking device are 4240-12-307-8050, 4240-12-307-8051, and 4240-12-307-8052. ⁽⁸⁾

- **Sizes Available:** Size 1 (large), size 2 (medium), and size 3 (small). ⁽⁸⁾
- **Use(s):** Used as a civil defense mask and a German armed forces general purpose respirator. ^(1, 3)

*Designation used by Drägerwerk AG Lübeck.

**Designation used by Auergesellschaft GMBH.

● **Component(s):**

Canister	Uses the KS 80 B canister, the ZS 68 B canister, the CO Fe canister, or the FE 55 NM canister. ^(2, 9)
Canister Mount	Equipped with a DIN 3183-CI thread that accepts screw-in canister filters. ⁽⁸⁾
Carrying Strap	The mask may be worn in front of the chest by means of a separate carrying strap hung around the neck. ⁽¹⁾
Drinking Device	Mounted on right cheek. ⁽⁸⁾
Eyepiece(s)	The visors are made from laminated glass of a high optical grade. They are held by acetate resin clips that allow for quick, easy changing. ^(1, 8) After subjection to any of the following scenarios, the glass is not etched: ⁽⁸⁾ 7 days storage at $63 \pm 2^\circ\text{C}$. 5 hours storage at $-35 \pm 2^\circ\text{C}$. 48 hours immersion in 0.2% HTH solution at $50 \pm 2^\circ\text{C}$. 1 hour in boiling water.
Facepiece	Made of rubber that is 2.5 ± 0.1 mm thick. It will provide an effective seal at an overpressure of up to 12 mbar when inhalation and exhalation valves are sealed. ⁽⁸⁾
Head Harness	The head harness features a five-point adjustable suspension. ⁽⁸⁾
Metal Parts	Maximum magnetic field strength value is 0.02 A/m (25 nanotesla) at a distance of 12.5 cm. ⁽⁹⁾
Nosecup ⁽⁸⁾	
O-Ring for Canister Mount	Corresponds to DIN 3183-DCI. ⁽⁸⁾

● **Breathing Resistance:**

Inhalation Resistance	Less than 15.29 mm of H ₂ O pressure change through first valve plate at an airflow of 30 L/min (continuous flow).* ⁽⁸⁾ Between 3.06 and 10.19 mm of H ₂ O pressure change through control valve plate of the nosecup unit at an airflow of 30 L/min (continuous flow).* ⁽⁸⁾
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*Data originally reported in millibars.

Exhalation Resistance Less than 12.24 mm of H₂O pressure change at an airflow of 30 L/min (continuous flow).^{*(8)}

- **Airflow:** No positive airflow available. ⁽¹⁰⁾
- **Communications Enhancement:** Centrally located diaphragm type voicemitter. ⁽¹⁰⁾
- **Protection Afforded:** Effective against all known agents. The facepiece will provide protection against sulfur mustard and sarin (GB) for at least six hours. ⁽⁸⁾

● **Manufacturer(s):** Auergesellschaft GMBH
Thiemanslr. 1-11
D-1000
Berlin 44
Germany
Tel: 030 68 91-1 ⁽³⁾

Drägerwerk AG Lübeck
Moislinger Allee 53/55
D-2400 Lübeck 1
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Fax: (412) 787-2207 ⁽³⁾

- **Compatibility:** Not available.
- **Storage Life:** Not available.
- **Donning Time:** Not available.
- **Field of Vision:** Two large, cylindrically curved, wide-angle transparent visors guarantee a wide angle of vision both horizontally and vertically. ⁽¹⁾
- **Accessories:**

Simple Carrying Bag Order number 59 50 588. ⁽¹⁾

Special Carrying Bag Order number R 51171. ⁽¹⁾

Special Connector For changing filter position. ⁽¹⁾

*Data originally reported in millibars.

- **Decontaminability:** The entire mask is decontaminable. All plastic parts are resistant to the effects of mustard agent, G & V agents, chlorine containing decontaminants, and boiling water. The masks must be able to withstand immersion in an HTH (calcium hypochlorite) solution (0.2%) for 48 hours at a solution temperature of $50 \pm 2^\circ\text{C}$, and boiling soapy water for one hour. The mask material must not adsorb or retain more than 0.15 mg agent/drop area after being decontaminated. ⁽⁸⁾
- **Fogging Characteristic(s):** Two check valves on the nosecup prevent exhaled air from fogging the lenses. ⁽¹⁾
- **Deployment:** The Israeli government has bought manufacturing rights from Drägerwerk AG Lübeck, Germany. The Israeli 80-S-70 mask is based on the design of the German M65, the predecessor to the Kareta M. The Kareta M has also been sold to The Netherlands, Swiss Army, and Saudi Arabia. ⁽³⁾

Both the M65 and the Kareta M were deployed to Iraq and used during Operation Desert Storm. ⁽⁴⁾

- **Miscellaneous:**

Operational Temperature Between -30°C and $+44^\circ\text{C}$. ⁽⁸⁾

Storage Temperature Between -35°C and $+63^\circ\text{C}$. ⁽⁸⁾



Photo courtesy of Drägerwerk AG Lübeck.

The German Panorama Nova

- **Designator(s):** Panorama Nova
- **Item Name(s):** Panorama Nova Mask
- **Item Description:** The Panorama Nova mask features a rubber facepiece, a large one-piece eyelens, centrally located canister mount, stainless steel speech diaphragm, internal nosecup, and five-point head harness suspension. ^(7, 10)
- **Total Weight:** Not available.
- **Stock Number(s):** Not available.
- **Sizes Available:** One size fits all. ⁽⁶⁾
- **Use(s):** Primarily used by fire fighters and for industrial purposes. ⁽³⁾
- **Component(s):**

Canister	Designed for use with the 630-ST-P3 HEPA filter canister. ⁽⁶⁾ With an adapter the Panorama Nova may be used with any NATO standard thread canister. ⁽³⁾
Canister Mount	Non-NATO. ⁽³⁾
Eyepiece(s)	Large, one-piece lens made of scratch-resistant polycarbonate. ⁽⁷⁾
Facepiece	Made of neoprene or silicone rubber. The silicone mask is resistant to ozone, heat, and light (even with high ultraviolet content and the oxidation of gaseous or liquid media). Not readily attacked by oils, greases, or solvents, this silicone mask is ideal for wearers who have allergic reactions to neoprene. It is ideal for the nuclear industry due to the ease of decontaminating silicone rubber. Both the silicone or neoprene facepieces have a double sealing edge. ⁽⁶⁾
Head Harness	The mask has a five-point head harness suspension. ^(6, 10)
Mask Hardware	Stainless steel. ⁽⁷⁾
Neck Strap ⁽⁶⁾	
Nosecup	The nosecup has two check valves that prevent exhaled air from fogging the lenses. Use of the nosecup is optional at temperatures above 0°C. ⁽⁶⁾
Voicemitter	Stainless steel speech diaphragm. ⁽⁷⁾

- **Breathing Resistance:** Not available.

- **Airflow:** No positive airflow available. ⁽¹⁰⁾
- **Communications Enhancement:** Speech diaphragm provides clear, reliable voice transmission. ⁽⁷⁾
- **Protection Afforded:** Not available.
- **Manufacturer(s):** Drägerwerk AG Lübeck
Moislinger Allee 53/55
D-2400 Lübeck 1
Germany
Tel: 049 451 8820 ⁽⁶⁾
- **U.S. Representative:** National Dräger, Inc.
101 Technology Drive
P.O. Box 120
Pittsburgh, PA 15230
Tel: (412) 788-5602
(412) 787-8383
Fax: (412) 787-2207 ⁽⁶⁾
- **Compatibility:** Not available.
- **Storage Life:** Not available.
- **Donning Time:** Not available.
- **Field of Vision:** Allows 90% effective field of vision. ⁽⁷⁾
- **Accessories:** Not available.
- **Decontaminability:** Not available.
- **Fogging Characteristic(s):** Check valves on the nose cup prevent exhaled air from fogging the lenses. ⁽⁷⁾
- **Deployment:** Although the Panorama Nova is primarily intended for industrial use, it was carried by Iraqi soldiers during Operation Desert Storm. ⁽⁵⁾
- **Miscellaneous:** Not available.

8.3 REFERENCES

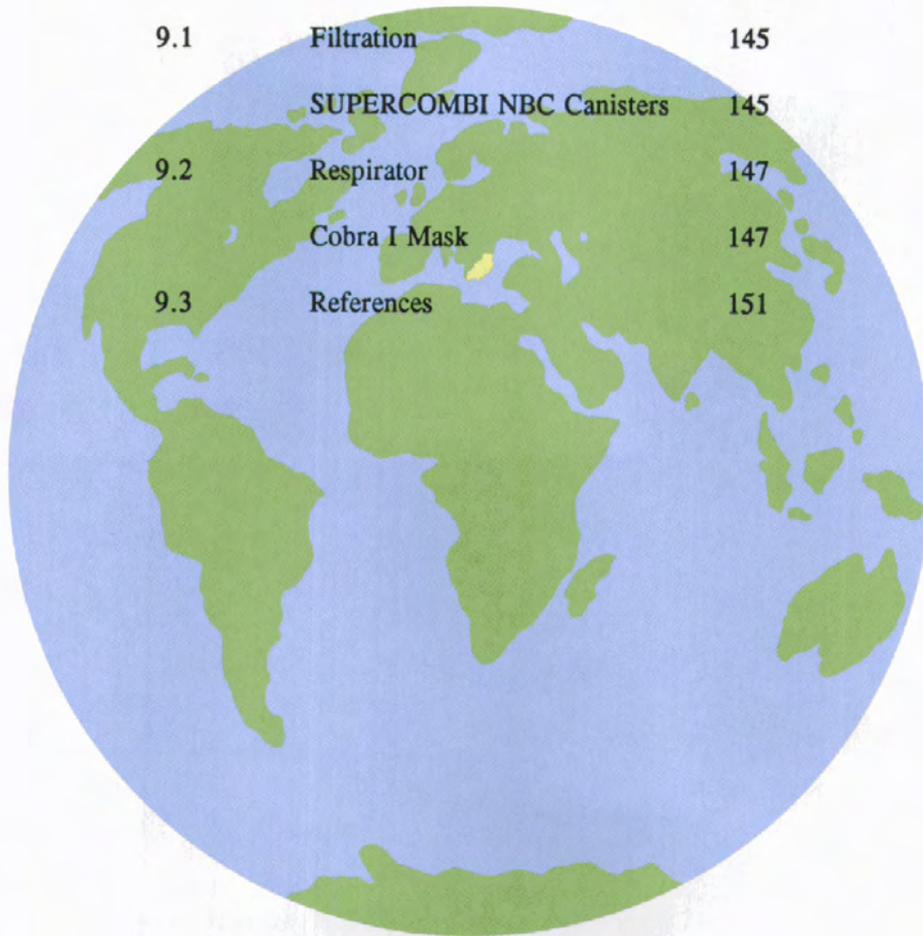
1. "The Most Economical Twin – Visor Breathing – Protection Mask: Kareta M from Dräger." Pamphlet provided by National Dräger, Inc.
2. "Respirator Filters." Pamphlet provided by National Dräger, Inc.
3. Interview with representative of National Dräger, Inc.
4. Interview with U.S. Army Chemical Corp Museum personnel, U.S. Army Chemical School, Fort McClellan, AL, 36205-5000.
5. Interview with CRDEC personnel, Individual Protection Division, Edgewood Area, APG, MD, 21010-5423.
6. Brochure on the PA-80 Self-Contained Breathing Apparatus provided by National Dräger, Inc.
7. "Panorama Nova RA Air Purifying Respirator." Brochure provided by National Dräger, Inc.
8. Translation of German Technical Delivery Specification "ABC-Schutzmasken." August 1990. TL 4240-0016.
9. Translation of German Technical Delivery Specification "Schraubfilter, nicht magnetisierbar für ABC-Schutzmasken." February 1989. TL 4240-0017.
10. Analysis based on physical evaluation of the mask by CBIAC personnel.



Chapter 9 – Greece

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9.1 FILTRATION

- **Item Name(s):** SUPERCOMBI NBC Canisters
- **Use(s):** Used with the Greek Cobra respirator. ⁽⁴⁾
- **Physical Characteristic(s):**

Aerosol Filter	Folded filter paper of glass fiber cellulose. ⁽⁵⁾
Canister	Plastic, brown in color. ⁽³⁾
Diameter	114 mm. ⁽³⁾
Gas Filter	Impregnated, activated carbon. ⁽⁵⁾
Height	106 mm for Type I, 92 mm for Type II, and 86 mm for Type III. ⁽³⁾
Thread	NATO standard, conforms to STANAG 4155. ⁽⁵⁾
Thread Size	40 x 3.63 mm, conforms to DIN 3182. ⁽⁵⁾
Weight	340 g for Type I, 280 g for Type II, and 270 g for Type III. ⁽⁵⁾
- **Performance Specification(s):**

Aerosol Efficiency	Greater than 99.997% against paraffin oil mist of 0.3 microns. ⁽³⁾
Airflow Resistance	
Type I	20 mm H ₂ O at an airflow of 30 L/min. ⁽⁵⁾
Type II	17 mm H ₂ O at an airflow of 30 L/min. ⁽⁵⁾
Type III	16 mm H ₂ O at an airflow of 30 L/min. ⁽⁵⁾
Gas Life	The gas life has been tested against HCN, CK, chloropicrin, CG, and GB. ⁽³⁾
- **Deployment:** Not available.

- **Manufacturer(s):** BIANA S.A.
Personal Protective Equipment
3rd km Koropi - Vari Avenue
P.O. Box 5
19400 Koropi
Greece
Tel: 030 1 6623940
030 1 6623910
030 1 6624700
Fax: 030 1 6624724 ⁽³⁾

- **Stock Number(s):** Not available.

- **Miscellaneous:** The SUPERCOMBI NBC canister family comes in three different sizes (Types I, II, and III) to fulfill various technical specifications. ⁽⁵⁾

9.2 RESPIRATOR



Photo courtesy of BIANA S.A.

The Greek Cobra I

- **Designator(s):** Cobra I
- **Item Name(s):** Cobra I Mask
- **Item Description:** The Cobra Respirator is the latest in a line of Greek respirator models developed to NATO requirements (AC/255/Panel VII), Greek standards (DID/July 1981), and West German specifications (TL 4240-016).⁽⁴⁾

The Cobra resembles the German Karetta M in appearance. It features a halogen butyl rubber facepiece (black), two triangular shaped lenses, a centrally located canister mount, an internal nose cup, and a five-point head harness suspension with halogen butyl rubber straps. The drinking device is located on the right side of the mask.^(3, 6)

A variant of the COBRA I is the COBRA II. It differs from the COBRA I in that it has neither a drinking device nor a prop base for fitting corrective lenses.⁽³⁾

- **Total Weight:**

SUPERCOMBI Type I	820 g.
SUPERCOMBI Type II	760 g.
SUPERCOMBI Type III	750 g. ^(1, 3)

Canister	SUPERCOMBI Type I	340 g.
	SUPERCOMBI Type II	280 g.
	SUPERCOMBI Type III	270 g. ⁽¹⁾

Facepiece 480 g.⁽³⁾

- **Stock Number(s):** Not available.
- **Sizes Available:** One universal size protects large, medium-large, and medium-small faces.⁽³⁾
- **Use(s):** Used by the Greek Army as a general purpose respirator.⁽³⁾
- **Component(s):**

Canister Uses the Greek SUPERCOMBI NBC canister Types I, II, and III.⁽³⁾

Canister Mount NATO standard.⁽³⁾

Drinking Device The mask may be offered with the option of a drinking device for water and liquid food. This system consists of an inner mouth piece, intake valve, external connecting tube, and special flask top with suitable feeding valve.⁽⁴⁾

Eyepiece(s) The eyepieces are made of plexiglass; under special request they can be replaced with antiscratch, impact-resistant polycarbonate (at a higher price).⁽³⁾

Facepiece The face mask is made of a halogen butyl rubber mixture with a flat black finish. Airtight sealing of the mask on the face is achieved through an inner lip sealing frame on the mask body. In addition, a rib on the outer rim of the mask ensures a good fit of the mask inside a NBC clothing hood. ⁽⁴⁾

Head Harness A five-piece head harness made of halogen butyl rubber mixture holds the mask to the face. ⁽³⁾

Prop Base Special rubber socket for fitting corrective lenses. ⁽³⁾

- **Breathing Resistance:** Not available.
- **Airflow:** No positive airflow available. ⁽²⁾
- **Communications Enhancement:** The design of the mask facilitates verbal communication. The exhalation valve is located at mouth level. Thus, the sound waves are guided through the inner mask directly to the exhalation valve, where the high-elasticity, vibratory, multiple-seat valve disc transmits the sound waves to the exterior with high efficiency. This construction also facilitates the use of all up-to-date telecommunication equipment. ⁽⁴⁾
- **Protection Afforded:** Protection against mustard is greater than 72 hours. ⁽³⁾
- **Manufacturer(s):**
 - BIANA S.A.
 - Personal Protective Equipment
 - 3rd km Koropi - Vari Avenue
 - P.O. Box 5
 - 19400 Koropi
 - Greece
 - Tel: 030 1 6623940
 - 030 1 6623010
 - 030 1 6624700
 - Fax: 030 1 6624724 ⁽³⁾
- **Compatibility:** The mask is compatible with combat clothing, protective headgear, weapons, optical sights, and communication equipment. ⁽³⁾
- **Storage Life:** Not available.
- **Donning Time:** Less than 9 seconds. ⁽³⁾
- **Field of Vision:**

Binocular	21.3%. ⁽³⁾
Down	68.1%. ⁽³⁾
Lateral	89.1%. ⁽³⁾

Two large, curved and transparent visors guarantee a wide field of vision both horizontally and vertically. ⁽³⁾

- **Accessories:**

Carrying Case The respirator can be carried in the Type 87 B carrying case. This case has space for the respirator, two filter canister spares, an instruction book (in English), and NBC first aid equipment (i.e., an atropine self-injector). Two loops on the back side of the carrying case hold the bag in position on the waist belt. ⁽³⁾

Corrective Lenses. ⁽³⁾

- **Decontaminability:** Not available.
- **Fogging Characteristic(s):** Clearness of vision is achieved by two ways. A nose cup, which covers only the nose and mouth, conveys the exhaled air directly to the exhalation valve without allowing it to contact the visor/eyepiece. Consequently, condensation of the water vapor on the visor/eyepiece is avoided. In addition the visor/eyepiece is demisted during inhalation by directing the inhaled air first over the inner surface of the visor/eyepiece and then to the nose cup. ⁽⁴⁾
- **Deployment:** Not available.
- **Miscellaneous:** Not available.

9.3 REFERENCES

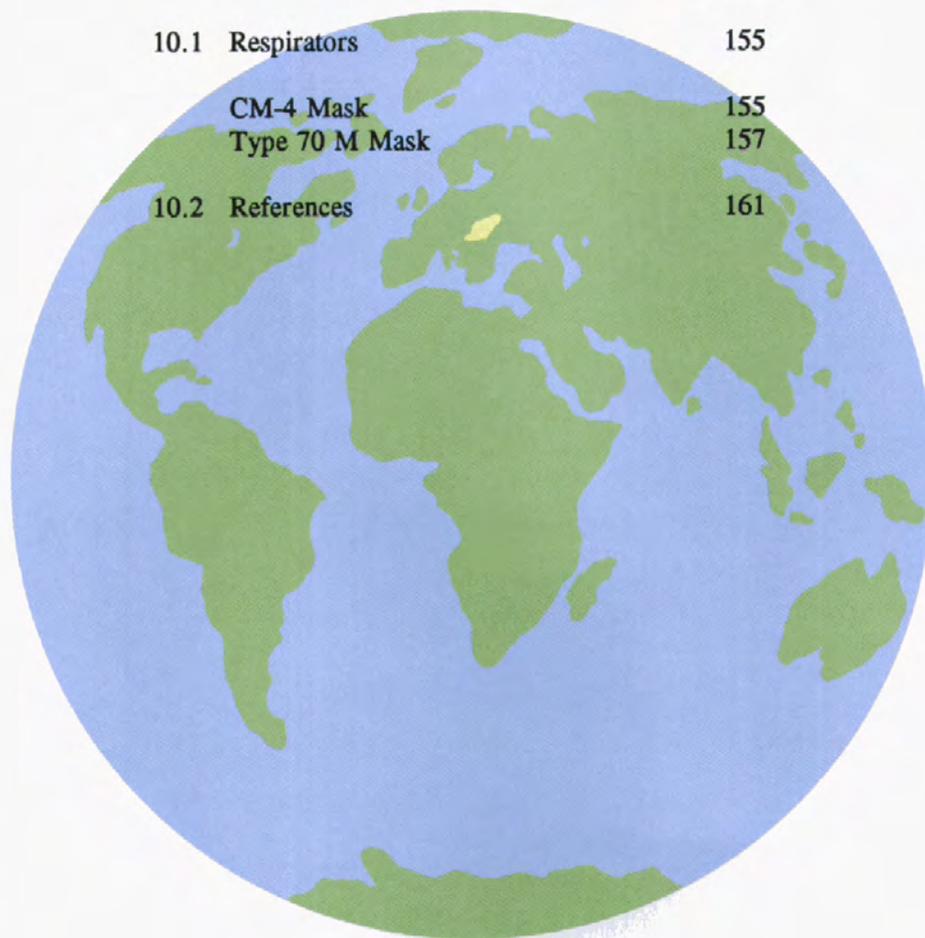
1. "Gas Filter: SUPERCOMBI NBC." Brochure from BIANA S.A.
2. Analysis based on photo evaluation of the mask by CBIAC personnel.
3. Correspondence from BIANA S.A.
4. "Gas Mask COBRA: The Greek Answer on the Chemical Attack!" Brochure from BIANA S.A.



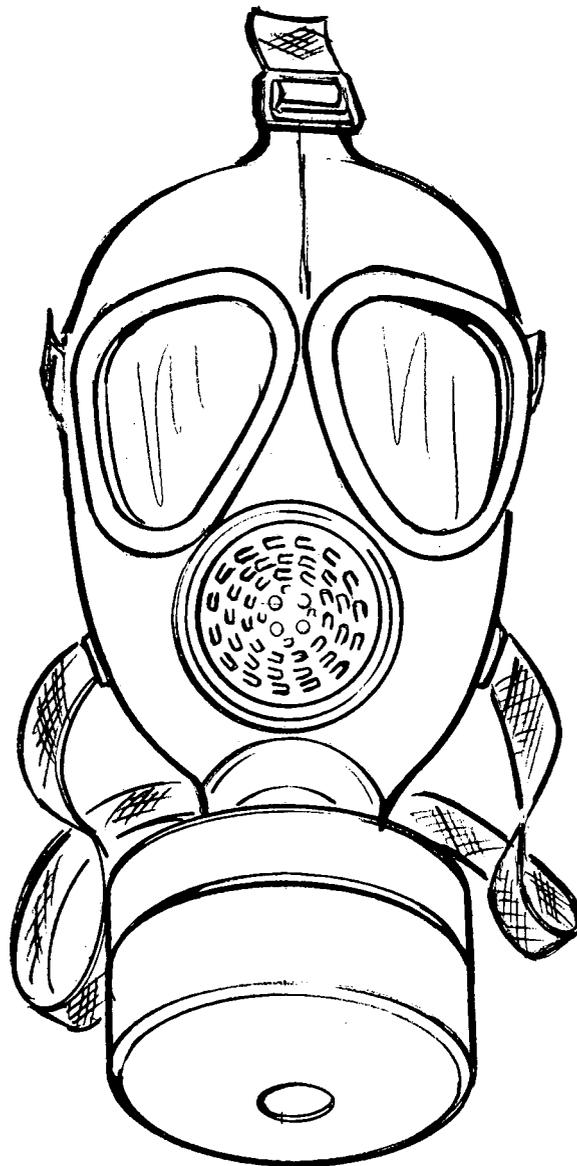
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10.1 RESPIRATORS



Sketch courtesy of Battelle.

The Hungarian CM-4

The Hungarian CM-4 has two quasitriangular eyepieces, a centrally located canister mount, an internal nosecup, a voicemitter, and a five-point adjustable head harness suspension. The mask is also provided with a neck strap to allow the mask to be carried on the chest when not on the face. The mask does not have a drink device. ⁽³⁾

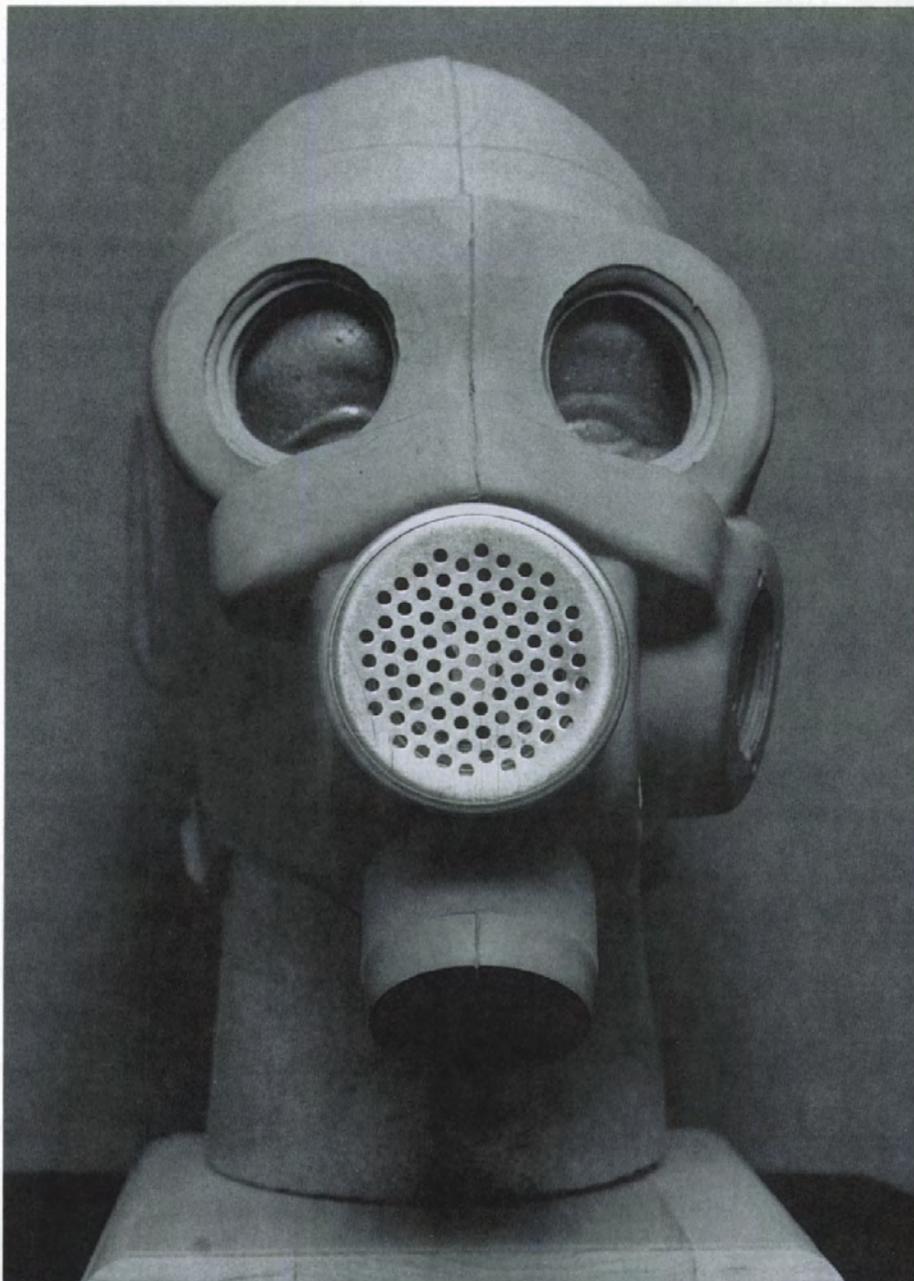


Photo courtesy of CBIAC Personnel.

The Hungarian Type 70 M

- **Designator(s):** Type 70 M
- **Item Name(s):** Type 70 M Gas Mask Set
- **Item Description:** The Type 70 M features a light grey rubber facepiece, two circular eyepieces, a centrally located voicemitter, and an exhalation valve located immediately below it. There is a left-sided canister mount. The rubber facepiece material extends behind the head to hold the mask in place. There are two oval cut-outs on the top of this facepiece/hood. An adjustable fabric strap is attached at the back of the neck. This mask does not have a drink device. ⁽²⁾
- **Total Weight:**

Facepiece	431 g. ⁽²⁾
-----------	-----------------------
- **Stock Number(s):** Not available.
- **Sizes Available:** Available in four sizes. ⁽¹⁾
- **Use(s):** Used by the Hungarian armed forces. ⁽¹⁾
- **Component(s):**

Exhalation Valve	Chin-mounted exhalation valve directs exhaled air out of the mask into the atmosphere. ⁽¹⁾
Eyepiece(s)	There are two small, flat eyepieces with antifogging inserts that may be placed on the inside. ⁽²⁾
Facepiece	The facepiece is of the helmet type and uses a rubber body stretched over the head to provide a tight protective seal around the face. ⁽¹⁾
Voicemitter	This is located in front of the mouth area. ⁽²⁾
- **Breathing Resistance:** Not available.
- **Airflow:** No positive airflow available. ⁽²⁾
- **Communications Enhancement:** A voicemitter is mounted in front of the mouth area. ⁽²⁾
- **Protection Afforded:** Protects the respiratory tract, mouth, face, and eyes against poisonous, radioactive and biological warfare agents. ⁽¹⁾
- **Manufacturer(s):** Not available.
- **Compatibility:** Not available.
- **Storage Life:** Not available.

- **Donning Time:** Not available.
- **Field of Vision:** Not available.
- **Accessories:** The fabric carrying bag is used to carry the face mask, filter, and accessories. These accessories include a box containing three pairs of anticondensation plates and one piece of anticondensation soap. A separate box contains four pairs of spare membranes. ⁽¹⁾
- **Decontaminability:** Not available.
- **Fogging Characteristic(s):** The box-shaped unit just below the eyepieces circulates the incoming air to reduce fogging of the eyepieces. ⁽⁴⁾
- **Deployment:** Not available.
- **Miscellaneous:** Not available.

10.2 REFERENCES

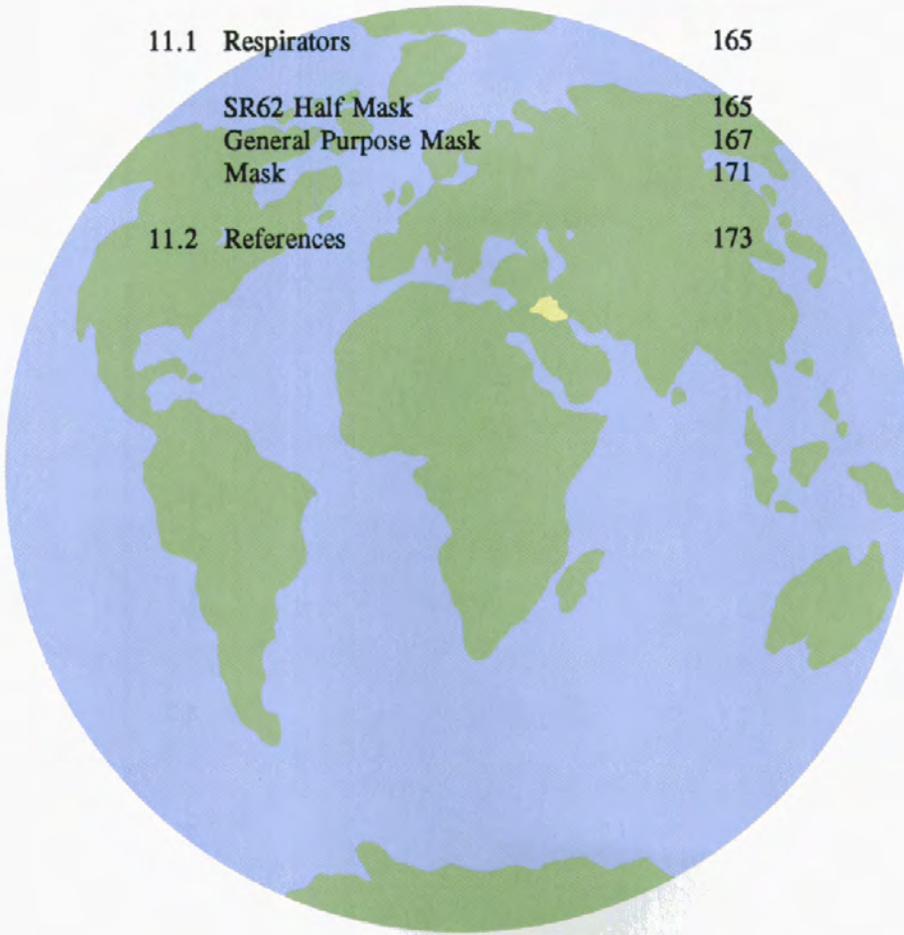
1. "Gas-Mask Set Type 70 M." Data sheet in CBIAC collection.
2. Analysis based on physical evaluation of the mask by CBIAC personnel.
3. Analysis based on photo evaluation of the mask by CBIAC personnel.



Chapter 11 – Iraq

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11.1 RESPIRATORS



Photo courtesy of CBIAC personnel.

This Swedish SR62 was carried by Iraqi soldiers during Operation Desert Shield/Storm. This is not an NBC protective mask, however, Iraqi soldiers carried it with the presumption that it would protect them against NBC agents.



Sketch courtesy of Battelle.

The Iraqi Memorial to the Iran/Iraq war is molded into every Iraqi mask.



Photo courtesy of CBIAC personnel.

The Iraqi General Purpose Mask with Drinking Device

- **Designator(s):** Not available.
- **Item Name(s):** Iraqi General Purpose Mask
- **Item Description:** The Iraqi military protective mask used during Operation Desert Shield/Storm is identical in appearance to the Romanian M85 mask, which was also used by the Iraqi military during Operation Desert Shield/Storm. Molded on the facepiece is a profile of the Iraqi memorial to the Iran/Iraq War. The mask features an olive-colored rubber facepiece with two triangular-shaped lenses held in place by screw-tightened metal collars. An integral drinking device is located on the right side of the mask. A centrally located canister mount is just below the voicemitter at the chin position. The mask has an internal nosecup. The six-point head harness suspension has adjustable straps. ⁽²⁾
- **Total Weight:** 1,000 g. ⁽²⁾
- **Stock Number(s):** Not available.
- **Sizes Available:** Not available.
- **Use(s):** Used by Iraqi military as a general purpose respirator. ⁽¹⁾
- **Component(s):** The respirator uses the Iraqi CF4 canister. ⁽¹⁾
- **Breathing Resistance:** Not available.
- **Airflow:** No positive airflow available. ⁽²⁾
- **Communications Enhancement:** Not available.
- **Protection Afforded:** Not available.
- **Manufacturer(s):** Iraqi state factories. ⁽¹⁾
- **Compatibility:** Not available.
- **Storage Life:** Not available
- **Donning Time:** Not available.
- **Field of Vision:** Not available.
- **Accessories:**

Mask Carrier The mask carrier includes gloves, medical kit, and personal decontamination kit. The medical items include atropine and antinausea injectors; the decontamination items include personal skin and face decontamination items. ⁽¹⁾

- **Decontaminability:** Not available.
- **Fogging Characteristic(s):** Not available.
- **Miscellaneous:** This mask was carried by Iraqi soldiers during Operation Desert Storm. In addition to the Iraqi manufactured models carried by Iraqi soldiers during Operation Desert Storm, U.S. troops confiscated the following masks: German (Dräger) manufactured Kareta M and Panorama Nova, Romanian manufactured M85 and M74, Yugoslav manufactured M1 and M59, and Swedish manufactured industrial half-mask SR62. ^(1, 3)



Photo courtesy of CBLAC personnel.

The Iraqi Mask

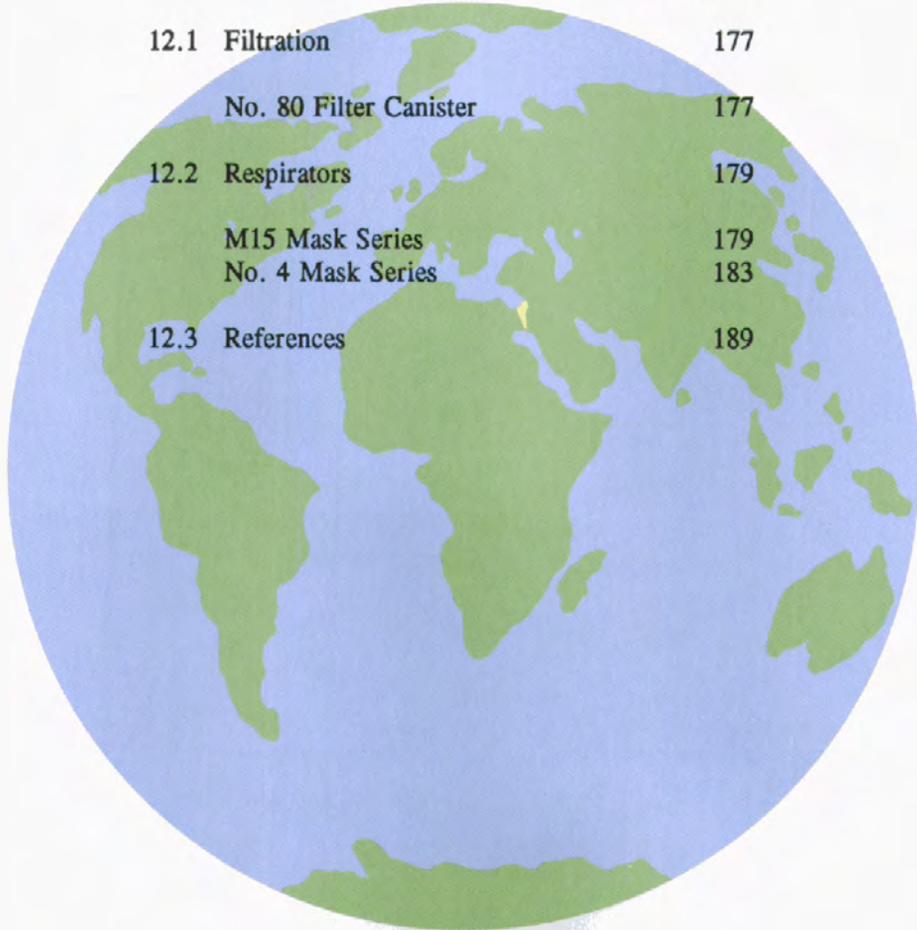
This Iraqi manufactured mask was carried by Iraqi soldiers during Operation Desert Shield/Storm. It features an olive green colored rubber facepiece with a very large one-piece lens, an internal nosecup, and a centrally located canister mount. There is an adjustable five-point head harness suspension and a neck strap. It does not have a drink device. The mask has a profile of the Iraqi memorial to the Iran/Iraq War molded on the facepiece. ^(1, 2)

11.2 REFERENCES

1. Correspondence from CRDEC personnel, Individual Protection Division, Edgewood Area, APG, MD, 21010-5423.
2. Analysis based on physical evaluation of the mask by CBIAC personnel.
3. Interview with U.S. Army Chemical School personnel, Anniston, AL, 36205-5000.

Chapter 12 – Israel

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12.1 FILTRATION

- **Item Name(s):** No. 80 Filter Canister
- **Use(s):** Used with the Israeli M15-A1 mask and all variants of this mask including the M15-S-80. Also used with the No. 4A1 civilian mask and all its variants. ^(5, 6)
- **Physical Characteristic(s):**

Aerosol Filter	Glass fiber, HEPA media complying with Mil-F-51079D. ⁽¹¹⁾
Canister	Aluminum, green in color. ⁽¹⁾
Diameter	106 mm. ⁽¹¹⁾
Gas Filter	ASC charcoal complying with Mil-C-13724D. ⁽¹¹⁾
Height	75 mm. ⁽¹¹⁾
Thread	NATO standard, conforms to STANAG 4155. ⁽¹⁾
Thread Size	40 x 3.63 mm. ⁽¹⁾
Weight	228 g. ⁽¹¹⁾
- **Performance Specification(s):**

Airflow Resistance	14 mm H ₂ O at an airflow of 30 L/min. ⁽¹¹⁾
Gas Life	
CK Life	100 minutes at an airflow of 30 L/min, concentration of 2.4 g/m ³ . ⁽¹¹⁾
DMMP Life	250 minutes at an airflow of 30 L/min, concentration of 3.0 g/m ³ . ⁽¹¹⁾
- **Deployment:** Not available..
- **Manufacturer(s):** Shalon Chemical Industries Ltd.
25 Nahmani Street
65794 Tel Aviv
Israel
Tel: 0972 3 291225
0972 3 291226
0972 3 291227
Fax: 0972 3 291615 ⁽¹¹⁾

- **Stock Number(s):** Not available.
- **Miscellaneous:** Sealed by leak-proof plastic caps, assuring a shelf life of 15 years. Meets the performance requirements of the U.S. C2 canister. ⁽¹¹⁾

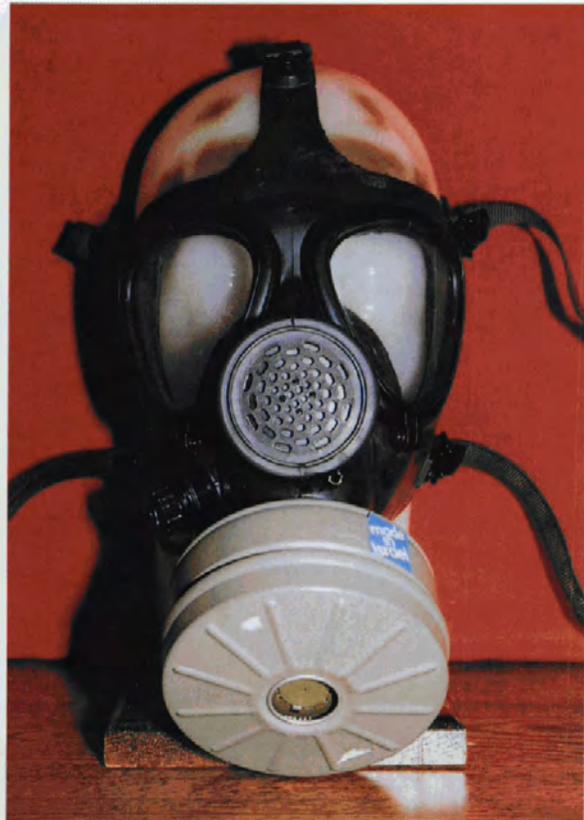
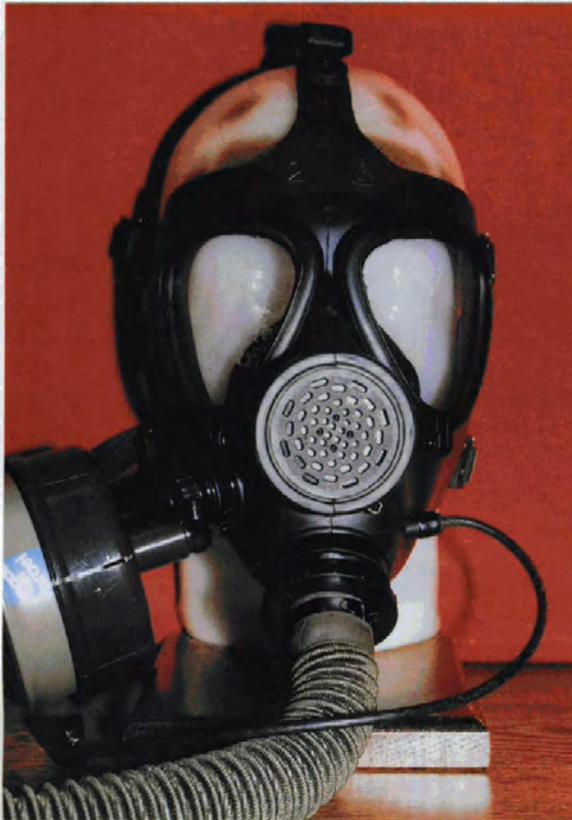
12.2 RESPIRATORS



Top: The Israeli M15-A1T with side voicemitter is the official Israeli military respirator.

Bottom Left: The Israeli M15-S-80 is used by tank crews.

Bottom Right: The Israeli M15-A1 does not have a side voicemitter.



Photos courtesy of CBIAC personnel.

- **Designator(s):** M15 Series
- **Item Name(s):** M15-A1 Mask
M15-A1T Mask
M15-A30 Mask
M15-S-80 Mask
- **Item Description:** The Israeli M15-A1 mask is constructed of a molded black polychloroprene rubber facepiece. Molded into the facepiece over the left eyepiece is a unique Israeli insignia. The two triangular-shaped eyepieces are held in place by screw-tightened hard plastic collars. A spectacle mount assembly is available for attaching prescription eyeglasses. A voicemitter is located over the nose area with a centrally located canister mount over the chin position, immediately below the voicemitter. On the right side of the mask is a drinking device. It has an adjustable five-point head harness suspension with rubber straps. This mask is similar in physical appearance to the German Karetta M since it is based on the German technology. ^(1, 6, 9)

The model M15-A1T is a variant of the M15-A1 and is the official Israeli NBC military respirator. It differs from the M15-A1 in that it has a side voicemitter for telephone communication. The M15-A30 model is less costly: it does not have a drinking device and is primarily used by police and civil defense units. The M15-S-80 model is the standard Israeli mask for tank crews. It has a flexible hose that attaches to the canister and a specially designed adapter for quick coupling with the vehicle's central collective filter unit, which supplies the crew with pressurized air. In case of emergency dismounting of the vehicle, the mask-canister system can be immediately and easily disconnected from the central filter unit. Easy access to optical sights of armored vehicles is ensured by having the filter canister connected to the mask through the hose and not directly to the facepiece. ^(2, 6)

- **Total Weight:** 770 g. ⁽¹⁾
Canister 230 g. ⁽¹⁾
Facepiece 540 g. ⁽¹⁾
- **Stock Number(s):** Not available.
- **Sizes Available:** Small, medium, and large. ⁽⁶⁾
- **Use(s):** Intended for use as a general purpose military protective mask and for police use within the Israeli Defense Forces. ⁽⁶⁾

The M15-S-80 version is used by Israeli armored fighting vehicle (AFV) crews. ⁽²⁾

- **Component(s):**
Canister Uses the No. 80 filter canister. ⁽²⁾
Canister Mount NATO standard. ⁽¹⁾

Drinking Device	The integral drinking device, combined with a modified canteen cap and connecting tube, allows the soldier to drink while maintaining a seal. ⁽⁶⁾
Eyepiece(s)	CR39 plastic. ^(1, 6)
	Triangular and splinterproof. ⁽²⁾
Facepiece	Polychloroprene, black in color. ⁽¹⁾
Head Harness	Polychloroprene. ⁽¹⁾
	Supplied with specially developed plastic buckles for quick adjustment and fast release. ⁽²⁾
	Five-point, adjustable. ⁽¹³⁾
Hood	Butyl rubber, not always worn. ⁽¹⁾
Valve Cover	Polyethylene. ⁽¹⁾
Valve Housing	Nylon. ⁽¹⁾
Voicemitter	The voicemitter enables the soldier to communicate effectively in a contaminated environment. ⁽⁶⁾

- **Breathing Resistance:**

Inhalation Resistance 54.85 mm of H₂O at an airflow of 85 L/min. ⁽⁷⁾

Exhalation Resistance 19.14 mm of H₂O at an airflow of 85 L/min. ⁽⁷⁾

- **Airflow:** For the M15-S-80, an adapter integrates with the AFV's central collective filter, supplying crews with pressurized air. ⁽²⁾

- **Communications Enhancement:** Mask is equipped with a center-front voicemitter that transmits speech efficiently and clearly. ⁽²⁾

For the M15-S-80, a dynamic microphone is centrally placed inside the mask and can be plugged into the vehicle's communication system by means of a standard external connector. ⁽²⁾

The model M15-A1T has a side voicemitter in addition to the one located on the center-front of the mask. ⁽⁶⁾

- **Protection Afforded:** Protects face, eyes, and respiratory tract from field concentrations of chemical and biological agents, riot control agents, and nuclear fallout. ⁽²⁾

- **Manufacturer(s):** Shalon Chemical Industries Ltd.
25 Nahmani Street
65794 Tel Aviv
Israel
Tel: 0972 3 291225
Fax: 0972 3 291615 ⁽⁶⁾

- **Compatibility:** Not available.

- **Storage Life:** 20 years. ⁽⁶⁾

- **Donning Time:** Not available.

- **Field of Vision:** Broad field of vision. ⁽¹⁾

- **Accessories:**
 - Drinking Tube Permits fluid intake from field canteen or open containers without mask removal. ⁽²⁾

 - Flexible Extension Available for the CP blower. ⁽¹⁾

 - Haversack ⁽¹⁾

 - Intercom Connection ⁽¹⁾

 - Spectacle Frames Available for vision correction. ⁽²⁾

- **Decontaminability:** Easily washed and sanitized. ⁽²⁾

- **Fogging Characteristic(s):** Not available.

- **Deployment:** This unit is in service with a number of police forces in Europe. ⁽¹⁾

- **Miscellaneous:** The Israeli Government has bought manufacturing rights from Drägerwerk AG Lübeck, Germany. The Israeli mask 80-S-70 is based on the German M65 mask. ⁽⁴⁾

A unique training attachment that simulates the breathing resistance of the filter canister is provided for training drills, thus saving the use of canisters during training. ⁽²⁾

The Israeli No. 4A1 has both a side drink device and a voicemitter.



Photos courtesy of CBIAC Personnel.

The Israeli No. 4 is a less expensive variant with no drink device or voicemitter.

- **Designator(s):** No. 4 Series
- **Item Name(s):** CBR Protective Mask No. 4
CBR Protective Mask No. 4A1
CBR Protective Mask No. 10
CBR Protective Mask No. 10A1
- **Item Description:** The Israeli No. 4A1 features a black rubber facepiece with two round methacrylate lenses. The adult model 4A1 has a uniquely designed peripheral sealing lip. An integral canister mount/exhalation valve/voicemitter assembly is centrally located over the mouth area. The mask also has an internal nose cup with a valve that facilitates demisting. The drinking device is located on the right side of the facepiece. This mask has a five-point elasticized, adjustable head harness suspension with a carrying strap. ^(8, 9)

Model 10A1 is identical to model 4A1 and is designed for use by children ages 8 and older. Models 4 and 10 are identical to 4A1 and 10A1, but do not have a voicemitter or drinking device. ⁽⁵⁾

- **Total Weight:** 650 g. ^(1, 7)
 - Canister 230 g. ⁽¹⁾
 - Facepiece 420 g (No. 4A1). ⁽⁷⁾
- **Stock Number(s):** Not available.
- **Sizes Available:** Universal size. ⁽⁸⁾
- **Use(s):** Approved by Israeli Civil Defense Authorities for adults. Model 10A1 is designed for protection of children from ages 8 and older. ⁽⁵⁾
- **Component(s):**
 - Canister Uses the Israeli No. 80 canister. ⁽⁵⁾
 - Canister Mount NATO standard. ⁽¹⁾
 - Carrying Strap A flat PVC strap, one centimeter wide, is connected to the faceblank buttons at the cheek position by flat clips. ⁽⁸⁾
 - Drinking Device The drinking system enables the wearer to intake fluids while wearing the mask. It consists of an inlet valve assembly, mouthpiece, and flexible tube that permits drinking from the bottle. The inlet valve assembly is located on the right cheek of the facepiece and extends through the corresponding side of the nose cup. The assembly, containing a spring-loaded check valve and having a threaded protective cap, is secured to the faceblank by a closing band. A flexible plastic mouthpiece is secured to the nipple of the

inlet valve assembly by a spring washer. The flexible tube consists of a 570-mm-long rubber tube fitted on one end with a compression type plastic nipple, gasket, and threaded coupling for connection with the inlet valve assembly. A special drinking valve (ball type) is placed at 300 mm from the intake end of the tube. The valve is opened by pressing together the two round, black levers placed on both terminals. ⁽⁸⁾

- Exhalation Valve** The exhalation valve is a rising stem, rubber disc mounted in the lower part of the connecting piece and placed behind a vented closure. The leakage of the outlet valve does not exceed 20 ml of air/min when tested at a differential pressure of 25 mm of H₂O. ⁽⁸⁾
- Eyepiece(s)** Two circular clear methacrylate eyelenses are inserted into grooved openings of the faceblank and tightened with black nylon rings. ⁽⁸⁾
- Facepiece** The faceblank is made of black rubber, especially compounded to provide high resistance to mustard gas permeability and a prolonged shelf life. It is molded to form-fit the face. ⁽⁸⁾
- Head Harness** The adjustable five-point head harness consists of four straps of cotton-based elastic webbing specially treated against mildew for water repellency sewn together and attached to the faceblank by clip and buckle connectors attached to polypropylene buttons. The five polypropylene buttons are inserted into the tabs of the faceblank at the following positions for connection with the head harness: one at the forehead, two at the temples, and two at the cheek positions. ⁽⁸⁾
- Inhalation Valve** The inhalation valve is a flat rubber disc mounted inside the internally threaded upper part of the connecting piece. This orifice accepts either the filter canister or the training attachment. ⁽⁸⁾
- Nosecup** The soft rubber nosecup is joined to the connecting piece housing from within the faceblank and diverts most of the exhaled air toward the outlet valve. A rubber disc valve is located in a hard plastic housing on each side of the nosecup. ⁽⁸⁾
- Voicemitter** The voicemitter permits clear speech transmission while wearing the mask. It consists of a plastic (mylar) disc mounted between perforated baffle plates and is located behind a vented closure. ⁽⁸⁾

● **Breathing Resistance:**

- Inhalation Resistance** 55.6 mm of H₂O at an airflow of 85 L/min. ⁽⁷⁾
- Exhalation Resistance** 19.3 mm of H₂O at an airflow of 85 L/min. ⁽⁷⁾
10 mm of H₂O at an airflow of 30 L/min. ⁽⁸⁾

- **Airflow:** Battery-operated airflow is available and used by children and disabled adults (active mask configuration). The passive mask configuration (no airflow) is used by teenagers and adults. ⁽¹⁰⁾

The SB 35/45 miniblower may be used with the model 4A1 as a means of positive airflow. It conforms to the following specification: ⁽³⁾

Diameter	60 mm.
Length	30 mm.
Motor	DC micromotor with a guaranteed shelf life of 10 years.
Weight	55 g.

Performance at nominal operating voltage of 2.7 volts: ⁽³⁾

Airflow Resistance	35 mm H ₂ O at an airflow of 45 L/min.
Current	0.300 to 0.350 amps.
Motor Speed	12,300 RPM.

- **Communications Enhancement:** Not available.
- **Protection Afforded:** Not available.
- **Manufacturer(s):**

No. 4A1 Mask and SB 35/45 Miniblower	Shalon Chemical Industries Ltd. 25 Nahmani Street 65794 Tel Aviv Israel Tel: 0972 3 291225 Fax: 0972 3 291615 ⁽⁵⁾
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- **Compatibility:** Not available.
- **Storage Life:** 20 years. ⁽⁵⁾
- **Donning Time:** Not available.
- **Field of Vision:** Not available.

- **Accessories:**

Training Attachment The training attachment is a cylindrically shaped, white, hard plastic body that threads into the inlet valve orifice of the connecting piece. The inlet of the attachment consists of a round opening that provides a resistance to airflow equivalent to that obtained when wearing a canister-equipped mask. ⁽⁸⁾

- **Decontaminability:** Not available.
- **Fogging Characteristic(s):** The noseclip valves permit filtered air to enter the noseclip and prevent exhaled air from contacting the eyelenses, thus eliminating fogging. ⁽⁸⁾
- **Deployment:** Not available.
- **Miscellaneous:** Not available.

12.3 REFERENCES

1. Data sheet on the 80-S-70 obtained from the Materials Research Laboratory, P.O. Box 50, Ascot Vale, VIC.3032, Australia.
2. "CBR Protective System." Pamphlet obtained from Shalon Chemical Industries Ltd.
3. "SB 35/45 Miniblower." Brochure from Shalon Chemical Industries Ltd.
4. Interview with representative of National Dräger, Inc., 101 Technology Drive, P.O. Box 120, Pittsburgh, PA, 15230.
5. "NBC Civilian Respirators." Brochure from Shalon Chemical Industries Ltd.
6. "NBC Military Respirators." Brochure from Shalon Chemical Industries Ltd.
7. Test data obtained from CRDEC personnel, Edgewood Area, APG, MD, 21010-5423.
8. "Technical Description CBR Protective Mask No. 4A1." Data obtained from Shalon Chemical Industries Ltd.
9. Analysis based on physical evaluation of the mask by CBIAC personnel.
10. "Suffocation from Misuse of Gas Masks during the Gulf War", by J. Hiss and B. Arensburg. British Medical Journal. January 11, 1992.
11. "NBC Filter Canister Type 80." Brochure from Shalon Chemical Industries Ltd.



Chapter 13 – Italy

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A circular globe of the Earth is centered behind the table of contents. The continents are shown in green and the oceans in blue. A small yellow marker is placed on the Italian peninsula.

13.1 FILTRATION

- **Item Name(s):** M58 Canister
- **Use(s):** Used with the Italian M59 series, M73, M84, and C.607 masks. (1, 6, 10)
- **Physical Characteristic(s):**

Aerosol Filter	Pleated glass paper filter element with filtering surface of approximately 100 cm ³ . (6, 15)
Canister	1 mm thick cylindrical aluminum shell, coated with brown alkali-proof paint. (15)
Diameter	106 mm. (15)
Gas Filter	Activated charcoal, 290 cm ³ . (6)
Height	103 mm. (15)
Markings	"Pirelli" trademark and "M58" on screw cap, bottom cover has month and year of production. (15)
Thread	NATO standard, conforms to STANAG 4155. (2)
Thread Size	40 x 3.63 mm. (2)
Weight	400 g. (2)

- **Performance Specification(s):**

Aerosol Efficiency	Greater than 99.99% for DOP mist, concentration of .02 g/m ³ , average particle size of 0.3 microns. (15)
Airflow Resistance	18.35 mm of H ₂ O at an airflow of 30 L/min.* (6) 50.99 mm of H ₂ O at an airflow of 80 L/min. (15)
Gas Life	
CG Life	120 minutes at an airflow of 30 L/min, concentration of 4.0 g/m ³ , RH of 75%, temperature of 18°C. (15)
CK Life	60 minutes at an airflow of 30 L/min, concentration of 2.4 g/m ³ , RH of 75%, temperature of 18°C. (15)

*Data originally reported in Pascals.

HCN Life 120 minutes at an airflow of 30 L/min, concentration of 1.2 g/m³,
RH of 75%, temperature of 18°C. ⁽¹⁵⁾

PS Life 90 minutes at an airflow of 30 L/min, concentration of 5.0 g/m³,
RH of 75%, temperature of 18°C. ⁽¹⁵⁾

- **Deployment:** Not available.
- **Manufacturer(s):** Sèkur (Pirelli)
Via di Torrespaccata 140
00169 Roma
Italy
Tel: 039 6 238997
039 6 260047
039 6 260048
039 6 260049
Fax: 039 6 260046 ⁽⁶⁾
- **Stock Number(s):** 4240-15-005-7999 (NATO). ⁽⁶⁾
- **Miscellaneous:** May be used with forced ventilation systems with flow rates of 75 L/min. ⁽¹⁵⁾
Storage life is over 10 years when packed in a hermetically sealed special metal container. ⁽¹⁴⁾

- **Item Name(s):** M91 Canister
- **Use(s):** Used with the Italian M90 mask. ⁽¹¹⁾
- **Physical Characteristic(s):**
 - Canister NATO Green - IR color. ⁽¹¹⁾
 - Gas Filter Activated charcoal, 290 cm³. ⁽¹¹⁾
 - Thread NATO standard, conforms to STANAG 4155. ⁽¹¹⁾
 - Thread Size 40 x 3.63 mm. ⁽¹¹⁾
 - Weight 305 g. ⁽¹¹⁾
- **Performance Specification(s):**
 - Aerosol Efficiency Greater than 99.997% for aerosols of 0.3 microns. ⁽¹¹⁾
 - Airflow Resistance 13.26 mm of H₂O at an airflow of 30 L/min.* ⁽¹¹⁾
37.73 mm of H₂O at an airflow of 80 L/min.* ⁽¹¹⁾
- **Deployment:** Not available.
- **Manufacturer(s):** Sèkur (Pirelli)
Via di Torrespaccata 140
00169 Roma
Italy
Tel: 039 6 238997
039 6 260047
039 6 260048
039 6 260049
Fax: 039 6 260046 ⁽⁶⁾
- **Stock Number(s):** Not available.
- **Miscellaneous:** The filter can be replaced in a contaminated area. ⁽¹¹⁾

*Data originally reported in Pascals.

13.2 RESPIRATORS



The Italian C.607

Photo courtesy of CBIAC personnel.



The Italian C.607 Twin Filter Mask

Photo courtesy of S&kur (Pirelli).

- **Designator(s):** C.607 Series
- **Item Name(s):** C.607 Mask
C.607 Twin Filter Mask
- **Item Description:** The Italian C.607 series of protective masks features a neoprene rubber facepiece with inturned peripheral lip and a wide, one-piece transparent visor eyepiece made of a synthetic shock-resistant resin. The designation "C.607" is clearly molded to the left of the visor, and "SÈKUR" is molded on the top of the visor. The lens is held in place by a hard plastic clamp with screw tighteners. The eyelens extends down to reveal the nosecup with two nonreturn valves. There are two exhalation valve assemblies located on the right and left sides of the mask; they have hard plastic covers held in place by screw-tightened metal bands. Beneath the eyepiece is an oval shaped integral canister mount/voicemitter assembly. The mask is held in place by a five-point head harness suspension. This mask also has a neck strap. The mask does not have a drink facility. ^(3, 9)

The C.607 Twin Filter mask is a special version of the C.607 for use in connection with series 200 chemical cartridges and aerosol filters or a combination of the two. The C.607 Twin Filter mask complies with NIOSH standards. It differs from the C.607 in that it has two canister mounts, on both the right and left sides, for use with the series 200 cartridges and filters. It also features one exhalation valve assembly with a prechamber for compensating the inertia of the membrane; this is located on the front under the speech diaphragm. ⁽³⁾

- **Total Weight:** 890 g. ^(2, 3)
 - Canister 400 g. ⁽²⁾
 - Facepiece 490 g. ⁽³⁾
- **Stock Number(s):** Not available.
- **Sizes Available:** One standard size. ⁽¹³⁾
- **Use(s):** Special purpose respirator used by Italian police, firefighters, and for civil defense. ⁽¹⁰⁾
- **Component(s):**
 - Canister Uses the Italian DIRIN 600/U canister for fire fighting. Uses the Italian M58 canister or DIRIN 300/500 series for police and civil defense purposes. ⁽¹⁰⁾
 - Canister Mount The mask has a standard threaded connector (UNI 7246 CI; DIN 3181 CI; AFNOR NF S76-011) into which any filter or canister will fit as long as it complies with the following standards: UNI 8962 and 8963 (with thread connector UNI 7246 CA), DIN 3181 (with thread connector DIN 3183 CA), AFNOR NF S-021, and S-022. ⁽⁵⁾
 - Canister Mount/
Voicemitter Assembly Voicemitter and canister mount are located on a unified assembly. ⁽⁹⁾

- | | |
|---------------------------|---|
| Exhalation Valve(s) | Two exhalation valve assemblies. ⁽⁹⁾ |
| Eyepiece(s) | Wide, one-piece, transparent visor lens made of synthetic shock-resistant polycarbonate. ⁽³⁾ |
| Facepiece | Facepiece of neoprene rubber with a soft inturred peripheral lip and chin stop for good fit and tight seal. ⁽³⁾ |
| Head Harness | Five-point suspension with adjustable rubber straps attached to the facepiece by stainless steel, quick-adjustable roller buckles. ⁽³⁾ |
| Metal Parts | Stainless steel. ⁽³⁾ |
| Neck Strap ⁽⁹⁾ | |
| Nosecup | Internal nosecup with two nonreturn valves. ⁽³⁾ |
- **Breathing Resistance:** Low breathing resistance. ⁽³⁾
 - **Airflow:** The C.607-MkII can be used in conjunction with a fresh air hose or compressed airline breathing apparatuses, powered filtering devices, and self-contained open circuit compressed air breathing apparatuses that are provided with a standard connector (UNI 7246 CA, DIN 3183 CA, AFNOR NF S76-031). ⁽⁵⁾
 - **Communications Enhancement:** Speaking diaphragm permits the use of megaphones, telephones, and walkie-talkies. ⁽³⁾
 - **Protection Afforded:** Protects against all toxic gases including carbon monoxide, dust, and fumes. ⁽¹⁰⁾
 - **Manufacturer(s):** Sèkur (Pirelli)
Via di Torrespaccata 140
00169 Roma
Italy
Tel: 039 6 238997
039 6 260047
039 6 260048
039 6 260049
Fax: 039 6 260046 ⁽¹⁰⁾
 - **Compatibility:** Not available.
 - **Storage Life:** Not available.
 - **Donning Time:** Not available.

- **Field of Vision:** Wide field of vision:
 - Horizontal 180°. ⁽³⁾
 - Vertical 130°. ⁽³⁾
- **Accessories:**
 - Carrying case Hard shell, impact resistant. ⁽¹⁰⁾
 - Self-adhesive sheet For protection of visor when using spray paints or abrasives. ⁽³⁾
 - Spectacle kit Used for prescription lenses. ⁽³⁾
 - Visor lens Polycarbonate. ⁽³⁾
- **Decontaminability:** Not available.
- **Fogging Characteristic(s):** Nosecup divides airflow inlet from airflow outlet, keeping visor fog free in low-temperature and/or high-humidity conditions. ⁽³⁾
- **Deployment:** Not available.
- **Miscellaneous:** The following spare parts are available: ⁽³⁾
 - Encapsulated speech diaphragm
 - Inlet valve unit
 - Head harness
 - Nosecup with nonreturn valve
 - Outlet valve
 - Threaded inlet unit, including speech diaphragm
 - Visor clamp with screws
 - Visor lens.



Photo courtesy of CBIAC personnel.

The Italian M59/G

- **Designator(s):** M59 Series
- **Item Name(s):** M59/GD Mask
M59/G Mask
M73 Mask
M84 Mask
- **Item Description:** The Italian M59 series of masks features a molded, black rubber facepiece with two triangular lenses made of triplex glass and held in place with metal clamps. The internal nosecup is made of the same material as the facepiece and fixed to the facepiece by two lateral snap fasteners. A voicemitter is located over the mouth area just below the eyepieces and consists of a cylindrical capsule containing a speech diaphragm. The centrally located canister mount is found just below the voicemitter and conforms to NATO standards. The exhalation valve is located to the left of the voicemitter. In the M59, the adjustable, five-point head harness suspension is made of black rubber and textile, whereas the M84, a variant of the M59 has a head harness made solely of rubber. All other features of these two models are identical. ^(6, 9, 14)

The Italian M59/GD model has a drinking facility, whereas the Italian M59/G does not. ^(8, 9)

The Italian M73 mask, used by tank crews, is a special version of the Italian M59. It differs from the M59 in that it has two round eyepieces made of triplex glass rather than two triangular shaped eyepieces and has a threaded frame and rubber sealing rim. Additionally, a hose interfaces with the canister or vehicle collective protection systems. The head harness of the M73 is made either solely of rubber (identical to the M84) or rubber and textile (identical to the M59). All other components and characteristics are identical to the M59/G gas mask. ^(6, 14)

- **Total Weight:** Between 850 g and 930 g (depending on size). ^(6, 8)
 - Canister 400 g. ⁽²⁾
 - Facepiece M59/GD: small 490 g, medium 510 g, large 530 g. ⁽⁸⁾
M73: 450 g. ⁽⁶⁾
M84: small 460 g, medium 480 g, large 515 g. ⁽¹⁾
- **Stock Number(s):** The stock numbers for the M59/G are 4240-15-089-2736 (NATO), 4240-15-089-2737 (NATO), and 4240-15-089-2738 (NATO). ⁽⁶⁾
The stock numbers for the M73 are 4240-15-061-3991 (NATO), 4240-15-061-3993 (NATO), and 4240-15-061-3992 (NATO). ⁽⁶⁾
- **Sizes Available:** Available in three sizes. ⁽²⁾

- **Use(s):** The M59 is in service with Italian Navy, Army, and Air Force. ⁽⁶⁾

The M73 is used by tank crews, artillery personnel, and all personnel using optical, precision and ground instruments. ⁽⁶⁾

- **Component(s):**

Canister Uses the Italian M58 canister. ⁽²⁾

Canister Mount NATO standard. A rubber gasket fitted to the holder ensures a pressure-tight joint. Internally, the holder is fitted with an inhalation valve supported by a spider. The holder is aligned facing downward and is located just below the speech device; it allows fitting medium- to large-capacity filters to the mask. ⁽⁸⁾

For the M73, the canister mount interfaces with a flexible hose, that connects to a filter canister or tank filter system. ⁽⁸⁾

Drinking Device The drink facility is located on the right side of the M59/GD. The wearer takes off the cap of the drink facility and inserts the NBC canteen cap into the middle of the facepiece connector. When the needle penetrates the "S" rubber duct, it bends so that it reaches the wearers lips, and opens the front seal, thus enabling the liquid to flow to the wearer's mouth. After the extraction of the needle, the front seal of the "S" duct closes immediately to prevent the intake of external contaminants. The M59/G does not have a drink facility. ⁽⁸⁾

Exhalation Valve(s) The exhalation valve is fitted to the left side of the facepiece. The valve casing is made of a brown synthetic resin and connected to both the mask and nosecup. The rubber valve is circular (diameter 30 mm) and conveys the exhaled air straight from the nosecup to the atmosphere. ⁽⁸⁾

Eyepiece(s) The M59 and M84 have triangular eyepieces made of triplex glass, which is approximately 3.5 mm thick. The eyepieces are held in place by aluminum rings. There is sufficient room between the eyepiece and the wearers face to allow for wearing of spectacles inside the mask. ^(8, 14)

The M73 mask has two round, interchangeable lenses made of triplex glass which are screwed on aluminum seats, clinched to the facepiece. The M73 lenses may be changed with optical lenses for users requiring vision correction. ⁽¹⁴⁾

- Facepiece** The facepiece is made of molded, low-hardness, black natural rubber. The average thickness of the facepiece is 2.5 mm. Around the periphery of the facepiece is a 20- to 30-mm-wide internal face seal. Two snap fasteners are located inside the facepiece to position the nosecup. ⁽⁸⁾
- The face seal is 99.95% efficient. ⁽⁶⁾
- Head Harness** In the M59, the head harness is made of molded black rubber and textile while the M84 harness is composed solely of rubber. In the M73, the head harness is made of either rubber or rubber and textile. Both models feature five separate straps terminate at a buckle. The front ends of the cheek straps are fitted with slide buckles provided with rings that link with the hook-on buckles fixed to the facepiece. The front strap and the temple straps are made captive to the facepiece for fast and easy donning of the mask. ⁽¹⁴⁾
- Nosecup** The nosecup is also made of molded, low-hardness, black natural rubber. Two Tissot ducts ensure demisting of the eyepieces and minimize dead space. It has a ridged rim that seals off the nose and mouth from the rest of the mask interior. The nosecup is fixed to the facepiece by means of two lateral snap fasteners and is stiffened by a nose clip. ^(8, 14)
- Voicemitter** The voicemitter is mounted centrally on the facepiece and consists of a cylindrical capsule containing the speech diaphragm. ⁽⁸⁾
- **Breathing Resistance:**
 - Inhalation Resistance** 5.09 mm of H₂O at an airflow of 40 L/min.* ⁽⁶⁾
3.06 mm of H₂O at an airflow of 30 L/min.* ⁽⁸⁾
10.19 mm of H₂O at an airflow of 95 L/min.* ⁽⁸⁾
 - Exhalation Resistance** 12.24 mm of H₂O at an airflow of 40 L/min.* ⁽⁶⁾
9.18 mm of H₂O at an airflow of 30 L/min.* ⁽⁸⁾
28.55 mm of H₂O at an airflow of 95 L/min.* ⁽⁸⁾
 - **Airflow:** No positive airflow available in the M59 series. ⁽⁹⁾
In the M73, the hose may be connected to an air ventilation system. ⁽⁶⁾

*Data originally reported in Pascals.

- **Communications Enhancement:** Good voice transmission is allowed by central position of speech diaphragm. This also permits the use of megaphones, telephones, and walkie-talkies while wearing the respirator. ⁽⁶⁾

Voicemitter permits communication with persons of up to 10 m away. ⁽¹⁾

- **Protection Afforded:** Designed to provide combat units of armed forces with protection against all particulates and gaseous NBC agents as well as nuclear fallout. ⁽⁶⁾

The M59 will provide protection against the liquid agents HD for 4 hours and VX for 6 hours. ⁽⁶⁾

- **Manufacturer(s):** Sèkur (Pirelli)
Via di Torrespaccata 140
00169 Roma
Italy
Tel: 039 6 238997
039 6 260047
039 6 260048
039 6 260049
Fax: 039 6 260046 ⁽⁶⁾

- **Compatibility:** Not available.
- **Storage Life:** 15 years. ⁽⁶⁾
- **Donning Time:** Less than 9 seconds. ⁽⁶⁾
- **Field of Vision:** 77% of natural view. ⁽⁶⁾

- **Accessories:**

M66 Carrying Case Flexible, tough canvas carrying case holds the M59 or M73, one canister, and NBC accessories. ⁽⁸⁾

Microphone May be clipped in front of the voicemitter. ⁽⁶⁾

- **Decontaminability:** The mask can withstand a few decontamination cycles without diminishing its protective capacity. When the mask is removed, it can be decontaminated by dipping it in boiling water from 15 minutes to 120 minutes. The textile and rubber harness (M59 and some M73 models) can withstand boiling water decontamination treatment for 15 to 20 minutes only. After each decontamination, a check and/or replacement of the exhalation valve and, if necessary, the inhalation diaphragm and gaskets, is required. Damage to other components requires a major overhaul of the mask at an authorized service center. ^(8, 14)

- **Fogging Characteristic(s):** The nosecup rests against the facepiece and forms two Tissot ducts that channel the inhaled air over the eyepieces. The inhaled air is then drawn into the nosecup through four holes set centrally high in the cup and positioned to prevent exhaled air from escaping upward and flowing back against the eyepieces. Thus, demisting of the eyepieces is achieved without a flush-back check valve. ⁽⁸⁾
- **Deployment:** Not available.
- **Miscellaneous:** Not available.



The Italian M90 without canister



**The Italian M90 (with canister)
shows the designator molded into
the left side of the mask.**

Photos courtesy of CBLAC personnel.

- **Designator(s):** M90
- **Item Name(s):** M90 NBC Protective Mask
- **Item Description:** The Italian M90 mask features a bromobutyl rubber facepiece with a reverse seal made of natural rubber and two round eyelenses made of surface-treated polycarbonate. Located over the mouth area of the mask is an integral canister mount/exhalation valve/voicemitter assembly. This assembly is constructed of low-density, glass reinforced polymers and is held in place by a screw-tightened metal band. On the right side of the mask is a drink facility. The incoming air is deflected over the eyepieces to reduce fogging and then directed through the check valves of the internal nosecup to the individual wearing the mask. A five-point adjustable neoprene rubber head harness holds the mask in place. ^(9, 11)
- **Total Weight:** 845 g. ⁽¹¹⁾
 - Canister 305 g. ⁽¹¹⁾
 - Facepiece 540 g. ⁽¹¹⁾
- **Stock Number(s):** Not available.
- **Sizes Available:** Small, medium, and large. ⁽¹¹⁾
- **Use(s):** Not available.
- **Component(s):**
 - Canister Uses the Italian M91 canister. The canister is located in the center of the mask (lower front) so it does not interfere with vision. A patented device included in the facepiece connector allows the safe replacement of the filter canister in a NBC contaminated environment. The M90 can accommodate any filter canister with a QSTAG 496 standard thread (NATO standard thread). ^(9, 11)
 - Canister Mount NATO standard. The M90 can accommodate filter canisters with a STANAG 4155 standard thread. ⁽¹¹⁾
 - Canister Mount/
Exhalation Valve/
Voicemitter
Assembly These three components are combined into a single unit located over the mouth area. The unit is constructed of low-density, glass-reinforced polypropylene with high impact strength and good resistance to chemical agents. ^(9, 11)
 - Drinking Device The drinking device is located on the right side of the facepiece. It is used with a direct connector fitted to a standard canteen. The drinking device can be used for nourishing liquids. ⁽¹¹⁾

- Eyepiece(s)** The two eyepieces are made of surface-treated polycarbonate. The eyepieces are plane in front of the eyes and curved on the sides to allow the use of optical instruments. ^(9, 11)
- Facepiece** The facepiece external surface is made of bromobutyl rubber; the reverse edge seal is made from natural rubber. A peripheral rib ensures tightness and stable coupling between the mask and the hood of the NBC protective suit. ⁽¹¹⁾
- Head Harness** The facepiece is held in place by a five-point neoprene rubber adjustable harness. ⁽¹¹⁾
- Nosecup** The internal nosecup has two check valves. ⁽⁹⁾
- **Breathing Resistance:**
 - Inhalation Resistance** 15.29 mm of H₂O at an airflow of 30 L/min.* ⁽¹¹⁾
43.85 mm of H₂O at an airflow of 80 L/min.* ⁽¹¹⁾
 - Exhalation Resistance** 2.34 mm of H₂O at an airflow of 30 L/min.* ⁽¹¹⁾
5.61 mm of H₂O at an airflow of 80 L/min.* ⁽¹¹⁾
 - **Airflow:** No positive airflow available. ⁽⁹⁾
 - **Communications Enhancement:** The centrally located voicemitter provides voice attenuation between 250 and 400 Hz. ⁽¹¹⁾
 - **Protection Afforded:** With the M91 canister, that unit provides protection against all known NBC agents, including when the wearer is asleep, and exceeds NATO specifications. Protection factor of 10,000. ⁽¹¹⁾

Provides protection against the liquid NBC agents GB for more than 24 hours and VX for more than 72 hours. ⁽¹¹⁾
 - **Manufacturer(s):** Sèkur (Pirelli)
Via di Torrespaccata 140
00169 Roma
Italy
Tel: 039 6 238997
039 6 260047
039 6 260048
039 6 260049
Fax: 039 6 260046 ⁽¹¹⁾

*Data originally reported in Pascals.

- **Compatibility:** The canister mount/exhalation valve/voicemitter assembly can incorporate a connection to a radio microphone just under the front screen of the assembly, in a protected position. ⁽¹¹⁾
- **Storage Life:** Greater than 10 years. ⁽¹¹⁾
- **Donning Time:** 9 seconds. ⁽¹¹⁾
- **Field of Vision:**

Binocular	24%. ⁽¹¹⁾
Down	43%. ⁽¹¹⁾
Lateral	87%. ⁽¹¹⁾
Transparency	Above 90%. ⁽¹¹⁾
- **Accessories:**

Canteen	For nourishing liquids. ⁽¹¹⁾
Canteen Connector ⁽¹¹⁾	
Carrying Case	Available in NBC-proof material with soft protective pad and pockets for auxiliary equipment. ⁽¹¹⁾
Corrective Spectacles ⁽¹¹⁾	
- **Decontaminability:** The facepiece has a smooth external surface for ease of decontamination and may be decontaminated using boiling water for one to two hours. ⁽¹¹⁾
- **Fogging Characteristic(s):** The incoming air is deflected over the eyepieces to reduce fogging. ⁽⁹⁾
- **Deployment:** Not available.
- **Miscellaneous:** The mask is designed to be worn for up to five days. ⁽¹¹⁾

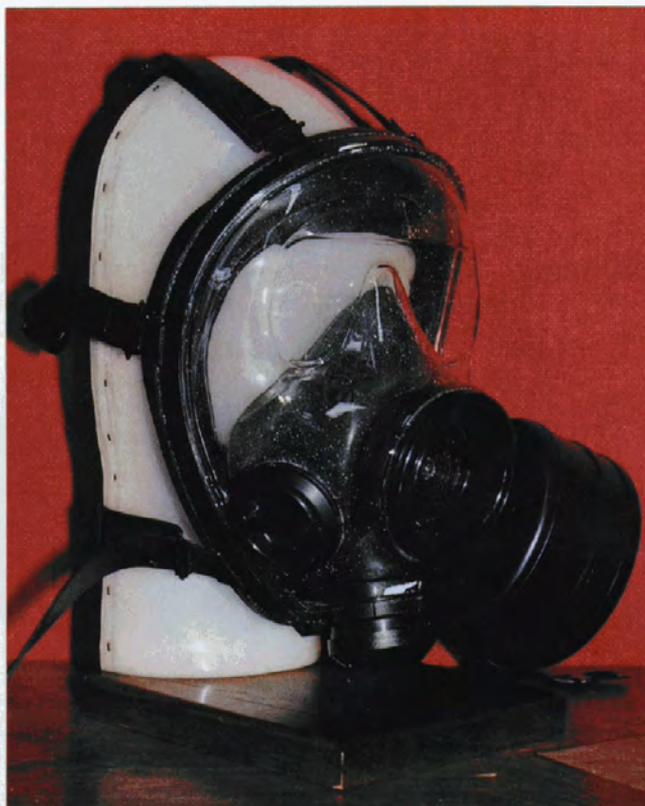


Photo courtesy of CBLAC personnel.

The Italian SGE 1000



Photo courtesy of SGE SpA.

The Italian SGE 1000/H has a specially designed rim that holds the hood in place.

- **Designator(s):** SGE 1000 Series
- **Item Name(s):** SGE 1000 NBC Protective Mask
SGE 1000/H NBC Protective Mask
- **Item Description:** The Italian SGE 1000 mask is unique in design and features a nearly transparent facepiece with the large front eye area set back in relation to the entire structure of the mask. The mask has right and left connections for the filter(s). There is an integral drinking device/exhalation valve/speech device assembly in the lower center front of the mask (nose/mouth region). A second exhalation valve is located in the chin area. An orinasal unit and a face seal is on the interior of the mask. There is a six-point adjustable head harness suspension. ⁽⁹⁾

The design of the SGE 1000 has been made to comply with NATO TRIPTYCH specifications. ⁽⁴⁾

A variant of the SGE 1000 is the SGE 1000/H. The SGE 1000/H has a rim that holds the head harness and firmly retains and tightens the hood. The use of the integrated hood protects the exposed rubber parts of the mask and the silicon rubber face seal. The design of this hood eliminates the traditionally critical issue of coupling the NBC suit to the mask. ⁽⁴⁾

- **Total Weight:** 617 g. ⁽⁷⁾
- **Stock Number(s):** Not available.
- **Sizes Available:** A bellows type structure allows easy adjustment to all shapes of faces. One size fits 76% of the adult population within the penetration limit of 0.01 percent. The remaining 24% of the population is within the limit of 0.01% \pm 10%. ⁽⁴⁾
- **Use(s):** Not available.
- **Component(s):**

Canister Mount NATO standard. The SGE 1000 has two side connections for filter canisters. Either may be used at the discretion of the wearer; the unused connection may be sealed with a screw on cap or a microphone. ⁽⁴⁾

Drinking Device Bromobutyl rubber. ⁽⁴⁾

**Drinking Device/
Exhalation Valve
Voicemitter** The voicemitter, composed of bromobutyl and natural rubber, is also the exhalation valve, which is composed of rubber. Externally the valve is fitted with a stiff, dome-shaped element that protects the membrane while allowing exhaled air to escape. The drinking system allows refilling of the canteen in a contaminated environment. ⁽⁴⁾

Facepiece	Rigid transparent polycarbonate-coated with polysiloxane resin to improve scratch and chemical resistance. This facepiece transmits not less than 90% of available light and absorbs ultraviolet rays. ⁽⁴⁾
Faceseal	Bromobutyl rubber. The faceseal is constructed with a supple bellows type structure that allows perfect sealing and a very high degree of comfort even after prolonged wear. ⁽⁴⁾
Faceseal with Incorporated Hood	Platinum-catalyzed, medical grade silicone rubber. ⁽⁴⁾
Head Harness	Bromobutyl rubber. ⁽⁴⁾
Second Exhalation Valve	Fitted to the chin area of the mask. The device has two functions. The first is to increase the exhalation flow, needed during high work rates. The second and more important function is to drain away any liquids (condensation, saliva, or drinking) that may accumulate in the orinasal area of the mask during use. ⁽⁴⁾
Orinasal Unit	Platinum-catalyzed, medical-grade silicone rubber. ⁽⁴⁾

● **Breathing Resistance:**

Inhalation Resistance	2.04 mm of H ₂ O at an airflow of 30 L/min.* ⁽⁴⁾
	11.22 mm of H ₂ O at 90 L/min.* ⁽⁴⁾
	17.33 mm of H ₂ O at 120 L/min.* ⁽⁴⁾
	55 mm of H ₂ O at an airflow of 85 L/min. ⁽⁷⁾
Exhalation Resistance	2.55 mm of H ₂ O at an airflow of 30 L/min.* ⁽⁴⁾
	14.28 mm of H ₂ O at 90 L/min.* ⁽⁴⁾
	22.33 mm of H ₂ O at 120 L/min.* ⁽⁴⁾
	17.5 mm of H ₂ O at an airflow of 85 L/min. ⁽⁷⁾

● **Airflow:** No positive airflow available. ⁽⁹⁾

● **Communications Enhancement:** The SGE speech device consists of an open circular membrane that also acts as an exhalation valve. This membrane, fitted around the drinking device, allows sound waves to be released with the exhaled air. The speech device is located in front of the wearer's mouth. ⁽⁴⁾

*Data originally reported in millibars.

A microphone can be screwed into the unused canister mount to allow easy use of a radio-telephone. ⁽⁴⁾

- **Protection Afforded:** Provides full protection against all known NBC agents. After over 50 hours, mustard gas failed to penetrate through the tested specimens. ⁽⁴⁾
- **Manufacturer(s):** Societa Generale Elastomeri (SGE) SpA
Via Arvigo, 6
16010 Sant'Olcese (GE)
Italy
Tel: 039 10 711634
039 10 711523
Fax: 039 10 711668 ⁽⁴⁾
- **Compatibility:** Fits any type of hood and allows for the use of optical instruments. ⁽⁴⁾
- **Storage Life:** Not available.
- **Donning Time:** Not available.
- **Field of Vision:**

Binocular	80%. ⁽⁴⁾
Total	87%. ⁽⁴⁾
- **Accessories:**

C-21 Lens Frames	Corrective lenses can be mounted on the C21 frame, which snaps into the inside of the mask. ⁽⁴⁾
C-30 Canteen with Drinking Device	Bottle can be refilled in a contaminated area. ⁽⁴⁾
K-15 Protective Overvisor	Provides protection of the eyes against thermal radiation. It is removed from the mask by means of studs, and has a chemical- and scratch-resistant coating. ⁽⁴⁾
- **Decontaminability:** The facepiece may be decontaminated an unlimited number of times using "normal decontamination methods"* including immersion in boiling water. ⁽⁴⁾

The mask can be washed and sterilized by boiling in a pressure vessel; contact with disinfectants is not needed. ⁽¹²⁾
- **Fogging Characteristic(s):** An internal ring-nut design permits perfect ventilation throughout the mask while preventing fogging even at low temperatures. At -30°C, both starting cold and starting warm, the eyepiece did not fog. ⁽⁴⁾

*SGE does not define "normal decontamination methods".

- **Deployment:** Not available.
- **Miscellaneous:** The SGE-1000 has been developed for five continuous days of wearing. ⁽⁴⁾

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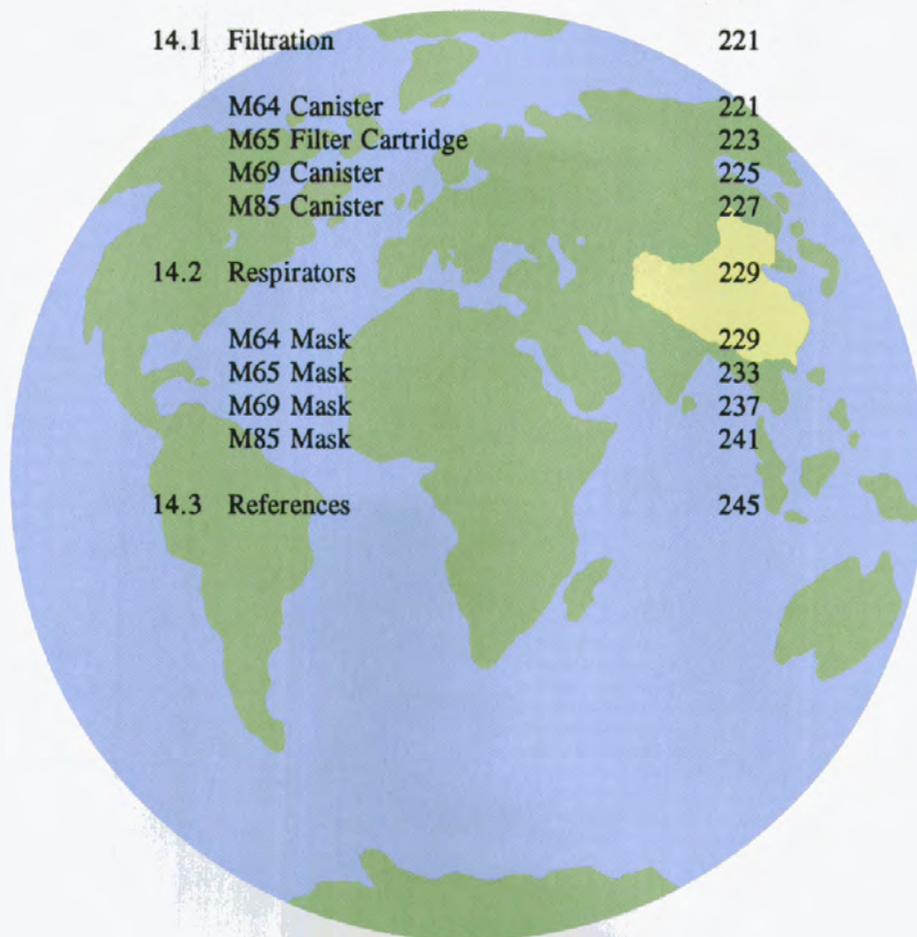
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Chapter 14 – People's Republic of China

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14.1 FILTRATION

- **Item Name(s):** M64 Canister
- **Use(s):** Used with the Chinese M64 mask. ⁽⁴⁾
- **Physical Characteristic(s):**

Canister	Sheet metal, olive in color. ⁽⁹⁾
Diameter	76 mm. ⁽⁹⁾
Gas Filter	Activated carbon, designated as T111.* ⁽⁴⁾
Height	165 mm. ⁽⁹⁾
Weight	680 g. ⁽⁹⁾
- **Performance Specification(s):**

Gas Life	
CK Life	Greater than 260 minutes. ⁽⁴⁾
GB Life	Greater than 600 minutes. ⁽²⁾
VX Life	Greater than 120 minutes. ⁽²⁾
- **Deployment:** Not available.
- **Manufacturer(s):** Xinhua Chemical Plant
China North Industries Group
5 Xinlan Road, Taiyuan
People's Republic of China ⁽¹⁾
- **Stock Number(s):** Not available.
- **Miscellaneous:** A canister resistance simulator is used as a substitute for the canister in training; it has the same breathing resistance as the canister. ⁽²⁾

*An extruded activated carbon heavily impregnated with chromium and copper with an appearance similar to that of activated carbon manufactured by Norit of Holland.

- **Item Name(s):** M65 Filter Cartridge
- **Use(s):** Used with the Chinese M65 mask. ⁽⁴⁾
- **Physical Characteristic(s):** Filter material appears very similar to U.S. filter material. ⁽⁴⁾
 - Aerosol Filter Filter paper laminate. ⁽⁴⁾
 - Canister Metal. ⁽⁴⁾
 - Gas Filter Charcoal. ⁽⁹⁾
- **Performance Specification(s):**
 - Gas Life
 - CK Life Greater than 30 minutes. ⁽²⁾
 - GB Life Greater than 10 hours. ⁽²⁾
 - VX Life Greater than 30 minutes. ⁽²⁾
- **Deployment:** Not available.
- **Manufacturer(s):**
 - Xinhua Chemical Plant
 - China North Industries Group
 - 5 Xinlan Road, Taiyuan
 - People's Republic of China ⁽¹⁾
- **Stock Number(s):** Not available.
- **Miscellaneous:** A canister resistance simulator is used as a substitute for the canister in training; it has the same breathing resistance as the canister. ⁽²⁾

- **Item Name(s):** M69 Canister
- **Use(s):** Used with the Chinese M69 mask. ⁽⁴⁾
- **Physical Characteristic(s):**

Canister	Plastic. ⁽⁴⁾
Charcoal Release	1A. ⁽³⁾
Filter Element	Uses a unique Chinese gas particulate filter medium known as charcoal gauze. ⁽⁴⁾
Thread	Non-NATO. ⁽⁹⁾¹
Weight	150 g. ⁽³⁾
- **Performance Specification(s):**

Gas Life	
CK Life	Greater than 25 minutes at an airflow of 30 L/min, concentration 2500 g/m ³ , and humidified. ⁽³⁾
GB Life	Greater than 600 minutes. ⁽²⁾
VX Life	Greater than 30 minutes. ⁽²⁾
- **Deployment:** Not available.
- **Manufacturer(s):**

Xinhua Chemical Plant
China North Industries Group
5 Xinlan Road, Taiyuan
People's Republic of China ^(1, 3)
- **Stock Number(s):** Not available.
- **Miscellaneous:** A canister resistance simulator is used as a substitute for the canister in training; it has the same breathing resistance as the canister. ⁽²⁾

- **Item Name(s):** M85 Canister
- **Use(s):** Used with the Chinese M85 mask. ⁽⁶⁾
- **Physical Characteristic(s):**

Aerosol Filter	Folded fiberglass filter paper. ⁽⁶⁾
Canister	Metal. ⁽⁶⁾
Gas Filter	Activated, impregnated carbon. ⁽⁶⁾
Thread	NATO standard, conforms to STANAG 4155. ⁽⁸⁾
Thread Size	40 x 3.63 mm. ⁽⁸⁾
Weight	200 g. ⁽⁸⁾
- **Performance Specification(s):**

Aerosol Efficiency	99.995% for DOP particles of 0.3 microns. ⁽⁵⁾
Gas Life	
CK Life	Greater than 50 minutes at an airflow of 30 L/min, concentration 1.5 g/m ³ , RH of 80%. ⁽⁶⁾
GB Life	Greater than 60 minutes at an airflow of 30 L/min, concentration 4 g/m ³ , RH of 0%. ⁽⁵⁾
HCN Life	Greater than 50 minutes at an airflow of 30 L/min, concentration 3 g/m ³ , RH of 0 to 50%. ⁽⁶⁾
- **Deployment:** Not available.
- **Manufacturer(s):**

Xinhua Chemical Plant
China North Industries Group
5 Xinlan Road, Taiyuan
People's Republic of China ^(1, 5)
- **Stock Number(s):** Not available.
- **Miscellaneous:** Not available.

14.2 RESPIRATORS



Photo courtesy of CBIAC personnel.

The Chinese M64

- **Designator(s):** M64
- **Item Name(s):** M64 Mask
- **Item Description:** The Chinese M64 is constructed of a molded grey rubber facepiece designed to cover the entire face. Two round eye lenses are sealed to the facepiece with metal collars. Slots are available for optical inserts. The mask is equipped with antifogging deflector tubes. A circular plastic housing over the mouth area contains an integral voicemitter/exhalation valve assembly. The mask uses a hose to connect the filter canister to the facepiece. One end of the hose is permanently attached to the mask at the chin position, the other end has a threaded coupling. The threaded filter coupling adds a quick change capability to the filter. The five-point adjustable head harness is made of cloth with the straps coming together at a head pad. This mask has no drinking device. ⁽⁹⁾
- **Total Weight:** 1,400 g. ⁽⁹⁾
 - Canister 680 g. ⁽⁹⁾
 - Facepiece 720 g. ⁽⁹⁾
- **Stock Number(s):** Not available.
- **Sizes Available:** Not available.
- **Use(s):** Military respirator issued to ground troops in the People's Republic of China. ⁽¹⁰⁾
- **Component(s):**
 - Canister Uses the Chinese M64 canister. ⁽⁴⁾
 - Eyepiece(s) Round, 64 mm in diameter. ⁽⁹⁾
 - Facepiece Molded rubber, grey in color. ⁽⁹⁾
 - Head Harness Adjustable five-point fabric suspension. ⁽⁹⁾
 - Hose Fabric reinforced rubber. ⁽⁹⁾
- **Breathing Resistance:** Not available.
- **Airflow:** No positive airflow available. ⁽⁹⁾
- **Communications Enhancement:** The voicemitter allows effective communication to a distance of 20 meters. ⁽⁹⁾
- **Protection Afforded:** All known NBC agents. ⁽²⁾

- **Manufacturer(s):** China North Industries Corporation
7A Yuetan Nanjie
P.O. Box 2137
Beijing
People's Republic of China
Tel: 086 1 862254 ⁽³⁾

Xinhua Chemical Plant
China North Industries Group
5 Xinlan Road
Taiyuan
People's Republic of China ⁽¹⁾
- **Compatibility:** Not available.
- **Storage Life:** Not available.
- **Donning Time:** Not available.
- **Field of Vision:** The mask provides limited peripheral vision. Optical inserts may be worn with this mask. ⁽⁹⁾
- **Accessories:** A carrying case made of canvas with two adjustable straps. ⁽⁹⁾
- **Decontaminability:** Not available.
- **Fogging Characteristic(s):** The mask is equipped with antifogging deflector tubes for the eye lenses. ⁽⁹⁾
- **Deployment:** Not available.
- **Miscellaneous:** Not available.



Photo courtesy of CBIAC personnel.

The Chinese M65

- **Designator(s):** M65
- **Item Name(s):** M65 Mask
- **Item Description:** Similar in design to the United States' M17 face mask series and its accompanying filter element. The filter is internally located within a cheek pouch. ⁽⁴⁾

The Chinese M65 is constructed of molded grey rubber and is designed to cover the entire face. Two elliptical eye lenses made of plastic are sealed to the facepiece with metal collars. This mask is equipped with antifogging deflector tubes for the eyelenses. A round plastic housing over the mouth area contains an integral voicemitter/exhalation valve assembly. Tabs on the interior of the mask allow optical inserts. This mask does not allow drinking. The M65 has a six-point adjustable head harness with elastic straps that come together in a triangular head pad. ⁽⁹⁾

- **Total Weight:** 511 g. ⁽⁹⁾
 - Canister 123 g. ⁽⁹⁾
 - Facepiece 388 g. ⁽⁹⁾
- **Stock Number(s):** Not available.
- **Sizes Available:** Small, medium, large, and extra-large. ⁽¹⁰⁾
- **Use(s):** Military respirator issued to ground forces in the People's Republic of China. ⁽¹⁰⁾
- **Component(s):**
 - Canister Uses the Chinese M65 canister. Uses a single filter cartridge placed internally on the left side of the mask (similar to the U.S. M17 concept). ⁽⁴⁾
 - Exhalation Valve Low resistance, wide cross-sectional area. ⁽⁴⁾
 - Eyepiece(s) Two elliptical plastic lenses. ⁽⁹⁾
 - Facepiece Molded rubber, grey in color. ⁽⁹⁾
 - Head Harness Triangular head pad attaches to the mask with six adjustable straps. ⁽⁹⁾
 - Voicemitter Butyl rubber. ⁽⁴⁾
- **Breathing Resistance:** Not available.
- **Airflow:** No positive airflow available. ⁽⁹⁾

- **Communications Enhancement:** The voicemitter allows effective communication to a distance of 20 meters. ⁽⁹⁾
 - **Protection Afforded:** All known NBC agents. ⁽²⁾
 - **Manufacturer(s):** Xinhua Chemical Plant
China North Industries Group
5 Xinlan Road, Taiyuan
People's Republic of China ⁽¹⁾
 - **Compatibility:** Not available.
 - **Storage Life:** Not available.
 - **Donning Time:** Not available.
 - **Field of Vision:** Peripheral vision is impaired with this mask. Due to the location of the filter, left-handed firers will have difficulty sighting weapons. ⁽⁹⁾
 - **Accessories:** Not available.
 - **Decontaminability:** Not available.
 - **Fogging Characteristic(s):** Air entering the mask is drawn through the filter cartridge into a collection plenum, then into the mask where it is distributed to the lens defogging ducts. ⁽⁴⁾
- This mask is equipped with antifogging deflector tubes for the eyelenses. ⁽⁹⁾
- **Deployment:** Not available.
 - **Miscellaneous:** Not available.

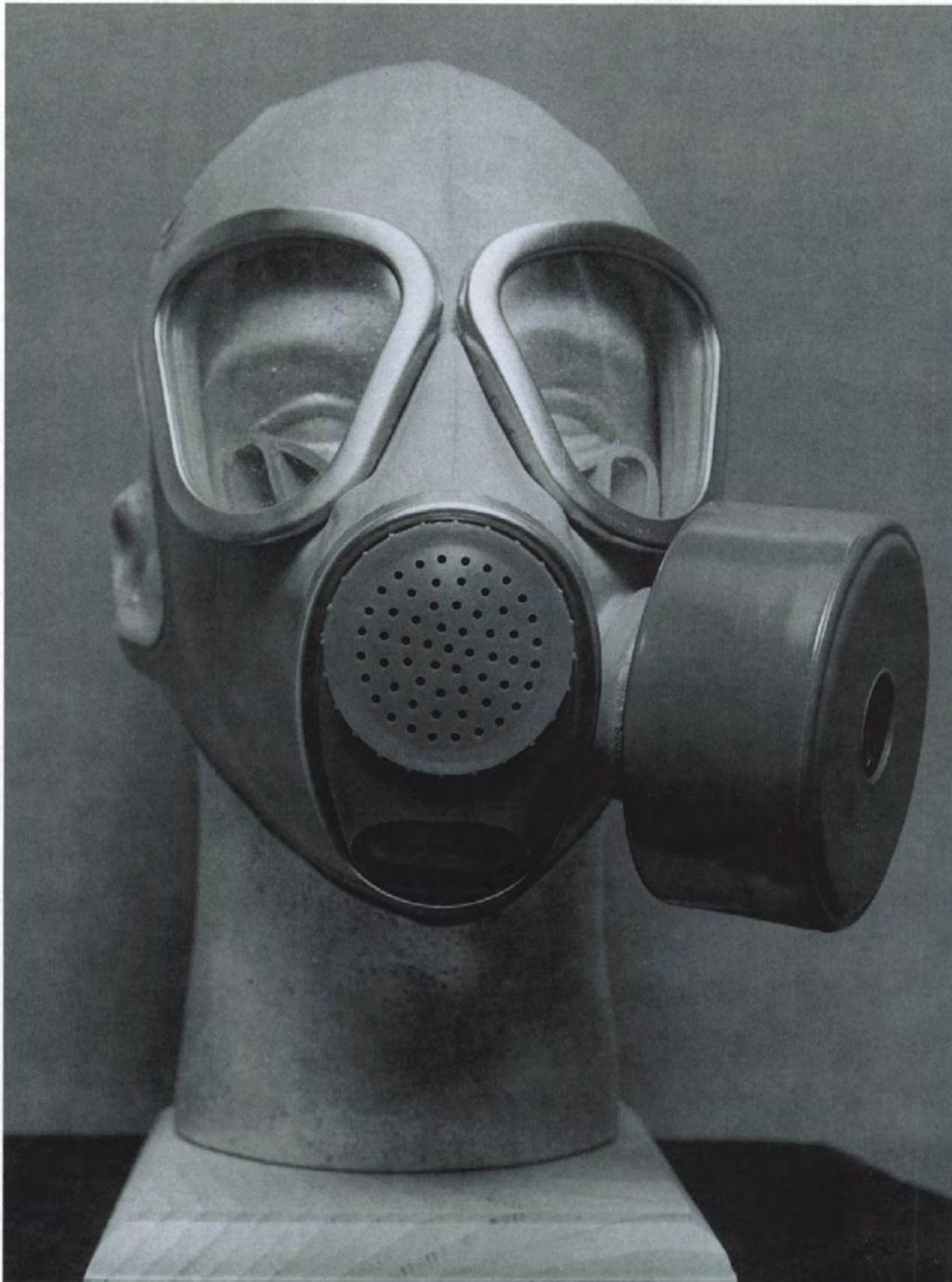


Photo courtesy of CBIAC Personnel.

The Chinese M69

- **Designator(s):** M69
- **Item Name(s):** M69 Mask
- **Item Description:** The Chinese M69 mask features a facepiece made of molded natural rubber, grey-green in color, which fits over the entire head (in lieu of a head harness). There are four cut-outs in the head region of the rubber material: two on the top and two at the ears. Two inverted triangular eyepieces are held in place by metal clamps. The mask is available in two configurations, left- or right-side canister mounts. An integral voicemitter/exhalation valve assembly is covered by a hard plastic housing, which is held in place by metal clamps. This mask does not permit drinking. ^(9, 10)
- **Total Weight:** 800 g. ⁽⁴⁾
 - Canister 150 g. ⁽³⁾
 - Facepiece 650 g. ⁽³⁾
- **Stock Number(s):** Not available.
- **Sizes Available:** Small, medium, large, and extra-large. ⁽¹⁰⁾
- **Use(s):** Military respirator used by the Chinese. ⁽³⁾
- **Component(s):**
 - Eyepiece(s) Flexible. ⁽⁹⁾
 - Facepiece Molded natural rubber. ⁽¹⁰⁾
- **Breathing Resistance:**
 - Inhalation Resistance 16 mm of H₂O at an airflow of 30 L/min. ⁽³⁾
 - Exhalation Resistance 13 mm of H₂O at an airflow of 30 L/min. ⁽³⁾
- **Airflow:** No positive airflow available. ⁽⁹⁾
- **Communications Enhancement:** 90% speech intelligibility at a distance of 50 meters. ⁽³⁾
- **Protection Afforded:** All known NBC agents. ⁽²⁾

Protects the face and respiratory organs against toxic gases, vapor, smoke particulates, radioactive dust, and bacteria. ⁽³⁾

- **Manufacturer(s):** China North Industries Corporation
7A Yuetan Nanjie
P.O. Box 2137
Beijing
People's Republic of China
Tel: 086 1 867019 ⁽³⁾

Xinhua Chemical Plant
China North Industries Group
5 Xinlan Road
Taiyuan
People's Republic of China ⁽¹⁾

- **Compatibility:** Not available.

- **Storage Life:** Not available.

- **Donning Time:** Not available.

- **Field of Vision:** Greater than 80%. ⁽³⁾

- **Accessories:** Not available.

- **Decontaminability:** Not available.

- **Fogging Characteristic(s):** Deflector tubes direct incoming air over lenses to reduce fogging. ⁽¹¹⁾

- **Deployment:** Not available.

- **Miscellaneous:** The cost of this mask is approximately \$30 per unit. ⁽¹⁰⁾



Photo courtesy of CBLAC personnel.

The Chinese M85

- **Designator(s):** M85
- **Item Name(s):** M85 Protective Mask
- **Item Description:** The Chinese M85 mask features a black natural rubber facepiece with an in-turned peripheral face seal. The two triangular lenses are made from optical plastic that has been treated for abrasion resistance. Plastic eyeglass inserts can be used by wearers requiring corrected vision. An integral exhalation valve/voicemitter assembly is located within a plastic housing over the mouth area. A drinking device is located on the right side of the mask. The canister mount is located on the left side of the mask. The head harness has a six-point suspension with adjustable plastic straps that come together at the head pad. ^(8, 9)
- **Total Weight:** 700 g. ⁽⁶⁾
 - Canister 200 g. ⁽⁶⁾
 - Facepiece 500 g. ⁽⁶⁾
- **Stock Number(s):** Not available.
- **Sizes Available:** Small, medium, and large; fits over 98% of male and female users. ^(6, 7)
- **Use(s):** Used by the Chinese Army; also used by industrial enterprises and research institutes, if fitted with other suitable canisters. ⁽⁶⁾
- **Component(s):**
 - Air Guide** An air guide is introduced into the facepiece to separate inlet and outlet air. During inhaling, the ambient air entering the mask through the canister goes to and sweeps over the eyelenses along an air guide channel via inhalation valve to maintain basically identical temperature on both sides of the eyelenses. Afterwards, the air comes downward into the inner mask. The expired air is removed directly from the exhalation valve. ⁽⁶⁾
 - Canister** Mounted on the left side of the mask. ⁽⁹⁾
 - Canister Mount** NATO standard. ⁽⁷⁾
 - Drinking Device** The drinking device is designed for the wearer to intake water or other fluids in a contaminated area. The device is placed on the right cheek position of the faceblank and composed of an inlet valve assembly, suction tube, canteen cap, and connecting pipe. The inlet valve assembly incorporates a spring-loaded cheek valve and a threaded protective cover. The connecting pipe is composed of a rubber hose with a pressing type plastic adaptor, a gasket, and a threaded adaptor on each end. When the ends of the connecting pipe

are screwed onto the water-inlet valve assembly and canteen cap, the cheek valve is forced open. The canteen cap with a cheek valve must be compatible with the canteen thread. The threaded cap protects the housing of the valve from any contamination when the drinking device is not in use. The suction tube is placed in the inner mask in front of the wearer's mouth. In use, the wearer can bite the suction tube and intake fluids. The drinking tube assembly provides leak-tight access to NATO standard canteens. ^(6, 8)

**Exhalation Valve/
Voicemitter Assembly**

The assembly has clear voice transmission with less voice loss. The exhalation valve is made from rubber, and the exhalation resistance is very low. Voice transmission is affected by the speech diaphragm oscillation caused by sound waves. The speech diaphragm is a butyl rubber film held under tension. The exhalation valve and speech diaphragm are positioned on a plastic seat. The housing is also made from plastic. The cover of the assembly may be opened for the convenience of cleaning and exchanging the exhalation valve. ⁽⁶⁾

Eyepiece(s)

The eyelenses are made from optical plastic and surface-treated for high strength and abrasion resistance to provide larger visual field and excellent optical properties. ⁽⁶⁾

Facepiece

The black facepiece with an in-turned peripheral seal and a chin cup is molded from natural rubber to form-fit the wearer's face. The rubber is especially compounded, increasing resistance to toxic agent permeability and storage performance of the mask, as well as eliminating skin irritation and being easily decontaminated by a standard decontaminant. ⁽⁶⁾

Head Harness

The six-point head harness has adjustable elastic straps that come together at the head pad. ⁽⁹⁾

● **Breathing Resistance:**

Inhalation Resistance

Less than 18.97 mm of H₂O at an airflow of 30 L/min.* ⁽⁶⁾

17 mm of H₂O at an airflow of 30 L/min. ⁽⁵⁾

Exhalation Resistance

Less than 80 Pascals at an airflow of 30 L/min. ⁽⁶⁾

8 mm of H₂O at an airflow of 30 L/min. ⁽⁵⁾

● **Airflow:** No positive airflow available. ⁽¹¹⁾

● **Communications Enhancement:** Speech diaphragm. ⁽⁶⁾

● **Protection Afforded:** All known nuclear, biological, and chemical warfare agents. ⁽⁶⁾

*Data originally reported in Pascals.

- **Manufacturer(s):** Xinhua Chemical Plant
China North Industries Group
5 Xinlan Road, Taiyuan
People's Republic of China ⁽¹⁾

- **Distributed by:** KT Corporation
33 South Main Street
Norwalk, CT 06854
Tel: (203) 853-3337
Telex: 282983 KTCORP UR ⁽⁶⁾

- **Compatibility:** Mask is compatible with the VAS-2 Voice Amplification System or the VA-11 Voice Amplifier. These systems can be used when the wearer's hands must be free for clear and loud voice amplification. ⁽⁸⁾

- **Storage Life:** 8 to 10 years. ⁽⁶⁾

- **Donning Time:** 10 seconds. ⁽⁶⁾

- **Field of Vision:**
 - **Binocular** 30%. ⁽⁶⁾
 - **Total** 75%. ⁽⁶⁾

- **Accessories:**
 - **Drink system** Includes canteen and canteen cover. ⁽⁶⁾
 - **M15A1 Carrier** Weighs 500 g. ⁽⁸⁾
 - **MAG-1 Combat Eyeglass Frames** ⁽¹⁴⁾

- **Decontaminability:** Can be decontaminated using standard procedures and chemicals. ⁽⁶⁾

- **Fogging Characteristic(s):** The eyelenses can be prevented from frosting and fogging by the use of the inhalation valve and inner mask. Hence, the nonfogging properties of the gas mask are good. Will not fog, distort, or deform when mask is donned and worn for 1.5 hours at -30°C. ⁽⁶⁾

- **Deployment:** Not available.

- **Miscellaneous:** This mask is marketed in the United States as the MF-11. ^(6, 8)

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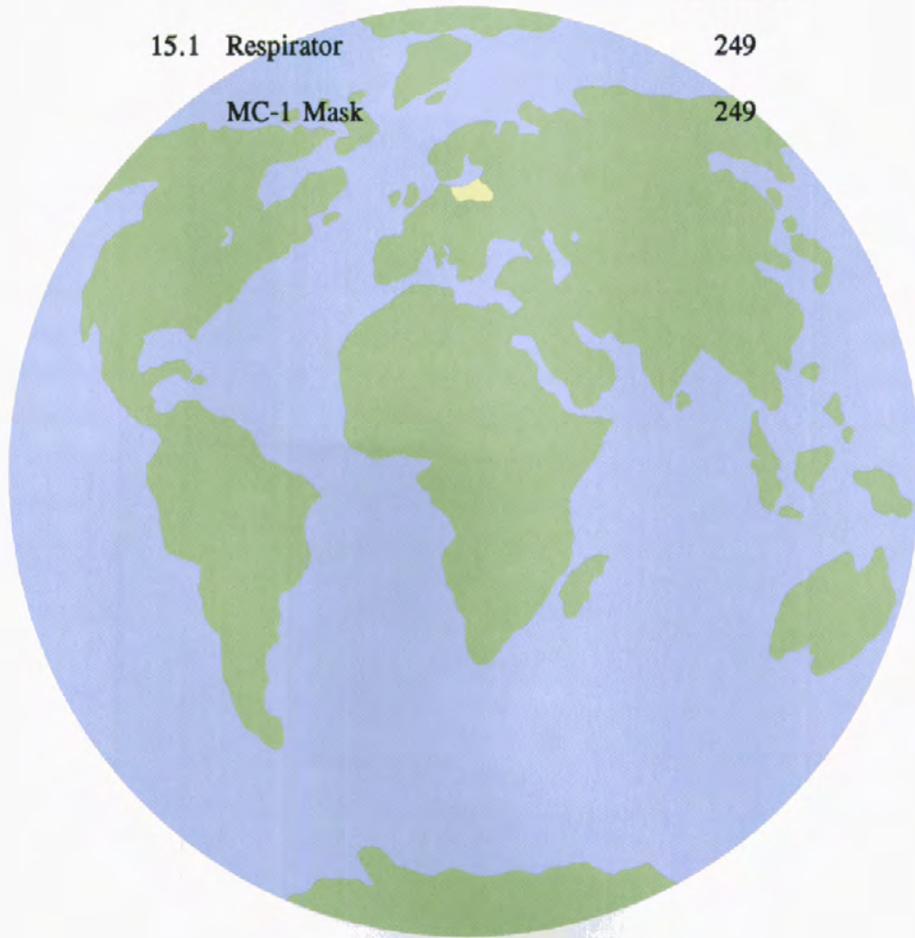
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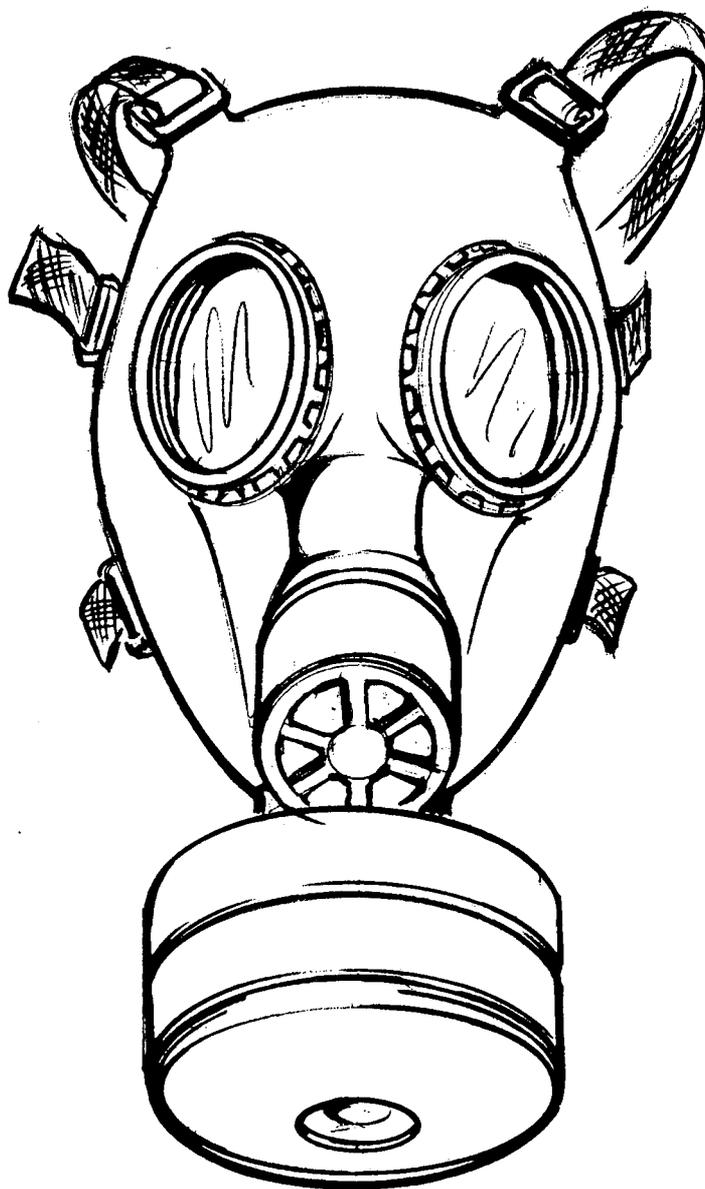
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15.1 RESPIRATOR



Sketch courtesy of Battelle.

The Polish MC-1

The Polish MC-1 respirator features an elastomeric facepiece, two circular eyepieces that are held on the facepiece by metal collars, an exhalation valve, a chin-mounted canister, and a six-point adjustable head harness suspension. This mask does not have a drink device.*

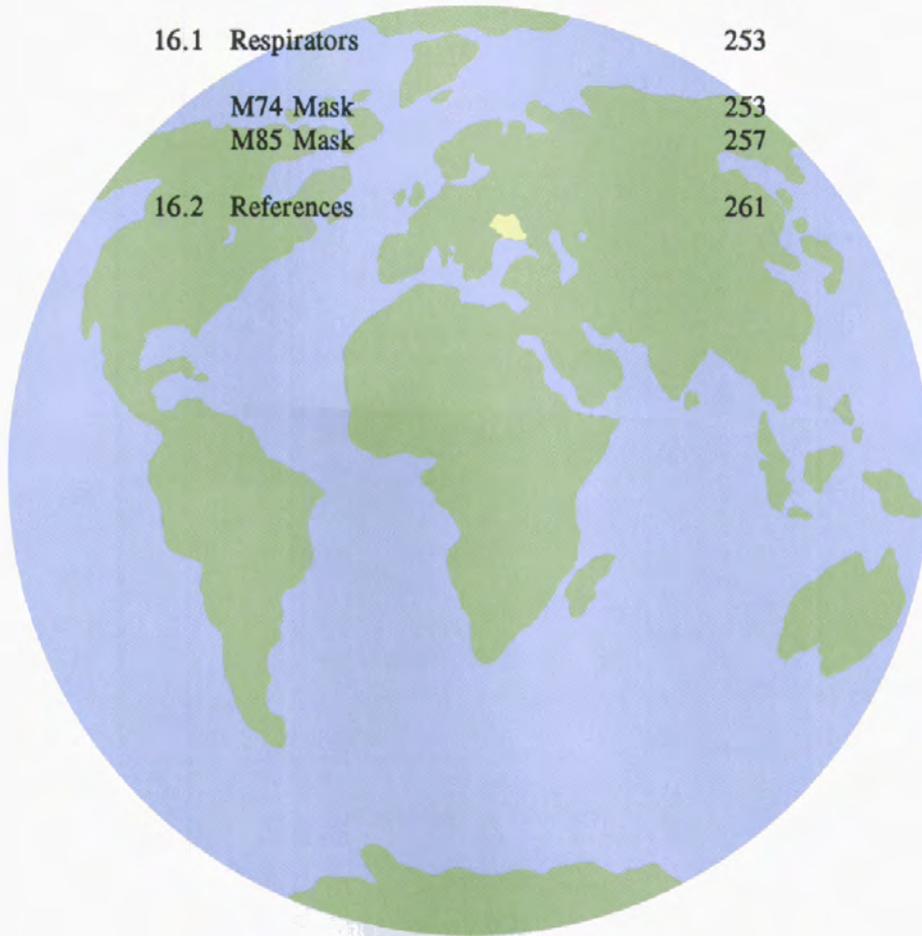
*Analysis based on photo evaluation of the mask.



Chapter 16 – Romania

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16.1 RESPIRATORS



Photo courtesy of CBIAC personnel.

The Romanian M74 was carried by Iraqi soldiers during Operation Desert Shield/Storm.

- **Designator(s):** M74
- **Item Name(s):** M74 Mask
- **Item Description:** The M74 respirator features a green rubber facepiece, two inverted triangular eyepieces that are held on the facepiece by metal collars, a voicemitter, a chin-mounted canister, and a six-point adjustable head harness suspension with a neck strap. The neck strap allows the respirator to hang on the chest when not in use. This mask does not have a drink device. ⁽¹⁾
- **Total Weight:** 1,200 g. ^(1, 2)
 - Canister 450 g. ⁽¹⁾
 - Facepiece 750 g. ⁽²⁾
- **Stock Number(s):** Not available.
- **Sizes Available:** Not available.
- **Use(s):** Not available.
- **Component(s):**
 - Canister Uses the CF-4 filter canister and is chin-mounted. ⁽²⁾
 - Eyepiece(s) Two triangular-shaped polycarbonate eyepieces. ⁽¹⁾
 - Facepiece Green in color. ⁽¹⁾
 - Head Harness Six-point adjustable suspension. ⁽¹⁾
- **Breathing Resistance:** Not available.
- **Airflow:** No positive airflow available. ⁽¹⁾
- **Communications Enhancement:** Not available.
- **Protection Afforded:** Not available.
- **Manufacturer(s):** Not available.
- **Compatibility:** Not available.
- **Storage Life:** Not available.
- **Donning Time:** Not available.
- **Field of Vision:** Not available.

- **Accessories:** Not available.
- **Decontaminability:** Not available.
- **Fogging Characteristic(s):** Not available.
- **Deployment:** The Romanian M74 was deployed to Iraq and confiscated from Iraqi soldiers during Operation Desert Storm. ⁽²⁾
- **Miscellaneous:** Not available.



Photo courtesy of CBLAC personnel.

The Romanian M85

- **Designator(s):** M85
- **Item Name(s):** M85 Mask
- **Item Description:** The M85 respirator features a green rubber facepiece, two inverted triangular eyepieces that are held to the facepiece with screw-tightened metal collars, a voicemitter, a chin-mounted canister, and a six-point adjustable head harness suspension. There is an integral right cheek-mounted drinking device that can be connected to a water bottle. The respirator also has a neck strap to allow it to hang on the chest when not in use. The Iraqi general purpose mask appears to be a replica of this mask. ⁽¹⁾
- **Total Weight:** 1,050 g. ⁽¹⁾
 - Canister 450 g. ⁽¹⁾
 - Facepiece 600 g. ⁽¹⁾
- **Stock Number(s):** Not available.
- **Sizes Available:** Not available.
- **Use(s):** Not available.
- **Component(s):**
 - Canister Uses the CF-4 filter canister and is chin-mounted. ⁽¹⁾
 - Eyepiece(s) Two inverted triangular-shaped polycarbonate eyepieces. ⁽¹⁾
 - Drinking Device Integral right cheek-mounted drinking device and tube. ⁽¹⁾
 - Facepiece Green in color. ⁽¹⁾
 - Head Harness Six-point adjustable suspension. ⁽¹⁾
- **Breathing Resistance:** Not available.
- **Airflow:** No positive airflow available. ⁽¹⁾
- **Communications Enhancement:** An internal cheek-mounted microphone is available with this mask.
- **Protection Afforded:** Not available.
- **Manufacturer(s):** Not available.
- **Compatibility:** Not available.
- **Storage Life:** Not available.

- **Donning Time:** Not available.
- **Field of Vision:** Not available.
- **Accessories:** Not available.
- **Decontaminability:** Not available.
- **Fogging Characteristic(s):** Not available.
- **Deployment:** The Romanian M85 was deployed to Iraq and confiscated from Iraqi soldiers during Operation Desert Storm. ⁽²⁾
- **Miscellaneous:** Not available.

16.2 REFERENCES

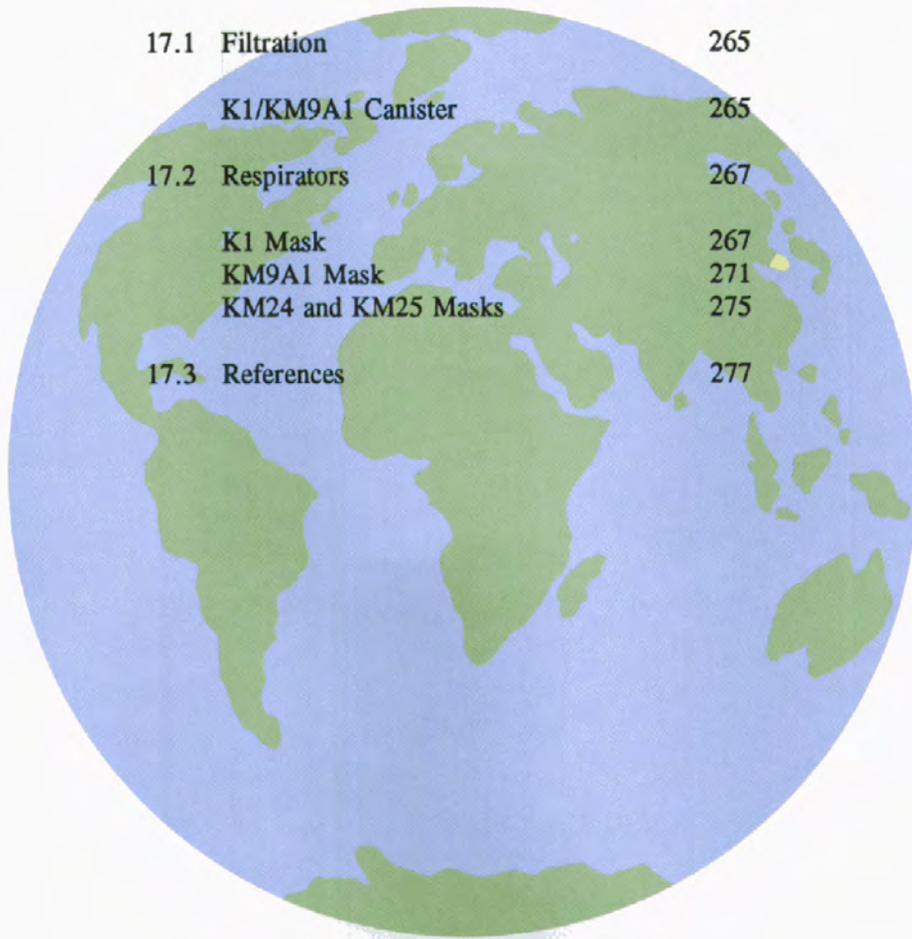
1. Analysis based on physical evaluation of the mask by CBIAC personnel.
2. Interview with U.S. Army Chemical Corp Museum personnel, U.S. Army Chemical School, Fort McClellan, AL, 36205-5000.



Chapter 17 – South Korea

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17.1 FILTRATION

- **Item Name(s):** K1/KM9A1 Canister
- **Use(s):** Used with the South Korean K1 and KM9A1 with German and U.S. type canister adapters, respectively. ⁽³⁾
- **Physical Characteristic(s):**

Aerosol Filter	Filter paper. ⁽³⁾
Canister	Aluminum. ⁽³⁾
Gas Filter	Active carbon. ⁽³⁾
- **Performance Specification(s):**

Gas Life	
CG Life	25 minutes at an airflow of 32 L/min, concentration of 20 g/m ³ . ⁽¹⁾
CK Life	30 minutes at an airflow of 50 L/min, concentration of 4 g/m ³ . ⁽¹⁾
HCN Life	25 minutes at an airflow of 32 L/min, concentration of 10 g/m ³ . ⁽¹⁾
PS Life	20 minutes at an airflow of 32 L/min, concentration of 50 g/m ³ . ⁽¹⁾
SA Life	45 minutes at an airflow of 50 L/min, concentration of 10 g/m ³ . ⁽¹⁾
- **Deployment:** Not available.
- **Manufacturer(s):** Sam Gong Industrial Co., Ltd.
136 Chungjin - Dong
Chongro-Ku, Seoul
Korea
Tel: 082 2 7203030/8
082 2 7203276/9
Fax: 082 2 7203039 ⁽²⁾
- **Stock Number(s):** Not available.
- **Miscellaneous:** Not available.

17.2 RESPIRATORS

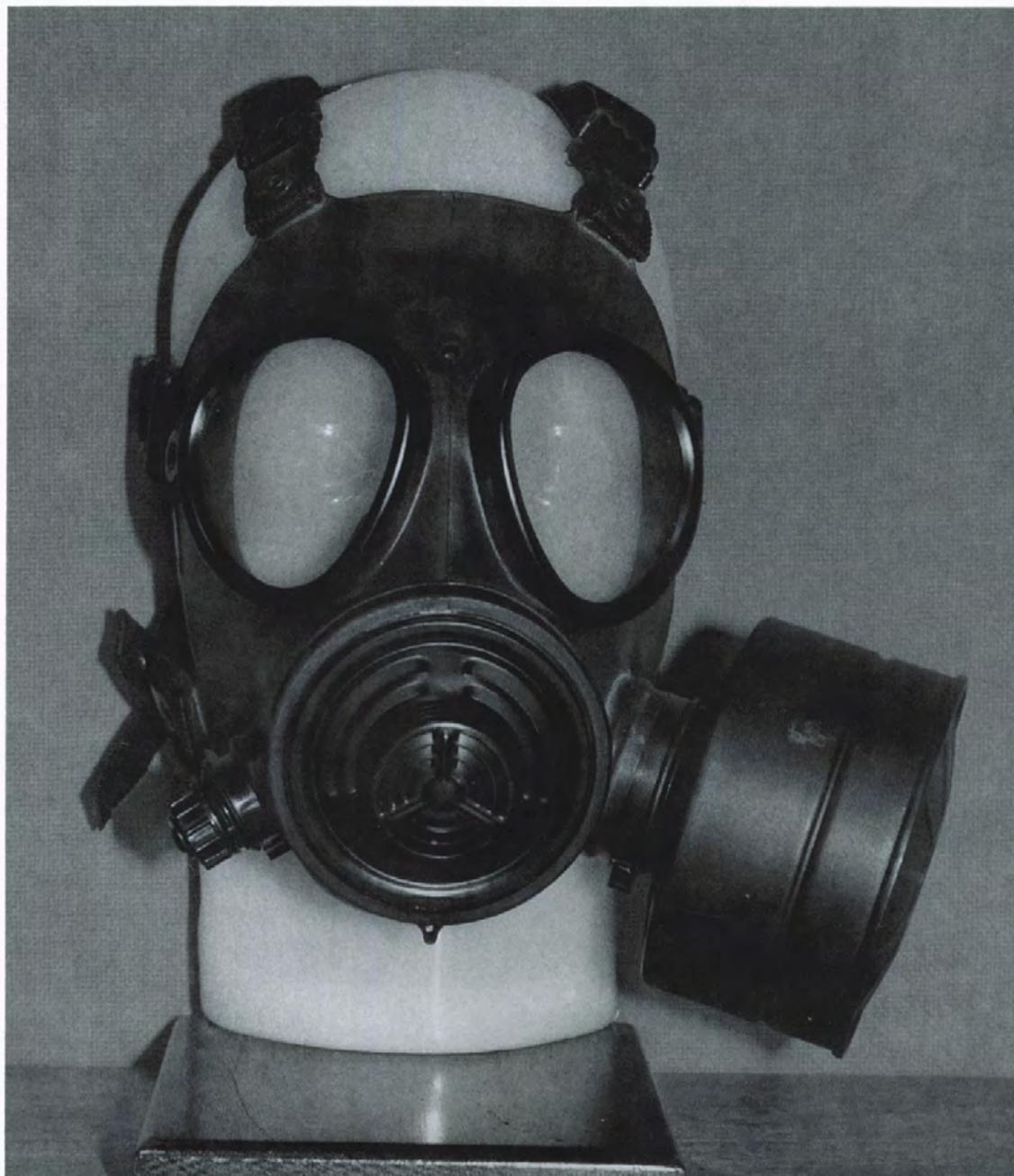


Photo courtesy of CBLAC personnel.

The South Korean K1

- **Designator(s):** K1
- **Item Name(s):** K1 Mask
- **Item Description:** The South Korean K1 mask features a black facepiece made of a neoprene/natural rubber blend with two flat polycarbonate lenses. Located over the mouth area is a large-diameter voicemitter. The drinking device is located to the right of the voicemitter, and the canister mount is located to the left. The mask has a six-point adjustable head harness with elastic straps. The K1 has an attachment for corrective lenses. ^(3, 4)
- **Total Weight:** Approximately 1,300 g including carrier. ⁽³⁾
- **Stock Number(s):** Not available.
- **Sizes Available:** Small, medium, and large. ⁽¹⁾
- **Use(s):** Used by South Korean military and civilians. ⁽¹⁾
- **Component(s):**

Canister Mount	Non-NATO. ⁽³⁾
Drinking Device	The leakage-proof drinking system is located on the right side of the mask. The user drinks from a bottle plugged into the mask from which the liquid is directed to the mouth by an internal tube. ⁽¹⁾
Eyepiece(s)	The two large wide-angle transparent eyepieces are flat and made of optical grade polycarbonate. ⁽¹⁾
Facepiece	The facepiece is manufactured with a corrosion-resistant neoprene/natural rubber compound. ⁽¹⁾
Head Harness	Six-point adjustable suspension. Self-locking sliding eyelets on the harness enable rapid adjustment of the straps. ⁽¹⁾
- **Breathing Resistance:**

Inhalation Resistance	69.3 mm H ₂ O at an airflow of 85 L/min. ⁽⁵⁾
Exhalation Resistance	25.8 mm of H ₂ O at an airflow of 85 L/min. ⁽⁵⁾
- **Airflow:** No positive airflow available. ⁽⁴⁾
- **Communications Enhancement:** The nosecup guides the sound waves in the shape of a funnel to the exhalation valve, located at mouth level. The highly vibratory multiseat valve disc transmits the sound waves to the exterior. ⁽¹⁾
- **Protection Afforded:** Designed to protect respiratory tract and eyes against chemical, biological, and radioactive agents. ⁽¹⁾

- **Manufacturer(s):** Daewoo Corporation
C.P.O. Box 2810
Seoul
Korea
Tel: 082 2 7592758
Fax: 082 2 7539489 ⁽³⁾

Sam Gong Industrial Co., Ltd.
136 Chungjin - Dong
Chongro-Ku, Seoul
Korea KPO BOX76
Tel: 082 2 7203030/8
082 2 7203276/9
Fax: 082 2 7203039 ⁽²⁾

- **Compatibility:** Not available.
- **Storage Life:** Not available.
- **Donning Time:** Not available.
- **Field of Vision:**
 - Down 57° ⁽³⁾
 - Lateral 90° ⁽³⁾
 - Up 50° ⁽³⁾
- **Accessories:**
 - Antifogging Kit For cleaning visors. ⁽¹⁾
 - Canteen Integrates with drinking device. ⁽¹⁾
 - Eyeglasses Can be attached. ⁽³⁾
 - Carrying Bag Waterproof bag has a shoulder strap and belt, designed for one mask, on filter, and one antifogging kit. ⁽¹⁾

- **Decontaminability:** Not available.
- **Fogging Characteristic(s):** Not available.
- **Deployment:** Not available.
- **Miscellaneous:** Not available.

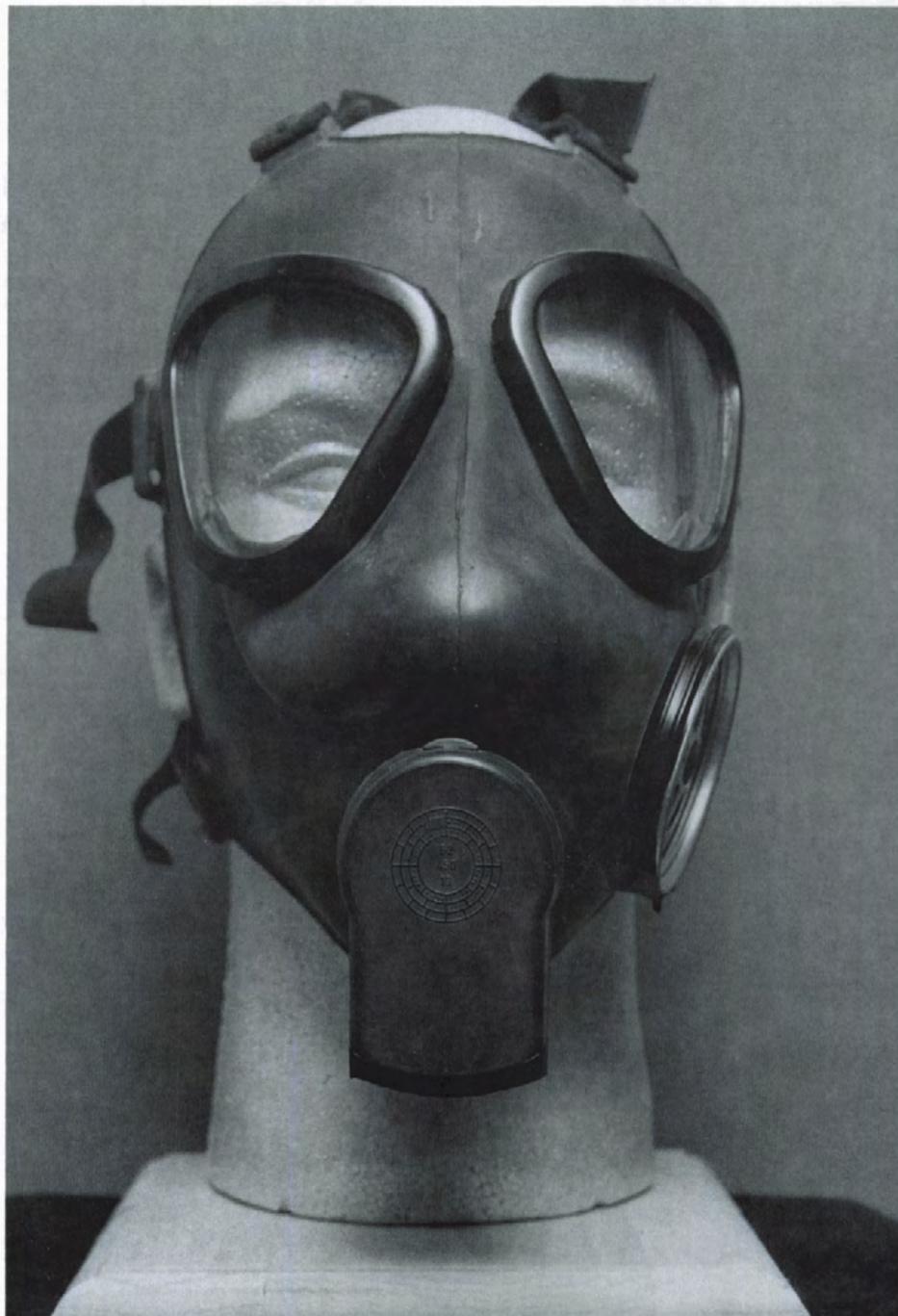


Photo courtesy of CBIAC Personnel.

The South Korean KM9A1

- **Designator(s):** KM9A1
- **Item Name(s):** KM9A1 Mask
- **Item Description:** The South Korean KM9A1 is a licensed replica of the U.S. M9A1. It features an olive green facepiece made of a neoprene/natural rubber blend with two triangular curved eyepieces made of polycarbonate and held in place by crimped metal collars. The mask has an internal nose cup. The exhalation valve is located over the mouth position and has a mushroom type disk cover. The canister mount may be located on either the right or left cheek to accommodate both right- and left-handed wearers. The mask has a six-point adjustable head harness suspension with elastic straps. This mask does not have a drinking device or a voicemitter. There are no provisions for wearing corrective lenses. ^(1, 3, 4)
- **Total Weight:** Approximately 1,300 g including carrier. ⁽³⁾
- **Stock Number(s):** Not available.
- **Sizes Available:** Small, medium, and large. ⁽¹⁾
- **Use(s):** Used by South Korean military and civilians. ⁽¹⁾
- **Component(s):**

Canister	The canister is normally fitted to the left cheek of the facepiece, but a right cheek fitting can be ordered for left-handers. ⁽¹⁾
Canister Mount	Non-NATO. ⁽³⁾
Eyepiece(s)	Two large wide-angle transparent eyepieces guarantee wide and clear vision, both horizontally and vertically. The eyepieces are cylindrically curved and made of optical grade polycarbonate. ⁽¹⁾
Facepiece	The facepiece is manufactured with a corrosion-resistant neoprene/natural rubber compound. ⁽¹⁾
Head Harness	Six-point adjustable suspension. Self-locking sliding eyelets on the harness enable rapid adjustment of the straps. ⁽¹⁾
- **Breathing Resistance:**

Inhalation Resistance	15.85 mm H ₂ O. ⁽³⁾
Exhalation Resistance	28 mm H ₂ O. ⁽³⁾
- **Airflow:** No positive airflow available. ⁽⁶⁾
- **Communications Enhancement:** This mask does not have a voicemitter. ⁽¹⁾

- **Protection Afforded:** - Designed to protect the eyes and respiratory tract against chemical and biological agents and radioactive fallout particle. ⁽¹⁾

- **Manufacturer(s):**
 - Daewoo Corporation
 - C.P.O. Box 2810
 - Seoul
 - Korea
 - Tel: 082 2 7592758
 - Fax: 082 2 7539489 ⁽³⁾

 - Sam Gong Industrial Co., Ltd.
 - 136 Chungjin - Dong
 - Chongro-Ku, Seoul
 - Korea KPO BOX76
 - Tel: 082 2 7203030/8
 - 082 2 7203276/9
 - Fax: 082 2 7203039 ⁽²⁾

- **Compatibility:** Not available.

- **Storage Life:** Not available.

- **Donning Time:** Not available.

- **Field of Vision:**
 - Down 53° ⁽³⁾
 - Lateral 90° ⁽³⁾
 - Up 43° ⁽³⁾

- **Accessories:**
 - Antifogging Kit For cleaning visors. ⁽¹⁾
 - Carrying Bag Waterproof bag has a shoulder strap and belt, designed for one mask, one filter, and one antifogging kit. ⁽¹⁾
 - Eyeglasses Cannot be attached. ⁽³⁾

- **Decontaminability:** Not available.

- **Fogging Characteristic(s):** Not available.

- **Deployment:** Not available.

- **Miscellaneous:** Not available.



The South Korean KM24



The South Korean KM25 shown with canister coupling

Photos courtesy of Sam Gong Industrial Co., Ltd.

The South Korean KM24 and KM25 masks are licensed replicas of the U.S. M24 and M25A1, respectively. The masks are identical with the exception that the KM24 is an aircrew mask used in helicopters, and the KM25 is a tanker's version designed to integrate with vehicle collective protection systems via a specific canister coupling. In addition, each of the masks uses a specific microphone connector to interface with aircraft and tanks. Both masks are manufactured by Sam Gong Industrial Co., Ltd.

See Pages 377 through 381 for further details on the U.S. M24 and M25A1.

17.3 REFERENCES

1. "NBC Protective Equipment." Pamphlet obtained from STS Sam Gong Industrial Co., Ltd.
2. "CBR Protective Equipment." Pamphlet obtained from STS Sam Gong Industrial Co., Ltd.
3. "Gas Masks." Pamphlet obtained from Daewoo Corporation.
4. Analysis based on physical evaluation of the mask by CBIAC personnel.
5. Test data obtained from CRDEC personnel, Edgewood Area, APG, MD, 21010-5423.



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A large circular world map is centered on the page. The continents are colored in a light green shade, and the oceans are light blue. The country of Spain is highlighted in a yellow color, matching the map in the top right corner.

18.1 FILTRATION

- **Item Name(s):** M6-87 Canister
- **Use(s):** Used with the Spanish M6-87 mask. ⁽¹⁾
- **Physical Characteristic(s):**
 - Aerosol Filter HEPA. ⁽¹⁾
 - Canister Aluminum, black in color, cylindrically shaped. ⁽¹⁾
 - Gas Filter Activated, impregnated ASC carbon. ⁽¹⁾
 - Thread NATO standard, conforms to STANAG 4155. ⁽¹⁾
 - Thread Size 40 x 3.63 mm. ⁽¹⁾
 - Weight 303 g. ⁽¹⁾
- **Performance Specification(s):**
 - Airflow Resistance 8.16 mm of H₂O at an airflow of 30 L/min (constant flow).* ⁽¹⁾
33.65 mm of H₂O at an airflow of 80 L/min (constant flow).* ⁽¹⁾
135.62 mm of H₂O at an airflow of 240 L/min (constant flow).* ⁽¹⁾
 - Gas Life
 - AC Life 50 minutes at an airflow of 50 L/min, concentration of 1.2 g/m³. ⁽¹⁾
 - CK Life 100 minutes at an airflow of 50 L/min, concentration of 2 g/m³. ⁽¹⁾
 - PS Life 180 minutes at an airflow of 50 L/min, concentration of 5 g/m³. ⁽¹⁾
- **Deployment:** Not available.
- **Manufacturer(s):** Fábrica Nacional La Marañosa
Apartado de correos 1.105.
28080 Madrid - España
Tel: 341 402 86 081216
Fax: 341 402 86 8947082. ⁽¹⁾

*Data originally reported in millibars.

- **Stock Number(s):** Not available.
- **Miscellaneous:** Not available.

18.2 RESPIRATORS

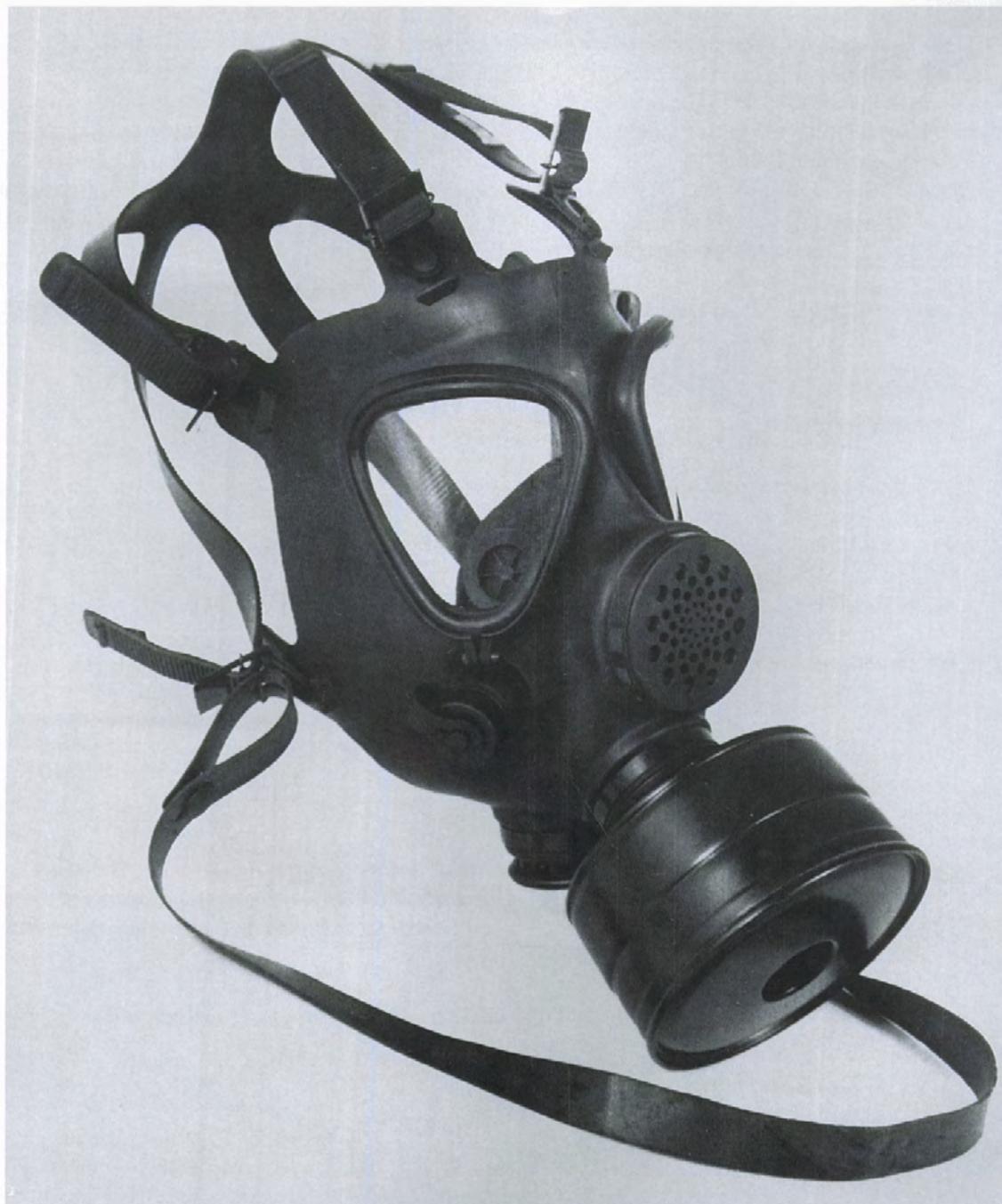


Photo courtesy of Fábrica Nacional La Marañosa.

The Spanish M6-87

- **Designator(s):** M6-87
- **Item Name(s):** NBC M6-87 Mask (Máscara NBQ M6-87)
- **Item Description:** The Spanish M6-87 features a facepiece made of molded butyl rubber and black in color. The two triangular eyepieces are made of impact resistant optical grade polycarbonate and held in place by screw-tightened collars. The internal nosecup has two check valves that prevent exhaled air from fogging the eyepieces. A voicemitter is centrally located, and the drinking device is to the right. The canister mount is also centrally located, immediately down from the voicemitter. The exhalation valve is found under the chin position and allows perspiration to drain off. This mask has a six-point adjustable suspension with rubber straps and a rubber neck strap. ^(1, 2)
- **Total Weight:** 794 g. ⁽¹⁾
 - Canister 303 g. ⁽¹⁾
 - Facepiece 491 g. ⁽¹⁾
- **Stock Number(s):** Not available.
- **Sizes Available:** One size is available. Currently developing two more sizes. ⁽¹⁾
- **Use(s):** Used by the Spanish armed forces and civilians as a general purpose respirator. ⁽¹⁾
- **Component(s):**
 - Canister Uses the Spanish M6-87 canister, may be used with any other NATO standard thread canister. ⁽¹⁾
 - Canister Mount NATO standard. ⁽¹⁾
 - Drinking Device Permits ingestion of water and nourishing liquids while the mask is being worn and integrates with the specially designed canteen. The canteen is geometrically equal to U.S. canteens with the inscription "NBQ-R". ⁽¹⁾
 - Exhalation Valve Located under the chin position, it allows exhaled air and perspiration exit the mask. ^(1, 2)
 - Eyepiece(s) Constructed of optical grade polycarbonate with high impact resistance. ⁽¹⁾
 - Facepiece Constructed of molded butyl rubber. ⁽¹⁾
 - Head Harness Six-point adjustable elastomeric harness. ^(1, 2)
 - Inhalation Valve Located under the canister mount, it allows filtered air to enter the mask and prevents exhaled air from entering the canister. ^(1, 2)

Neck Strap ⁽¹⁾

Nosecup Reduces internal dead space; check valves prevent exhaled air from fogging the eyepieces. ⁽¹⁾

Voicemitter Consists of a membrane under tension and serves to amplify voice transmission. ⁽¹⁾

- **Breathing Resistance:**

Inhalation Resistance Less than 9.18 mm of H₂O at an airflow of 30 L/min (constant flow).* ⁽¹⁾

Less than 38.75 mm of H₂O at an airflow of 80 L/min (constant flow).* ⁽¹⁾

Less than 173.35 mm of H₂O at an airflow of 240 L/min (constant flow).* ⁽¹⁾

Exhalation Resistance Less than 6.12 mm of H₂O at an airflow of 30 L/min (constant flow).* ⁽¹⁾

Less than 17.33 mm of H₂O at an airflow of 80 L/min (constant flow).* ⁽¹⁾

Less than 79.54 mm of H₂O at an airflow of 240 L/min (constant flow).* ⁽¹⁾

- **Airflow:** No positive airflow available.

- **Communications Enhancement:** Voicemitter permits communication with persons up to five meters away. ⁽¹⁾

- **Protection Afforded:** Provides greater than 24 hours of protection against HD using the FINABEL method of testing. ⁽¹⁾

- **Manufacturer(s):** Fábrica Nacional La Marañosa
Apartado de correos 1.105.
28080 Madrid - España
Tel: 341 402 86 081216
Fax: 341 402 86 8947082. ⁽¹⁾

- **Compatibility:** Not available.

- **Storage Life:** Storage life of 10 years in an uncontaminated environment or one week in a contaminated environment. ⁽¹⁾

*Data originally reported in millibars.

- **Donning Time:** Less than 9 seconds for trained personnel. ⁽¹⁾
- **Field of Vision:** Not available.
- **Accessories:**
 - Carrying Case** Each carrying case holds one mask with canister attached, one spare canister, one canteen with canteen plug, and an instruction manual. It is constructed of impermeable plastic. ⁽¹⁾
 - Canteen Plug** Includes interface tube and valve. The canteen plug connects with the mask to permit drinking. ⁽¹⁾
- **Decontaminability:** Decontaminate with calcium hypochlorite or boiling water treatment. ⁽¹⁾
- **Fogging Characteristic(s):** Check valves on the nose cup prevent exhaled air from fogging the eyepieces. ⁽¹⁾
- **Deployment:** Not available.
- **Miscellaneous:** Not available.

18.3 REFERENCES

1. "Instrucciones para el manejo de la Máscara NBQ M6-87." Brochure from Fábrica Nacional La Marañosa.
2. Analysis based on photo evaluation of the mask by CBIAC personnel.



Chapter 19 – Sweden

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19.1 FILTRATION

- **Item Name(s):** F-13 Canister
- **Use(s):** Used with the Swedish M51 mask. (7)
- **Physical Characteristic(s):**
 - Canister Aluminum, green in color. (7)
 - Weight 290 g. (7)
- **Performance Specification(s):** Not available.
- **Deployment:** Not available.
- **Manufacturer(s):** Flodins Filter AB
Box 1011
S-453 29 Lysekil
Sweden
Tel: 046 523 15020
Fax: 046 523 13658 (5)
- **Stock Number(s):** Not available.
- **Miscellaneous:** This is a replica of the U.S. M11 canister. (7)

- **Item Name(s):** NBC 20 Canister

- **Use(s):** Not available.

- **Physical Characteristic(s):**

Canister Internal parts are epoxy-coated aluminum. External parts are lacquered aluminum, army green in color. ⁽²⁾

Carbon Moisture 3% max. ⁽²⁾
Content

Diameter 110 mm. ⁽²⁾

Gas Filter Carbon. ⁽²⁾

Height 70 mm. ⁽⁴⁾

Thread NATO standard, conforms to STANAG 4155. ⁽²⁾

Thread Size 40 x 3.63 mm, conforms to DIN 3183 and EN 148. ^(2, 5)

Weight Less than 255 g. ⁽²⁾

- **Performance Specification(s):**

Aerosol Efficiency Greater than or equal to 99.997% for DOP or paraffin oil at an airflow of 85 L/min, concentration of approximately 1500 mg/m³. Traps particle sizes down to 0.3 microns. ⁽²⁾

Airflow Resistance Less than 16.31 mm of H₂O at an airflow of 30 L/min.* ⁽²⁾

Gas Life

 CK Life Greater than 100 minutes at an airflow of 30 L/min, concentration of 2 g/m³. ^(2, 5)

 HCN Life Greater than 80 minutes at an airflow of 30 L/min, concentration of 2 g/m³. ⁽²⁾

 PS Life Greater than 70 minutes at an airflow of 30 L/min, concentration of 15 g/m³. ⁽²⁾

- **Deployment:** The Turkish government purchases NBC filter canisters from Flodins Filter AB for use with the SR6 respirator. ⁽⁴⁾

*Data originally reported in Pascals.

- **Manufacturer(s):** Flodins Filter AB
Box 10011
S-453 29 Lysekil
Sweden
Tel: 046 523 15020
Fax: 046 523 13658 ⁽²⁾

- **Stock Number(s):** Not available.

- **Miscellaneous:** Not available.

- **Item Name(s):** NBC 33 Canister

- **Use(s):** Not available.

- **Physical Characteristic(s):**

Canister	Internal parts are epoxy-coated aluminum. External parts are lacquered aluminum, army green in color. ⁽²⁾
Carbon Moisture Content	3% max. ⁽²⁾
Diameter	110 mm. ⁽²⁾
Gas Filter	Carbon. ⁽²⁾
Height	70 mm. ⁽³⁾
Thread	NATO standard, conforms to STANAG 4155. ⁽²⁾
Thread Size	40 x 3.63 mm, conforms to DIN 3183 and EN 148. ^(2, 5)
Weight	Less than 310 g. ⁽²⁾

- **Performance Specification(s):**

Aerosol Efficiency Greater than or equal to 99.997% for DOP or paraffin oil at an airflow of 85 L/min, concentration of approximately 1500 mg/m³. Traps particle sizes down to 0.3 microns. ⁽²⁾

Airflow Resistance Less than 200 Pascals at an airflow of 30 L/min. ⁽²⁾

Gas Life

CK Life Greater than 200 minutes at an airflow of 30 L/min, concentration of 2 g/m³. ^(2, 5)

HCN Life Greater than 120 minutes at an airflow of 30 L/min, concentration of 2 g/m³. ⁽²⁾

PS Life Greater than 200 minutes at an airflow of 30 L/min, concentration of 5 g/m³. ⁽²⁾

- **Deployment:** The Turkish Government purchases NBC filter canisters from Flodin Filter AB for use with the SR6 respirator. ⁽⁴⁾

The Belgian Government. ⁽⁵⁾

- **Manufacturer(s):** Flodins Filter AB
Box 10011
S-453 29 Lysekil
Sweden
Tel: 046 523 15020
Fax: 046 523 13658 ⁽²⁾
- **Stock Number(s):** Not available.
- **Miscellaneous:** Not available.

- **Item Name(s):** NBC 37 Canister
- **Use(s):** Not available.
- **Physical Characteristic(s):**

Canister	Internal parts are epoxy-coated aluminum. External parts are lacquered aluminum, army green in color. ⁽²⁾
Carbon Moisture Content	3% max. ⁽²⁾
Diameter	110 mm. ⁽²⁾
Height	100 mm. ⁽⁵⁾
Thread	NATO standard, conforms to STANAG 4155. ⁽²⁾
Thread Size	40 x 3.63 mm, conforms to DIN 3183 and EN 148. ^(2, 5)
Weight	Less than 340 g. ⁽⁵⁾

- **Performance Specification(s):**

Aerosol Efficiency	Greater than or equal to 99.997% for DOP or paraffin oil at an airflow of 85 L/min, concentration of 1500 mg/m ³ . Traps particle sizes down to 0.3 microns. ⁽²⁾
Airflow Resistance	Less than 23.45 mm of H ₂ O at an airflow of 30 L/min.* ⁽²⁾
Gas Life	
CK Life	Greater than 240 minutes at an airflow of 30 L/min, concentration of 2 g/m ³ . ^(2, 5)
HCN Life	Greater than 140 minutes at an airflow of 30 L/min, concentration of 2 g/m ³ . ⁽²⁾
PS Life	Greater than 240 minutes at an airflow of 30 L/min, concentration of 5 g/m ³ . ⁽²⁾

- **Deployment:** The Turkish Government purchases NBC filter canisters from Flodin Filter AB for use with the SR6 respirator. ⁽⁴⁾
The Austrian Government. ⁽⁵⁾

*Data originally reported in Pascals.

- **Manufacturer(s):** Flodins Filter AB
Box 10011
S-453 29 Lysekil
Sweden
Tel: 046 523 15020
Fax: 046 523 13658 ⁽²⁾
- **Stock Number(s):** Not available.
- **Miscellaneous:** Not available.

- **Item Name(s):** Sundström 374 Canister
- **Use(s):** Used with the Swedish NBC Respirator Type F2. ⁽⁵⁾
- **Physical Characteristic(s):**

Aerosol Filter	Fiber glass material. ⁽⁵⁾ 1600 cm ² hydrophobic glass fiber paper. ⁽¹⁰⁾
Canister	Polyamide and aluminum. ⁽¹⁰⁾
Diameter	115 mm. ⁽¹⁰⁾
Gas Filter	Whetlerite type activated carbon, impregnated with TEDA, 208 cm ³ . ^(5, 10)
Height	85 mm. ⁽¹⁰⁾
Thread	NATO standard, conforms to STANAG 4155. ^(5, 10)
Thread Size	40 x 3.63 mm, conforms to DIN 3182. ^(5, 10)
Weight	240 g. ⁽¹⁰⁾

- **Performance Specification(s):**

Aerosol Efficiency	Less than 0.004% for paraffin oil aerosol at an airflow of 95 L/min, concentration of 100 mg/m ³ , RH of 50%. ⁽¹⁰⁾
Airflow Resistance	8.16 mm of H ₂ O at an airflow of 30 L/min.* ⁽⁵⁾ 7.65 mm of H ₂ O at an airflow of 30 L/min.* ⁽¹⁰⁾ 27.23 mm of H ₂ O at an airflow of 95 L/min.* ⁽⁵⁾ 29.06 mm of H ₂ O at an airflow of 95 L/min.* ⁽¹⁰⁾ 51.49 mm of H ₂ O at an airflow of 160 L/min.* ⁽⁵⁾
Gas Life	
CK Life	30 minutes at an airflow of 30 L/min, concentration of 5 g/m ³ , RH of 70%. ⁽¹⁰⁾
GB Life	160 minutes at an airflow of 30 L/min, concentration of 5 g/m ³ , RH of 70%. ⁽¹⁰⁾

*Data originally reported in Pascals.

HCN Life	18 minutes at an airflow of 30 L/min, concentration of 15 g/m ³ , RH of 70%. ⁽¹⁰⁾
PS Life	85 minutes at an airflow of 30 L/min, concentration of 15 g/m ³ , RH of 70%. ⁽¹⁰⁾

- **Deployment:** Not available.
- **Manufacturer(s):** Sundström Safety AB
Box 100 56
Vasaavägen 84
S-181 10 Lidingö
Sweden
Tel: 046 8 7679085
Fax: 046 8 7679812 ⁽¹⁰⁾
- **Stock Number(s):** Not available.
- **Miscellaneous:** The filter is equipped with protective covers on both sides. It can be decontaminated more than 20 times in hot air, 130°C for 2 hours. In dry atmospheric conditions,* the filter can be stored for more than 20 years. ⁽¹⁰⁾

Currently being considered for use with the Type F2 prototype mask. ⁽⁵⁾

The Sundström 374 canister is also known as the A4 canister, an internal code used by the Swedish Defence Materiel Administration. ⁽⁵⁾

*Dry atmospheric conditions not specified.

19.2 RESPIRATORS

The Forsheda-designed F2 is one of the prototypes being considered for the next generation of masks in Sweden.



Photo courtesy of CBIAC personnel.



Photo courtesy of FOA.

The Forsheda F2 with accessories

- **Designator(s):** F2
- **Item Name(s):** Type F2
NBC Respirator Type A4
- **Item Description:** The Swedish type A4 mask features a facepiece with two elliptical lenses and canister mounts on both left and right sides. There is a defined nose region with the integral exhalation valve/voicemitter/drinking device assembly located just below the molded nose and directly in front of the mouth. It features a six-point adjustable head harness. The mask is clearly marked with the designator "A4" just above the left eyepiece. The designation A4 is an internal code used by the Swedish Defence Materiel Administration. ^(5, 6)

The A4 is one of the candidate prototypes being considered for the Swedish production contract to replace the currently used M51. Production is tentatively scheduled to begin in 1994. ⁽¹²⁾
- **Total Weight:**

Facepiece	440 g (medium size). ⁽⁵⁾
-----------	-------------------------------------
- **Stock Number(s):** Not available.
- **Sizes Available:** Available in three sizes. ⁽⁵⁾
- **Use(s):** Currently being considered for the next generation of Swedish general purpose military masks. ⁽¹²⁾
- **Component(s):**

Canister	Uses the Sundström 374, which is also known as the Filter Type F2, or any other NATO standard thread canister. Can be worn on the left or right side. ^(5, 11)
Canister Mount	NATO standard. It is constructed of glass-fiber-reinforced polyamide. ⁽⁵⁾
Connections	Glass-fiber-reinforced polyamide. ⁽⁵⁾
Drinking Device	Allows for ingestion of greater than 200 ml of water per minute. ⁽⁵⁾
Eyepiece(s)	Polysulfone (specially treated to increase scratch resistance). ⁽⁵⁾
Facepiece	Bromobutyl rubber. ⁽⁵⁾
Head Harness	Six-point suspension, polyester straps. ⁽⁵⁾

- **Breathing Resistance:**
 - Inhalation Resistance 2.24 mm of H₂O at an airflow of 30 L/min.* ⁽⁵⁾
 - 7.65 mm of H₂O at an airflow of 95 L/min.* ⁽⁵⁾
 - 16.82 mm of H₂O at an airflow of 160 L/min.* ⁽⁵⁾
 - Exhalation Resistance 13.26 mm of H₂O at an airflow of 160 L/min.* ⁽⁵⁾
- **Airflow:** No positive airflow available. ⁽⁶⁾
- **Communications Enhancement:** An exponential speech horn is mounted in front of the exhalation valve. An optional speech capsule may be mounted in the unused filter screw thread connection. ⁽⁵⁾
- **Protection Afforded:** Protects against biological and chemical agents. When tested with corn oil aerosol on 56 test subjects, the mean weighted protection factor was 30,000. ⁽⁵⁾

Protection factor greater than 10,000. ⁽¹¹⁾
- **Manufacturer(s):** Forsheda AB
Division of Protective Products
S-330 12 Forsheda
Sweden
Tel: 046 370 81250
Fax: 046 370 81872 ⁽⁵⁾
- **Compatibility:** Can be used in conjunction with most commonly used weapon systems. Allows for the use of most optical devices for aiming and surveillance. ⁽⁵⁾
- **Storage Life:** More than 10 years at 30°C, more than 20 years at 20°C. ⁽⁵⁾
- **Donning Time:** Less than 10 seconds. ⁽⁵⁾
- **Field of Vision:**
 - Binocular 61%. ⁽⁵⁾
 - Total 88%. ⁽⁵⁾
- **Accessories:**
 - Corrective Lenses May be mounted on a frame and inserted into the inside of the mask. ⁽⁵⁾
 - Speech Capsule To be mounted in unused filter screw thread connector. ⁽⁵⁾

*Data originally reported in Pascals.

- **Decontaminability:** Not available.
- **Fogging Characteristic(s):** Not available.
- **Deployment:** Not available.
- **Miscellaneous:** This mask is one of the candidates for replacement of the Swedish M51. ⁽⁵⁾



Photo courtesy of Avon Industrial Polymers Ltd.

The Swedish FM12 is the second candidate prototype being considered for the Swedish production contract to replace the currently used M51. The FM12, a modified version of the UK S10, is manufactured by Avon Industrial Polymers Ltd. and incorporates the following changes to the S10 design. The two-round eyepieces are smaller and lie closer to the face, thus providing an increased field of vision. The primary speech unit is also smaller. An internal nose cup seals tightly against the face (the S10 nose cup does not), thereby offering improved fogging characteristics. In addition, the bead around the periphery has been eliminated in the FM12 design. Also in the FM12, the head harness is made of netting rather than rubber. ^(12, 13)

See Pages 347 through 351 for further details on the S10.



Photo courtesy of CBIAC personnel.

The Swedish M51 is a copy of the U.S. M9. It features a longer mushroom shaped exhalation valve cover than the U.S. M9.

- **Designator(s):** M51
- **Item Name(s):** Protective Mask NBC M51
- **Item Description:** The Swedish M51 mask features a facepiece composed of natural rubber and two triangular eyepieces held in place by metal clamps. The nose region is defined, and the exhalation valve is just below it. Most of the masks have a left-side canister mount for use by right-handed wearers, although masks with right-side canister mounts are also available. The M51 has a six-point adjustable head harness suspension. This mask does not have a drinking device or voicemitter.

The design of the M51 is based on the U.S. M9 mask series. However, the M51 incorporates several modifications to the M9 design including a longer mushroom shaped exhalation valve cover and a smoother interior. The Swedish M51 will be replaced by a new mask design in the near future (procurement is scheduled for the mid 1990s). The two prototypes being seriously considered are the A4 designed by Forsheda AB and the FM12 designed by Avon Rubber. ^(8, 12)

- **Total Weight:** 740 g. ⁽⁷⁾
 - Canister 290 g. ⁽⁷⁾
 - Facepiece 450 g. ⁽⁷⁾
- **Stock Number(s):** Not available.
- **Sizes Available:** Available in three sizes. ⁽⁷⁾
- **Use(s):** Used as a general purpose respirator. ⁽¹²⁾
- **Component(s):**
 - Canister Uses the F-13 canister. ⁽⁷⁾
 - Canister Mount Non-NATO, made of aluminum. ⁽⁷⁾
 - Eyepiece(s) Laminated safety glass. ⁽¹⁾
 - Facepiece Natural rubber, green in color. ⁽⁷⁾
 - Head Harness Six-point adjustable suspension with elastic webbing. ⁽⁷⁾
- **Breathing Resistance:** Not available.
- **Airflow:** No positive airflow available. ⁽⁶⁾
- **Communications Enhancement:** Not available.
- **Protection Afforded:** Not available.

- **Manufacturer(s):** Forsheda AB
Division of Protective Products
S-330 12 Forsheda
Sweden
Tel: 046 370 81250
Fax: 046 370 81872 ⁽⁷⁾

- **Compatibility:** Not available.

- **Storage Life:** Greater than 30 years. ⁽³⁾

- **Donning Time:** Less than 10 seconds. ⁽³⁾

- **Field of Vision:** Not available.

- **Accessories:** A green, cotton duck haversack is available to carry the mask when not in use. ⁽⁷⁾

- **Decontaminability:** Not available.

- **Fogging Characteristic(s):** Not available.

- **Deployment:** Not available.

- **Miscellaneous:** Replica of the U.S. M9 fitted with an M11 canister. ⁽⁷⁾

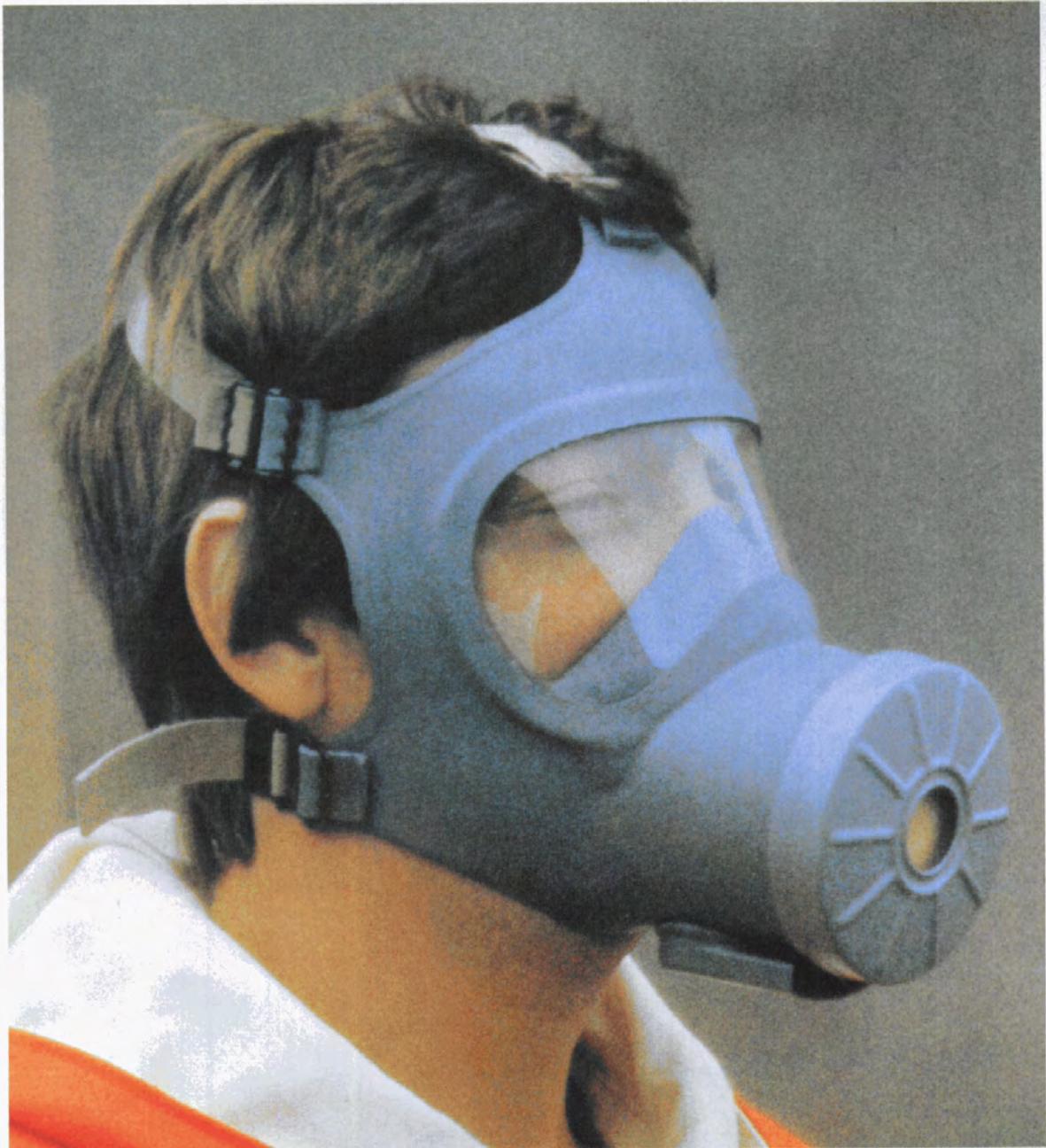


Photo courtesy of Trelleborg AB.

The Swedish Type 33C

- **Designator(s):** Type 33C
- **Item Name(s):** Protective Mask Type 33C
- **Item Description:** The Swedish Type 33C mask is intended mainly for civil defense purposes and does provide NBC protection. The Type 33C mask features an elastomeric facepiece material and a one-piece eye lens. The canister mount is in the center front, directly over the mouth. There is an internal nose cup. The mask is held in place by a five-point adjustable head harness suspension. ^(1, 6)
- **Total Weight:** 400 g. ⁽⁹⁾
- **Stock Number(s):** Not available.
- **Sizes Available:** Five sizes available, intended for use by children 5 years and older and by adults. ⁽¹⁾
- **Use(s):** Primarily used for civil defense purposes. ⁽¹⁾
- **Component(s):**
 - Canister Uses the Type 33C canister. ⁽¹⁾
 - Eyepiece(s) Soft polyvinyl chloride. ⁽¹⁾
 - Facepiece Neoprene and natural rubber. ⁽⁹⁾
- **Breathing Resistance:** Low breathing resistance. ⁽³⁾
- **Airflow:** No positive airflow available. ⁽⁶⁾
- **Communications Enhancement:** Not available.
- **Protection Afforded:** Provides protection against chemical and biological warfare agents as well as against radioactive fallout. ⁽¹⁾
- **Manufacturer(s):**
 - Trelleborg AB
Protective Products Division
S-23181 Trelleborg
Sweden
Tel: 046 410 51000
Fax: 046 410 14289 ⁽¹⁾
 - Forsheda AB
Division of Protective Products
S-330 12 Forsheda
Sweden
Tel: 046 370 81250
Fax: 046 370 81771 ⁽³⁾

- **Compatibility:** Not available.
- **Storage Life:** The mask is stored in a plastic box with a carrying strap. ⁽³⁾
The storage life is greater than 10 years. ⁽⁹⁾
- **Donning Time:** Not available.
- **Field of Vision:** Not available.
- **Accessories:** The carrying case is made of hard plastic. ⁽⁹⁾
- **Decontaminability:** Not available.
- **Fogging Characteristic(s):** Not available.
- **Deployment:** Not available.
- **Miscellaneous:** The type 33 mask series has been in production since the early 1970s. ⁽¹⁾

19.3 REFERENCES

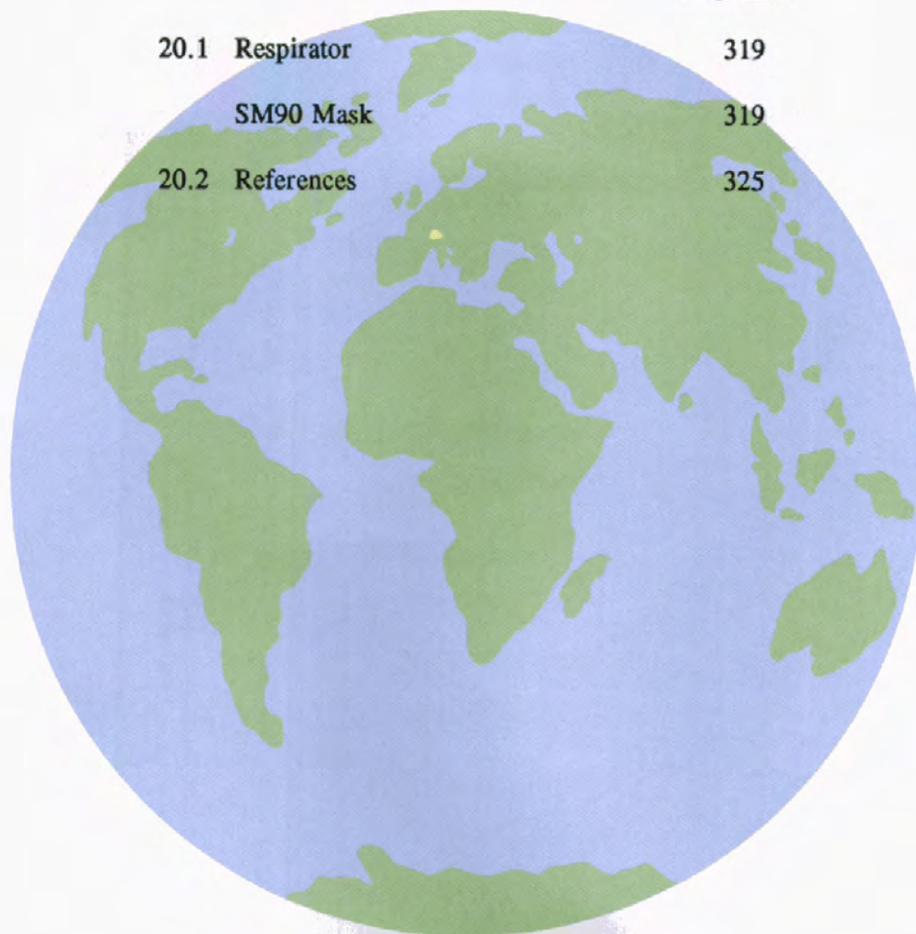
1. "Protective Mask (Type 33)." Pamphlet provided by Trelleborg AB.
2. "NBC Canisters: NBC 20, NBC 33, and NBC 37." Pamphlet provided by Flodin Filter AB.
3. "Forsheda for Protection." Brochure from Forsheda AB.
4. "NBC Mask and Canister Production." Pamphlet provided by Elsa A.S.
5. Correspondence from FOA, National Defense Research Establishment, Sweden.
6. Analysis based on photo evaluation of the mask by CBIAC personnel.
7. Data sheet obtained from the Materials Research Laboratory, P.O. Box 50, Ascot Vale, VIC. 3032, Australia.
8. "New Protective Material." Translation from Armenytt (Aryta), number 5, 1988, pages 18-19.
9. "Protective Face Mask Type 33C." Flyer from Forsheda AB.
10. "NBC Filter Technical Description." Flyer from Sundström Safety AB.
11. "NBC Respirator Type F2." Flyer from Forsheda AB.
12. Analysis based on physical evaluation of the mask by CBIAC personnel.
13. "NBC FM12 Respirator." Brochure from Avon Industrial Polymers Ltd, Protection Group, Bath Road Melksham, Wiltshire SN12 8AA, UK.



Chapter 20 – Switzerland

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20.1 RESPIRATOR



Photo courtesy of Huber and Suhner AG.

The Swiss SM90

- **Designator(s):** SM90
- **Item Name(s):** Protection Mask SM90
- **Item Description:** The Swiss SM90 was developed for the Defense Technology and Procurement Agency of the Swiss MoD. The mask features a black facepiece made of butyl and EPDM rubbers. The two eyepieces are made of either mineral glass or polycarbonate, and the left and right sides are interchangeable. Corrective lenses may be inserted between an inner and outer mounting frame and clamped in place. The internal nosecup, made of silicone, guides inhaled air over the eyepieces to prevent fogging. Located over the nose/mouth is an integral canister mount/drinking device/voicemitter assembly. Specifically, the voicemitter is located over the nose position with the drink transition tube attached to the left side of the voicemitter on the plastic mounting plate. Immediately below the voicemitter is the canister mount. The exhalation valve is located under the chin position to allow sweat to drain. The SM90 has a six-point adjustable head harness suspension with elastic straps that join at a nylon headnet. ^(1, 3)
- **Total Weight:** Not available.
- **Stock Number(s):** Not available.
- **Sizes Available:** Small, medium, and large. ⁽⁵⁾
- **Use(s):** General purpose respirator used by the Swiss Army. ⁽⁵⁾
- **Component(s):**

Canister	The canister is located over the chin position. ⁽³⁾
Canister Mount	NATO standard. The canister threads conform to DIN 3182, Rd 40 x 3.63 mm. ⁽³⁾
Drinking Device	<p>The drinking device consists of a metal transition tube fastened to the plastic mounting plate to the left of the voicemitter. Attached to the metal transition tube on the outside of the mask is a rubber drinking tube and on the inside of the mask is a rubber mouthpiece. Both rubber parts are pulled tightly over the transition tube. On the end of the drink tube is a connector that closes gastight and opens only when connected to the canteen. ⁽³⁾</p> <p>The mouthpiece also has a gastight valve that can only be opened when compressed lightly with the mouth. ⁽³⁾</p> <p>The drinking device allows the intake of liquid at a rate of over 200 ml/min. ⁽³⁾</p>
Exhalation Valve	The exhalation valve is located at the lowest point of the mask (under the chin position) to let accumulated liquid such as sweat drain out. ⁽³⁾

- Eyepiece(s)** The spherically shaped eyepieces are made of either mineral glass or polycarbonate and have the contours of an equilateral triangle with rounded corners. The lenses are interchangeable. To give a secure and absolutely tight fit in the exterior facepiece, two metal mounting frames are used and clamped together with three clamps. Corrective lenses may be inserted between the internal and external mounting frames and clamped in place. ⁽³⁾
- Facepiece** The facepiece is made of butyl and EPDM rubbers. A secure face seal is achieved because of a special lip seal design. In the center of the exterior facepiece is a plastic plate that serves as a mounting plate for the assembly consisting of voicemitter, canister mount, inhalation valve, and transition tube for the drinking device. A tight fit of the plate is guaranteed by a clamp. ⁽³⁾
- Head Harness** The head harness consists of a nylon headnet and six adjustable elastic straps to secure the mask to the wearer's head. The front and temple straps are fitted with buckles with slip-locks to prevent unwanted shifting after the initial fitting. The metal buckles are designed flat and fastened to the exterior facepiece on latches. Thus, they are easily accessible and positioned to avoid pressure spots. ⁽³⁾
- Nosecup** The inner facepiece, or nosecup, is made of silicone rubber and comfortable to wear. Air is guided effectively and evenly on both sides between the exterior and the inner facepiece, upward and across the eyepieces before reaching the nosecup and the mouth. The fine sealing lip of the nosecup prevents the exhaled air from reaching the space in front of the eyes, which could fog the eyepieces. The air volume of the nosecup is kept to a minimum. Therefore, when a person inhales, only a small amount of used air is mixed with fresh air. When exhaling, the used air exits through the exhalation valve and the front chamber. ⁽³⁾
- Voicemitter** A speech diaphragm is stretched in a housing made of plastic, which is screwed into the mounting plate of the exterior facepiece and located in front of the mouth. A specially perforated cover, located on the outer side, protects the diaphragm against dirt and mechanical damage. ⁽³⁾

● **Breathing Resistance:**

- Inhalation Resistance** Less than 8.16 mm of H₂O at a continuous airflow of 60 L/min.* ⁽³⁾
- Less than 22.43 mm of H₂O at a continuous airflow of 150 L/min.* ⁽³⁾

*Data originally reported in Pascals.

Exhalation Resistance Less than 10.19 mm of H₂O at a continuous airflow of 60 L/min.* ⁽³⁾

Less than 21.41 mm of H₂O at a continuous airflow of 150 L/min.* ⁽³⁾

- **Airflow:** Integrates with the FBB-1000 Compact Air Supply Unit (CASU), which generates positive pressure within the mask. May be used with the NBC 20 filter canister manufactured by Flodin Filter AB, Sweden, or any other NATO standard thread canister. ⁽⁴⁾
- **Communications Enhancement:** Speech diaphragm provides clear speech intelligibility with a dampening effect of 9 dB. ⁽³⁾
- **Protection Afforded:** Designed for protection against known chemical warfare agents and radioactive fallout. The respirator has been shown to be resistant against chemical warfare agents at least 25 to 30 hours and is still valid after being subjected for 30 minutes to the influence of the following chemicals:

Decontaminants

Decontaminating solution 85 (DS2).
Decontaminating powder.
Chlorine-calcium suspension at 80°C.

Disinfectants

Ethanol.
Desogen 2%.

Simulants

Perchloroethylene.
Tributylphosphate.

The time to resist warfare chemicals is measured as time of permeation of a solution consisting of a mixture of mustard and chlorine benzene (80:20) at 30°C and applied to one side of the mask. The time of permeation is reached when mustard gas permeates onto the opposite side of the material.

The respirator can be exposed for 30 minutes to gasoline, diesel fuel, and JP4 jet fuel and still allows 12 to 14 hours of protection against chemical warfare agents. ⁽³⁾

- **Manufacturer(s):**

CASU Micronel AG
 CH-8307 Tagelswangen
 Switzerland
 Tel: 041 52 327121
 Fax: 041 52 329504 ⁽⁴⁾

*Data originally reported in Pascals.

SM90
Huber and Suhner AG
Rubber Products Division
CH-8330 Pfäfflikon/ZH
Switzerland
Tel: 041 1 9522211
Fax: 041 1 9522424 ⁽²⁾

- **Compatibility:** Not available.
- **Storage Life:** With proper care and storage, * over 20 years can be expected. ⁽³⁾
- **Donning Time:** Not available.
- **Field of Vision:**

Binocular	20%. ⁽³⁾
Total	74%. ⁽³⁾
- **Accessories:**

Canteen	Integrates with the drinking device. ⁽³⁾
Corrective Lenses	Corrective lenses can be inserted into the mask in place of the standard glasses. This is possible because the glasses used are shaped in the form of a sphere with a radius of 120 mm. For corrective lenses, standard raw glass lenses are used. ⁽³⁾
Tinted Glasses	May be fastened over the eyeglasses to give protection against glaring sunlight. The mounting is done over the mounting frames of eyeglasses. ⁽³⁾
- **Decontaminability:** The respirator can be decontaminated for 30 minutes with Decontaminating Solution 85 (DS2), decontaminating power, and chlorine-calcium suspension at 80°C. Following decontamination, the mask still provides 25 to 30 hours of protection against chemical warfare agents. ⁽³⁾
- **Fogging Characteristic(s):** Fogging or icing of the eyeglasses is prevented by the positive guidance of the intake air across the glasses. Fogging does not occur from -20°C to 40°C and 70% RH. The mask remains functional at low temperatures (-20°C). ⁽³⁾
- **Deployment:** Not available.

*"Proper care and storage" not specified.

- **Miscellaneous:** The materials used ensure the proper functioning of the mask. Under normal climatic conditions in the range of -20°C to $+50^{\circ}\text{C}$, the mask will function properly and remain resistant to known warfare chemicals and radioactive fallout. ⁽³⁾

All metal parts are of weather and corrosion resistant design. The rubber compounds, the plastic material, and the polycarbonate glass are subjected to tests and test conditions with the following results: ⁽³⁾

Ozone test at 50 pphm, 72h, 30°C , and 20% stretch, according to DIN 53449.

Aging test, temperature storage 7 days at 70°C according to VSM 77053.

20.2 REFERENCES

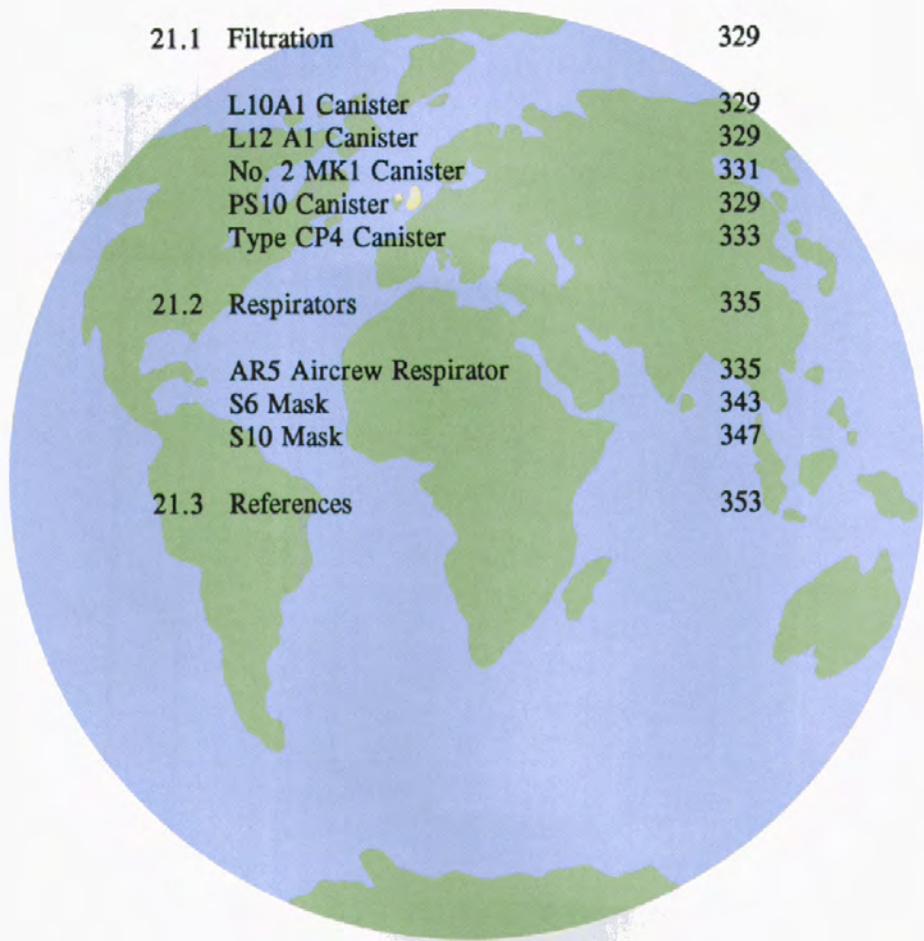
1. Analysis based on photo evaluation of the mask by CBIAC personnel.
2. "Protection Mask SM90: A Vital Part for Complete Personal Protection." Brochure provided by Huber and Suhner AG.
3. "Huber and Suhner AG Protection Mask 90: A New Development for Optimum Protection in Combat." Brochure provided by Huber and Suhner AG.
4. "Compact-Air-Supply-Unit (CASU)." Flyer from Micronel.
5. "Industry Spotlight: Huber and Suhner AG". The ASA Newsletter, number 27, December 11, 1991.



Chapter 21 – United Kingdom

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21.1 FILTRATION

- **Item Name(s):** L10A1 Canister*
L12A1 Canister**
PS10 Canister***
- **Use(s):** Used with the UK S10 mask and the UK AR5 respirator. (7, 21)
- **Physical Characteristic(s):**

Aerosol Filter	Pleated glass fiber paper. (19)
Canister	High impact, glass filled nylon, black in color. (9)
Diameter	110.5 mm. (9)
Gas Filter	ASC/TEDA Whetlerite activated charcoal. (9)
Height	73 mm. (9)
Thread	NATO standard, conforms to STANAG 4155. (11)
Thread Size	40 x 3.63 mm. (11)
Weight	275 g. (9)
- **Performance Specification(s):**

Airflow Resistance	41 mm H ₂ O at an airflow of 85 L/min. (9)
--------------------	---
- **Deployment:** Not available.
- **Manufacturer(s):** Avon Industrial Polymers Ltd.
Protection Group
Bath Road Melksham
Wiltshire SN12 8AA
United Kingdom
Tel: 044 225 706270
Fax: 044 225 700828 (9)

*Designation used by Siebe Gorman & Co Ltd.

**Designation used by Avon Industrial Polymers Ltd.

***Designation used by Protector Safety Ltd.

Protector Safety Ltd.
Pimbo Road
West Pimbo
Skelmersdale, Lancashire WN8 9RA
United Kingdom
Tel: 044 695 27171
Fax: 044 695 50573 ⁽¹⁷⁾

Siebe Gorman & Co Ltd.
Avondale Way
Cwnbran
Gwent NP44 1TS
United Kingdom
Tel: 044 663 361211
Fax: 044 663 872759 ⁽²⁵⁾

- **Stock Number(s):**

4240-99-130-7483 (NATO). ^(1, 21)

4240-99-132-0941 (NSN). ⁽⁹⁾

- **Miscellaneous:** Sealed in an airtight trilaminate foil bag containing a desiccant. ⁽⁹⁾

Although each of the three canisters are manufactured by different companies, all three are designed to meet a common specification.

- **Item Name(s):** No. 2 MK1 Canister
- **Use(s):** Used with the UK S6 mask and the UK AR5 respirator. ^(7, 8)
- **Physical Characteristic(s):**
 - Canister Aluminum, black in color. ⁽⁸⁾
 - Thread NATO standard, conforms to STANAG 4155. ⁽⁸⁾
 - Thread Size 40 x 3.63 mm. ⁽⁸⁾
 - Weight 250 g. ⁽⁸⁾
- **Performance Specification(s):** Not available.
- **Deployment:** Not available.
- **Manufacturer(s):** No longer manufactured. ⁽¹⁵⁾
- **Stock Number(s):** A2 4240-99-135-3662. ⁽⁸⁾
- **Miscellaneous:** Not available.

- **Item Name(s):** Type CP4 Canister
- **Use(s):** Intended for military use. ⁽¹³⁾
- **Physical Characteristic(s):**

Aerosol Filter	Pleated filter element consists of a glass organic fiber resinless medium that is waterproofed and co-pleated with Polypropylene net. ⁽¹³⁾
Canister	Injection-molded Noryl [®] * body. ⁽¹³⁾
Diameter	110 mm. ⁽¹³⁾
Gas Filter	Activated ASC-TEDA charcoal, 225 cm ³ . ⁽¹³⁾
Thread	NATO standard, conforms to STANAG 4155. ⁽¹³⁾
Thread Size	40 x 3.63 mm, conforms to DIN 3181 and EN 148. ⁽¹³⁾
Weight	325 g (including cap and plug). ⁽¹³⁾
- **Performance Specification(s):**

Aerosol Efficiency	Greater than 99.997% for DOP aerosol of 0.3 microns. ⁽¹³⁾
Airflow Resistance	16.5 to 17.5 mm H ₂ O at an airflow of 32 L/min. ⁽¹³⁾
Gas Life	
CK Life	Greater than 100 minutes, concentration of 4 g/m ³ . ⁽¹³⁾
DMMP Life	Greater than 350 minutes, concentration of 3 g/m ³ . ⁽¹³⁾
- **Deployment:** Not available.
- **Manufacturer(s):** Racal Health & Safety
Beresford Avenue
Wembley, Middlesex HA0 1QJ
United Kingdom
Tel: 044 81 900 8887
Fax: 044 81 902 2075 ⁽¹³⁾
- **Stock Number(s):** Not available.
- **Miscellaneous:** Not available.

*Noryl[®] is a high-impact plastic.

21.2 RESPIRATORS



Photo courtesy of Lifeguard Equipment Ltd.

The UK AR5 Aircrew Respirator with Tactical Ventilator

- **Designator(s):** AR5
- **Item Name(s):** AR5 Aircrew Respirator ⁽⁷⁾
NBC Respirator AR5 ⁽¹²⁾
AR5 NBC Respiratory System ⁽⁷⁾
- **Item Description:** The UK AR5 Aircrew Respirator was a cooperative design effort between the British Ministry of Defense Chemical Defense Establishment, Porton Down and the Royal Aircraft Establishment, Farnborough. Initial production of the AR5 began in 1978. ⁽²⁴⁾

A consortium of British companies contributed to the design effort. The consortium is headed by Cam Lock Ltd. Each of the companies is registered with the UK Ministry of Defense (MoD) List of Assessed Contractors as having quality control and inspection arrangements that satisfy MOD DEF STAN 05-21. ⁽¹²⁾

The basis for the respirator is an orinatal mask mounted on a close-fitting polycarbonate faceplate. The edges of the faceplate are bounded to a flexible bromo-butyl cowl, which is worn immediately over the head and beneath the protective helmet. Both the hood and mask are separately supplied with clean filtered air under pressure by way of a chest-mounted manifold and a pair of hoses. The respirator is matched to the supply system used in specific aircraft by means of one of several types of manifolds that proportion and meter the airflow to the faceplate and mask. Physiological requirements of aircrew operating at altitude are maintained by adding oxygen to the clean air supply of the orinatal mask. Providing a pressurized breathing supply minimizes the respiratory effort, and the positive air supply to the hood prevents the ingress of contaminants and greatly reduces thermal stress, even in hot humid conditions. Protection is maintained in the event of failure of the pressurizing system, when filtered air can be obtained by normal breathing demand. Under these conditions the transmission of suction to the faceplate is prevented by a nonreturn valve in the supply line. A nonreturn valve in the oxygen line prevents contamination when the oxygen supply is not connected. A quick disconnect in the mask supply line is provided for use in the event of ditching. The hood is equipped with a neck seal and bellows incorporated just below this to permit free head movement. ^(7, 12)

Several configurations of the AR5 are available including two oxygen variants, the Mk1 and the Mk3 respirators, and a nonoxygen variant, the Mk2 respirator. The Mk1 and Mk3 are designed for use at altitudes of 43,000 ft and 50,000 ft, respectively; the Mk2 is designed for use at 8000 ft. The Mk3 system has a two-position change-over valve permitting either filtered air to both the orinatal mask and hood (ground position) or filtered air to the hood and air/oxygen to the orinatal mask via a pressure demand regulator (flight position). It is primarily intended for fast jet use. The Mk2 system utilizes a manifold that supplies filtered air to both the orinatal mask and hood compartment. It is supplied for applications where air is only required for breathing (i.e., helicopter) or where a filtered air/oxygen mixture from a pressure demand regulator is used to supply the respirator (i.e., transport aircraft). ^(7, 24)

- **Total Weight:** 720 g. ⁽⁷⁾
- **Stock Number(s):** Not available.
- **Sizes Available:** Not available.

- **Use(s):** Used by the UK armed forces as an aircrew respirator. ⁽⁷⁾
- **Component(s):**
 - Antifogging Device** Deflects blown filtered air across the lens to ensure a clear visual area. ⁽⁶⁾
 - Antisuffocation Device** Prevents suffocation as a result of loss of air supply. ⁽⁶⁾
 - Canister** Uses the UK No. 2 Mk1 canister or the PS10 canister. ⁽⁷⁾
 - Canister Mount** NATO standard. ⁽⁷⁾
 - Drinking Device** Allows ingestion of hot and cold liquids and liquid medication. It consists of a disposable nylon drink tube that passes through the facepiece and terminates at the orinasal. ^(6, 24)
 - Emergency Disconnect** Designed as a break connector also preventing water from entering into the mask and hood compartments when ditching. This is achieved by incorporation of an automatic shut-off device. ⁽²⁴⁾
 - Facepiece**

The faceplate is made of polycarbonate, which renders it impact- and shatter-resistant as well as lightweight. A specially designed coating is used to provide an abrasive- and chemical-resistant surface. ⁽²⁴⁾

The faceplate is bonded to a flexible bromobutyl cowl, which is worn immediately over the head and beneath the protective helmet. ^(7, 12)

Included in the facepiece is a valsalva device, restraint harness, inlet ports for filtered air, antisuffocation device connector, entry tube to facilitate drinking, and microphone assembly. ⁽⁶⁾

The color of the facepiece is black. ^(6, 20)
 - Head Cowl Assembly** The hood and apron are made of impermeable rubber and cover the entire head and extend down the neck and over the shoulders. The neck seal is made of impermeable rubber and isolates the head and neck from the rest of the body. ⁽⁶⁾
 - Hood** A bromobutyl hood attached to the periphery of the faceplate envelopes the head. The hood is attached to the shoulder with a rubber neck seal forming a gas tight seal around the neck. ⁽²⁴⁾
 - Hood Inlet Adapter** Connects the hose from the manifold assembly to the hood compartment of the mask. ⁽⁶⁾

- | | |
|-----------------------------------|---|
| Intercom Unit | Provides headset-to-headset communication in addition to communication with other personnel via a built-in loudspeaker/microphone. ⁽²⁴⁾ |
| Manifold | To supply filtered air and/or oxygen to the AR5, a range of manifolds have been developed. For nonoxygen use, the Mk2 manifold allows the filtered air supply from the ventilator to pass the hood assembly for purging, protection, ventilation, and the breathing tract via the built-in orinasal mask. In cases where oxygen is required, an alternative manifold, the Mk3, is available. ^(7, 24) |
| Microphone | Compatible with all aircraft radio and intercommunication devices. ⁽⁶⁾ |
| Neckseal | Natural rubber overlaid with butyl-rubber bellows and an apron to protect the neck. ⁽⁷⁾ |
| Orinasal Mask | Molded of soft rubber to fit over the wearer's nose and mouth. It incorporates a turned-under edge to increase the efficiency of the seal around the wearer's face. The orinasal mask is mounted into the faceplate. ⁽⁶⁾ |
| Restraint Harness Assembly | Used to attach the mask to the helmet and prevent movement of the mask during aircraft maneuvers. ⁽⁶⁾ |
| Rip Facility | Provided for removal of the complete faceplate by one-handed operation in the event of an emergency such as parachute descent into water or helicopter ditching. ⁽²⁴⁾ |
| Tactical and Portable Ventilators | Designed to provide sufficient filtered air for the user's respiratory needs while maintaining positive pressure within the hood to prevent the ingress of contaminants and ensure a mist-free visor. ⁽²⁴⁾ |
| Valsalva Mechanism | A nose occluder is provided to enable the wearer to perform the valsalva maneuver in the event of a change in environmental pressure. ⁽²⁴⁾ |
| Valves | Allow proper flow of air to the hood and respiratory areas. ⁽⁶⁾ |
- **Breathing Resistance:** The airflow resistance from the ventilator through the manifold and the mask compartment is a nominal flow of 50 L/min and a peak inspiratory flow of 170 L/min while maintaining a mask compartment pressure between 38.1 and 114.3 mm of H₂O. ⁽⁶⁾

The airflow resistance from the ventilator through the manifold and the hood compartments is a nominal flow of 50 L/min; a minimum flow of 10 L/min is achieved while maintaining a hood compartment pressure between 5.08 and 10.16 mm of H₂O. ⁽⁶⁾

- **Airflow:** The ventilators supply sufficient purified air for the user's respiratory needs while maintaining a positive pressure within the hood. Ventilator options include an aircraft-mounted ventilator, portable ventilator, and tactical ventilator. ⁽¹⁾

The specifications for the aircraft-mounted ventilator are outlined below. The system incorporates both a voltage regulator and ventilator failure warning device. ^(7, 24)

Dimensions 128 x 120 x 70 mm.

Voltage 28 vdc.

Weight 780 g.

The specifications for the portable ventilator are outlined below. ⁽¹⁴⁾

Airflow 76.17 mm of H₂O at an airflow of 50 L/min.*

Battery Lithium Ref 5S/6135-99-770-2506.

Battery Life 1080 minutes (18 hours) minimum at -26°C.

Battery Storage Life 5 years.

Dimensions 268 x 145 mm.

Filters Used with the UK No. 2 Mk1 or the UK PS10 canisters.

Weight (including
battery and filter) 4,260 g.

The specifications for the tactical ventilator, designed for helicopter pilots, are outlined below. ^(12, 14)

Airflow 76.17 mm of H₂O at an airflow of 50 L/min.*

Battery Lithium/sulfur dioxide, 15 volt.

Battery Life 300 minutes minimum at 0°C.

Battery Storage Life 5 years.

Dimensions 175 x 140 x 138 mm.

*Data originally reported in Pascals.

Filters Used with the UK No. 2 Mk1 or the UK PS10 canisters.

Weight (including battery, filters, and sling) 2,600 g.

- **Communications Enhancement:** The intercom unit provides headset-to-headset communication in addition to communication with other personnel via a built-in loudspeaker/microphone. (7, 24)

The specifications for the intercom unit are outlined below. (12)

Battery 9 volt (NATO or domestic standard).

Dimensions 150 x 75 x 25 mm.

Weight (with battery) 360 g.

- **Protection Afforded:** Provides full physiological protection in the air and on the ground against nuclear fallout, and biological and chemical agents in any known form, either from entering the respiratory tract or from contacting the eyes and skin above the shoulders. Protection factor with ventilating flow on is greater than 10^4 . (24)

- **Manufacturer(s):**

AR5 Respirator Cam Lock Ltd.*
70 Hawley Lane
Farnborough, Hampshire GU14 8EN
United Kingdom
Tel: 044 252 5 46388 (7)

Intercom Unit Ultra Electronic Communications Ltd.
419 Bridport Road
Greenford
Middlesex UB6 8UA
United Kingdom
Tel: 01 578 0081 (12)

Manifold L. Adams Ltd.
22 Minerva Road
London NW10 6HS
United Kingdom
Tel: 01 965 5046 (12)

*Previously trading as Negretti & Zambra (Aviation) Limited.

Ventilators
(Aircraft Mounted) Richmond Electronics Ltd.
Hicks Road
Markyate
Hertfordshire AL3 8LQ
United Kingdom
Tel: 0582 840761 ⁽¹²⁾

Ventilators
(Portable and
Tactical) Lifeguard Equipment Limited
Life Support Division
White Waltham Aerodrome
Maidenhead, Berkshire SL6 3JG
United Kingdom
Tel: 044 62 8823361
Fax: 044 62 8823937 ⁽¹⁴⁾

- **Compatibility:** The mask is compatible with crew station hardware and electrical power systems aboard U.S. Navy and Marine Corps helicopters. It is compatible with all missions of the helicopters including the use of optical, targeting, and sighting devices. ⁽⁶⁾

The AR5 Respirator is compatible with a wide range of aircrew helmets. ⁽²⁴⁾

The microphone in the mask is compatible with aircraft radio and intercommunication devices. ⁽⁶⁾

- **Storage Life:** 5 years. ⁽⁶⁾
- **Donning Time:** Rip facility allows for one-handed removal of facepiece in the event of an emergency. ⁽⁷⁾
- **Field of Vision:** Contours allow close-fitting corrective spectacles. ⁽⁷⁾

Horizontal 160° without head rotation. ⁽⁶⁾

Vertical 90° without head rotation. ⁽⁶⁾

Built-in facilities are provided to fit corrective lenses without distortion. ⁽¹²⁾

- **Accessories:**
 - Drinking bottle/tube assembly. ⁽⁴⁾
 - Spectacle frames. ⁽⁴⁾
- **Decontaminability:** Not available.
- **Fogging Characteristic(s):** Has an antifogging device that deflects blown filtered air across the lens area to eliminate lens fogging. ⁽⁶⁾

Misting or frosting during use at low temperatures is prevented by constantly purging the optical area with a supply of clean filtered air. ⁽¹²⁾

- **Deployment:** Used by the U.S. Navy, U.S. Marine Corps, and Canadian Forces. ^(6, 7)

- **Miscellaneous:**

Military Specification MIL-M-85831 (A5). ⁽⁶⁾

Operating Temperature -26°C to 55°C. ⁽⁷⁾



Photo courtesy of CBLAC personnel.

The UK S6

- **Designator(s):** S6
- **Item Name(s):** S6 Respirator
- **Item Description:** The UK S6 features a facepiece made of black natural rubber with an inturned peripheral seal. The two curved eyelenses have optically flat glass surfaces joined by a parabola. This mask has a left-side canister mount, although some masks have been produced with right-side canister mounts to accommodate left-handed wearers. The mask has an internal nosecup. An internal air guide separates incoming and outgoing air, thereby reducing fogging of the eyepieces. The S6 incorporates a unified exhalation valve/voicemitter assembly located over the mouth area. The six-point head harness suspension with straps made of elastic webbing is adjustable. The S6 does not have a drinking capability. ^(8, 20)

This mask has been in service with the UK armed forces since the early 1960's. It is being replaced by the S10. ⁽⁸⁾

A variant of the UK S6 is the Turkish SR6. It is licensed for production in Turkey by Elsa A.S. ⁽²³⁾

- **Total Weight:**
 - Small 920 g. ^(8, 19)
 - Medium 924 g. ^(8, 19)
 - Large 929 g. ^(8, 19)

Canister 250 g. ⁽⁸⁾

Facepiece

- Small 670 g. ⁽¹⁹⁾
- Medium 674 g. ⁽¹⁹⁾
- Large 679 g. ⁽¹⁹⁾

- **Stock Number(s):** A2 4240-99-132-2129. ⁽⁸⁾
- **Sizes Available:** Small, medium, and large. ⁽⁸⁾
- **Use(s):** Used by the UK armed forces as a general purpose respirator. Currently being replaced by the UK S10. ⁽⁸⁾

- **Component(s):**

Canister Uses the No. 2 MK 1 canister. ⁽⁸⁾

Canister Mount NATO standard. ⁽²³⁾

Eyepiece(s) Glass. ⁽⁸⁾

Consists of two optically flat surfaces joined by a parabola. ⁽²³⁾

Facepiece	Natural rubber, black in color. ⁽⁸⁾ The inturred peripheral seal adapts to the contours of the wearer's face. ⁽²³⁾
Head Harness	Six-point adjustable suspension made of elastic webbing. ⁽⁸⁾
Metal Parts	Either anodized aluminum or brass that has been treated to render it corrosion resistant. ⁽²³⁾
Valve Cover	Natural rubber. ⁽⁸⁾
Valve Housing	Aluminum. ⁽⁸⁾

- **Breathing Resistance:**

Inhalation Resistance 49.18 mm of H₂O at an airflow of 85 L/min. ⁽¹⁹⁾

Exhalation Resistance 27.54 mm of H₂O at an airflow of 85 L/min. ⁽¹⁹⁾

- **Airflow:** No positive airflow available. ⁽²⁰⁾

- **Communications Enhancement:** Speech transmission is achieved by using a resined nylon diaphragm held under tension, located over the mouth area. The transmission factor is high, and it is possible to speak clearly and use a microphone while wearing the respirator. Special microphone assemblies are available that clip on to the front of the respirator. ⁽²³⁾

- **Protection Afforded:** NBC agents. ⁽⁸⁾

- **Manufacturer(s):** No longer manufactured in the UK. ⁽¹⁵⁾

Manufactured in Turkey as the SR6 by Elsa A.S.
Elektrik Sayaclari
Sanayi Ve Ticaret
A.S.
Abdülhakhamit Caddesi
06470 Mamak, Ankara
Turkey
Tel: 090 4 3680000
090 4 3687842
090 4 3687870
Fax: 090 4 3691658 ⁽²³⁾

- **Compatibility:** Compatible with internal spectacles. Accurate sighting of weapons and precise reading of instruments is achieved without special fittings. ⁽²³⁾

- **Storage Life:** Shelf life of 25 years. ⁽²³⁾

- **Donning Time:** Not available.
- **Field of Vision:** Not available.
- **Accessories:**
 - Haversack Nylon, green in color. Chest-, belt-, or shoulder-mounted and weighs 570 grams including the spare filter canister it holds. ^(8, 23)
 - Spectacle Frames ⁽⁸⁾
- **Decontaminability:** Not available.
- **Fogging Characteristic(s):** An air guide inside the facepiece separates incoming and outgoing air and prevents the eyepieces from misting. Air enters the respirator through the filter canister, passes through an inlet valve, then across the eyepieces. By directing the incoming air over the eyepieces, this system ensures that the air on both sides of the glass is at the same temperature to avoid condensation. ⁽²³⁾
- **Deployment:** The S6 is licensed for production in Turkey under the designator SR6. The SR6 has a slightly modified design. ⁽²³⁾
- **Miscellaneous:** A modified version of the S6 is produced in Turkey and issued to the Turkish armed forces including the Army, Navy, and Air Force as a general purpose respirator. ⁽²³⁾



Photo courtesy of CBDE Porton Down and UK MOD.

The UK S10

The UK S10 has a secondary speech transmitter that may be inserted into the unused canister mount.



Photo courtesy of CBLAC personnel.

- **Designator(s):** S10
L2A1
- **Item Name(s):** NBC S10 Respirator
- **Item Description:** The UK S10 was designed for the UK MoD to meet British and NATO requirements. It replaces the UK S6 mask, which has been used by the British armed forces since the early 1960s. The S10 was accepted into service by the UK MoD in 1985. ^(1, 2, 8)

Performance advantages of the S10 over the S6 include improved protection, better communication, clearer vision, increased comfort, greater compatibility, safe drinking, user maintainability, and extensive variant and growth potential due to modular design. ⁽⁵⁾

The S10 features a black facepiece made of chlorobutyl rubber with an inturred peripheral seal around the face. There are two circular eyelenses made of coated polycarbonate and recessed to be compatible with weapon sites. The mask has an internal nosecup. Located over the mouth area is an integral exhalation valve/voicemitter (horn)/drinking device assembly. The assembly cover is made of polyacetal copolymer. The mask has two NATO standard canister mounts located on the left and right sides. The unused canister mount is designed to hold the secondary voicemitter that may be inserted using bench tools. The six-point head harness is made of butyl rubber. ^(20, 21)

The S10 has two variants including the AR10, a British police respirator, and the SF10 designed for use by the special forces during antiterrorist assaults and hostage retrieval. ⁽²²⁾

- **Total Weight:** 804 g. ⁽²¹⁾
 - Canister 275 g. ⁽²¹⁾
 - Facepiece 529 g. ⁽²¹⁾
- **Stock Number(s):**
 - Facepiece 4240-99-130-7418/25. ⁽¹⁾
- **Sizes Available:** Available in four sizes. ⁽¹¹⁾
- **Use(s):** Used by the UK armed forces as a general purpose respirator. ⁽³⁾
- **Component(s):**
 - Air guide Polyisoprene. ⁽²¹⁾
 - Canister Uses the UK PS10 canister. ⁽²¹⁾
 - Canister Mount NATO standard, conforms to STANAG 4155. Mask has both left- and right-side canister mount options. ⁽¹⁾
Made of polyacetal homopolymer. ⁽¹¹⁾

- | | |
|-----------------|--|
| Drinking Device | Allows ingestion of greater than 100 ml/min of fluid. ⁽²¹⁾

Incorporates an additional safety feature of three protective valves for drinking in contaminated environments. ^(1, 2) |
| Eyepieces | Coated polycarbonate with high impact strength and scratch resistance. ⁽¹⁾ |
| Facepiece | Chlorobutyl rubber, black in color. ⁽¹¹⁾ |
| Head Harness | Six-point suspension made of butyl rubber. ⁽²¹⁾ |
- **Breathing Resistance:**

Inhalation Resistance	38.03 mm of H ₂ O at an airflow of 80 L/min.* ⁽¹⁾ 47.18 mm of H ₂ O at an airflow of 85 L/min. ⁽¹⁹⁾ 43 mm H ₂ O at an airflow of 80 L/min. ⁽²¹⁾
Exhalation Resistance	11.01 mm of H ₂ O at an airflow of 80 L/min.* ⁽¹⁾ 16.36 mm of H ₂ O at an airflow of 85 L/min. ⁽¹⁹⁾ 6 mm H ₂ O at an airflow of 80 L/min. ⁽²¹⁾
 - **Airflow:** No positive airflow available. ⁽²⁰⁾
 - **Communications Enhancement:** A primary speech transmitter incorporating a high-efficiency reflex horn located over the mouth area. ⁽²¹⁾

A secondary speech transmitter may be mounted in the unused canister mount. It is positioned to provide optimum communication performance with equipment telephone handsets. ^(2, 20)

A microphone attachment can be used for speech amplification. ⁽²⁾
 - **Protection Afforded:** All warfare gases, aerosols, and radioactive dust. ⁽¹⁾

Particulate and vapor protection exceeds NATO Triptych AC 225 (Panel VII) D/103 (1977). ⁽²¹⁾

*Data originally reported in Pascals.

- **Manufacturer(s):** Avon Industrial Polymers Ltd.
Protection Group
Bath Road Melksham
Wiltshire SN12 8AA
England
Tel: 044 2 25706270
Fax: 044 2 25700828 ⁽⁹⁾

- **Compatibility:** Compatible with a wide range of user equipment including combat clothing, protective headgear, weapons, optical sights, and communications equipment. ⁽²⁾

Secondary speech transmitter is compatible with Clansman radio equipment. ⁽²¹⁾

The recessed eyepieces and lateral canister mounts are design features that enhance compatibility with weapon systems. ⁽²¹⁾

- **Storage Life:** The minimum shelf life of the facepiece and canister (sealed) is 10 years. ⁽²¹⁾

The minimum shelf life of the valve components is 5 years. ⁽²¹⁾

- **Donning Time:** Less than 9 seconds. ⁽²¹⁾

- **Field of Vision:** Satisfies NATO visual efficiency index: ⁽²¹⁾

Binocular	15%.
Down	40%.
Lateral	70%.

- **Accessories:**

Corrective Lenses	May be clipped behind the eyepieces. ⁽²¹⁾
Haversack	Nylon. ⁽¹¹⁾
Manuals ⁽¹⁾	
NBC Hood ⁽¹⁾	
Optical Outserts ⁽¹⁾	
Spare Packs ⁽¹⁾	
Tool Kits ⁽¹⁾	
Training Videos ⁽¹⁾	

- **Decontaminability:** The overall design of the S10 has minimum crevices, so decontamination is fast and efficient. ⁽²⁾
- **Fogging Characteristic(s):** Careful airflow design provides the lenses with good antimist characteristics. ⁽²⁾
- **Deployment:** The Australian Army has selected the S10 to replace the M17 for its armed forces. ⁽¹⁰⁾

The S10 has been sold to Pakistan, Kuwait, the Saudi Arabian National Guard, and the Royal Netherlands Air Force. The U.S. uses a model known as the US10. ^(2, 3, 16, 18)

- **Miscellaneous:** Avon Industrial Polymers Ltd. is registered with the UK MoD standard 05-21 for quality assurance, equivalent to NATO AQAP-1 and the U.S. MIL-Q-985A specification. ⁽¹⁾

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5. "British Armed Forces to Receive New NBC Respirator." Defence Update International/Born in Battle, number 71, 1986, page 23.
6. U.S. Army Military Specification MIL-M-85831 (AS). Mask, Helicopter Aircrewman, Chemical, Biological, Radiological Protective, Non-oxygen. 6 November 1989.
7. Brochure on the AR5 Respirator from Cam Lock (UK) Ltd.
8. Data sheet on the S6 obtained from the Materials Research Laboratory, P.O. Box 50, Ascot Vale, VIC. 3032, Australia.
9. "NBC Filter Canister L12A1." Brochure from Avon Industrial Polymers Ltd.
10. Correspondence from Materials Research Laboratory, P.O. Box 50, Ascot Vale, VIC. 3032, Australia.
11. Data sheet on the S10 obtained from the Materials Research Laboratory, P.O. Box 50, Ascot Vale, VIC. 3032, Australia.
12. "Aircrew NBC Protection." Publication by a consortium of five companies including Cam Lock Ltd., Ultra Electronic Communications Ltd., L. Adams Ltd., Richmond Electronics Ltd., and Lifeguard Equipment Limited, registered on the UK Ministry of Defence List of Assessed Contractors.
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17. Conversation with personnel at Protector Safety Ltd.
18. Correspondence from the Ministry of Defense, The Hague, The Netherlands.
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Chapter 22 – United States

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22.1 FILTRATION

- **Item Name(s):** C2/C2A1 Canisters
- **Use(s):** Used with the U.S. M40, M42, M43, MCU-2/P, and MCU-19/P masks. ^(3, 4)
- **Physical Characteristic(s):**
 - Aerosol Filter ⁽³⁾
 - Carbon Moisture Content Average of less than 2% by weight for the C2, average of less than 3% by weight for the C2A1. ⁽⁴⁾
 - Gas Filter ASC carbon for the C2, ASZM-TEDA carbon for the C2A1. ⁽⁴⁾
 - Thread NATO standard, conforms to STANAG 4155. ⁽³⁾
 - Thread Size 40 x 3.63 mm. ⁽³⁾
 - Weight 275 g. ⁽⁴⁾
- **Performance Specification(s):**
 - Aerosol Efficiency 0.010% penetration DOP at an airflow of 32 L/min. ⁽³⁾
 - Airflow Resistance Between 10 and 17 mm H₂O at an airflow of 32 L/min. ⁽³⁾
 - Gas Life
 - CK Life 30 minutes at an airflow of 32 L/min, concentration of 4 g/m³. ⁽³⁾
 - DMMP Life 110 minutes at an airflow of 32 L/min. ⁽³⁾
59 minutes at an airflow of 50 L/min. ⁽⁴⁾
- **Deployment:** Racal Filter Technologies Ltd. manufactures the C2 canister in Canada for the Canadian Government according to Canadian specifications and for the United States Government using U.S. specifications. ^(3, 4)
- **Manufacturer(s):** Mine Safety Appliances Company (MSA)
Defense Products Department
P.O. Box 428
Pittsburgh, PA 15230
Tel: (412) 733-9270
Fax: (412) 733-8573 ⁽⁴⁾

- **Item Name(s):** M10A1 Canister
- **Use(s):** Used with the U.S. M24 and M25A1 masks. ⁽²⁾
- **Physical Characteristic(s):**

Aerosol Filter ⁽²⁸⁾

Carbon Moisture Content Average moisture content is less than 4% by weight. ⁽²⁸⁾

Gas Filter Impregnated charcoal, 330 cm³. ⁽²⁸⁾

Thread No thread, canister is clamped to hose. ⁽⁴⁾

Weight 560 g. ⁽⁴⁾

- **Performance Specification(s):**

Aerosol Efficiency Less than 0.025% penetration DOP at an airflow of 32 L/min. ⁽²⁸⁾

Airflow Resistance Less than 75 mm H₂O at an airflow of 85 L/min. ⁽²⁸⁾

Gas Life

CK Life 40 minutes at an airflow of 50 ± 1.6 L/min (intermittent flow)
concentration of 4.0 ± 0.4 g/m³, RH of 80 ± 3%, temperature of
26 ± 6°C. ⁽²⁸⁾

DMMP Life 200 minutes at an airflow of 50 ± 1.6 L/min (constant flow),
concentration of 3.0 ± 0.2 g/m³, RH of less than or equal to 15%,
temperature of 26 ± 6°C. ⁽²⁸⁾

GB Life 230 minutes at an airflow of 32 ± 1 L/min (constant flow),
concentration of 4.0 ± 0.4 g/m³, RH of less than or equal to 15%,
temperature of 26 ± 6°C. ⁽²⁸⁾

- **Deployment:** Not available.
- **Manufacturer(s):** No longer manufactured.

Formerly Mine Safety Appliances Company (MSA)
Manufactured by: Defense Products Department
P.O. Box 428
Pittsburgh, PA 15230
Tel: (412) 733-9270
Fax: (412) 733-8573 ⁽⁴⁾

- **Stock Number(s):** 4240-00-127-7186. ⁽⁴⁾

- **Miscellaneous:** This canister was developed by the U.S. Army Chemical Research, Development, and Engineering Center, Edgewood Area, Aberdeen Proving Ground, MD 21010-5423. ⁽⁴⁾

- **Item Name(s):** M11 Canister
- **Use(s):** Used with the U.S. M9 mask series. ⁽⁴⁾
- **Physical Characteristic(s):**

Aerosol Filter	Pleated paper. ⁽⁴⁾
Canister	Aluminum, formerly constructed of steel. ⁽⁴⁾
Gas Filter	250 mg ASC Whetlerite charcoal. ⁽⁴⁾
Thread	Non-NATO. ⁽⁴⁾
Weight	260 g. ⁽⁴⁾
- **Performance Specification(s):**

Aerosol Efficiency	Between 0.025 and 0.050% penetration DOP at an airflow of 32 L/min. ⁽³⁰⁾
Airflow Resistance	Between 50 and 75 mm H ₂ O at an airflow of 85 L/min. ⁽³⁰⁾
Gas Life	
CK Life	30 minutes at an airflow of 50 L/min (intermittent flow) concentration of 4.0 ± 0.5 g/m ³ , RH of 80%, temperature of 26 ± 6 °C. ⁽³⁰⁾
DMMP Life	150 minutes at an airflow of 50 L/min (constant flow), concentration of 3.0 ± 0.2 g/m ³ , RH of 15%, temperature of 26 ± 6 °C. ⁽³⁰⁾
GB Life	180 minutes at an airflow of 32 L/min (constant flow), concentration of 4.0 ± 0.4 g/m ³ , RH of 15%, temperature of 26 ± 6 °C. ⁽³⁰⁾
- **Deployment:** Not available.
- **Manufacturer(s):** No longer manufactured. ⁽⁴⁾
- **Stock Number(s):** 4240-00-112-9365 (NSN). ⁽⁴⁾
- **Miscellaneous:** This canister was developed by the U.S. Army Chemical Research, Development, and Engineering Center, Edgewood Area, Aberdeen Proving Ground, MD 21010-5423. ⁽⁴⁾

- **Item Name(s):** M13 Series Filter Element Sets
- **Use(s):** This is the "pork chop" shaped filter element set used with the M17 mask series. M13, with black connector, and M13A1 with black or gold connector, protect against riot control agents only, and the M13A2 with green connector protects against all known CB agents and riot control agents. ⁽⁴⁾
- **Physical Characteristic(s):**
 - Aerosol Filter ⁽²⁹⁾
 - Carbon Moisture Content Average moisture content is less than 0.5%. ⁽²⁹⁾
 - Gas Filter ⁽²⁹⁾
 - Weight 181.6 g. ⁽⁴⁾
- **Performance Specification(s):**
 - Airflow Resistance Between 25 and 45 mm H₂O at an airflow of 42.5 L/min. ⁽²⁹⁾
 - Gas Life
 - CK Life 7 minutes at an airflow of 25.0 ± 0.8 L/min (intermittent flow), concentration of 4 ± .2 g/m³, temperature between 39 and 50°C, RH of 80 ± 3%. ⁽²⁹⁾
 - DMMP Life 53 minutes at an airflow of 25.0 ± 0.8 L/min (continuous flow), concentration of 3 ± .2 g/m³, temperature between 41.7 ± 2.8°C, RH of less than 15%. ⁽²⁹⁾
- **Deployment:** Not available.
- **Manufacturer(s):** Mine Safety Appliances Company (MSA)
Defense Products Department
P.O. Box 428
Pittsburgh, PA 15230
Tel: (412) 733-9270
Fax: (412) 733-8573 ⁽⁴⁾
- **Stock Number(s):**
 - M13 4240-00-678-8474 with black connector (NSN). ⁽⁴⁾
 - M13A1 4240-00-934-7854 with black connector (NSN). ⁽⁴⁾
4240-00-152-1607 with gold connector (NSN). ⁽⁴⁾
 - M13A2 4240-00-156-5026 with green connector (NSN). ⁽⁴⁾

- **Miscellaneous:** This filter element set was developed by the U.S. Army Chemical Research, Development, and Engineering Center, Edgewood Area, Aberdeen Proving Ground, MD 21010-5423. ⁽⁴⁾

22.2 RESPIRATORS



The UK AR5 Aircrew Respirator is worn by U.S. Navy and U.S. Marine Corps aviators.

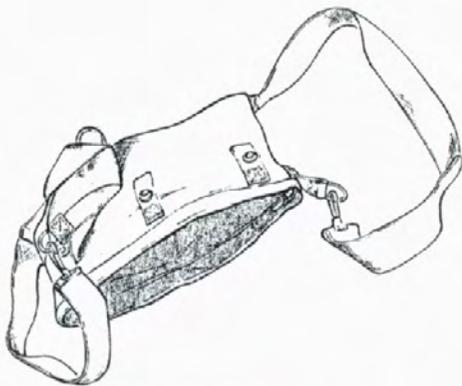
See Pages 335 through 342 for further details on the AR5.

Photo courtesy of Lifeguard Equipment Ltd.

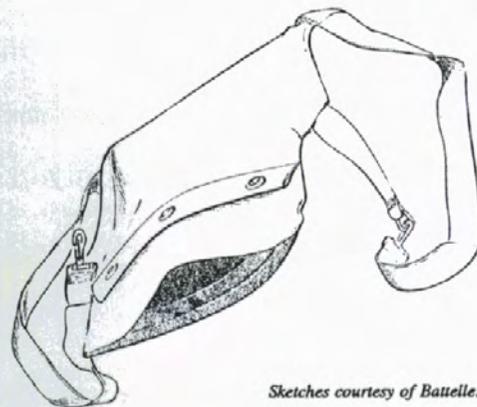


Photo courtesy of CBIAC personnel.

The U.S. M9 mask series. When equipped with the M11 carrier, this mask is designated as the M9; equipped with the C15R1 carrier, the mask is designated as the M9A1. (4)



M11 Carrier



Sketches courtesy of Battelle.

C15R1 Carrier

- **Designator(s):** M9 Mask Series
- **Item Name(s):** M9 Mask
M9A1 Mask
- **Item Description:** The U.S. M9 mask series consists of a molded rubber facepiece with a flat peripheral seal. The company initials, year of production, and size are clearly noted on the facepiece. Two triangular eyepieces made of safety glass are held in place by metal eyerings. The internal nosecup has check valves that prevent exhaled air from fogging the lenses. In addition, deflector tubes direct inhaled air across the lenses to help prevent fogging. Located over the mouth position is an exhalation valve that is covered by a mushroom-shaped disk cover. The M9 mask series is available with canister mounts on either the right or left side to accommodate left- and right-handed wearers during rifle firing. The six-point head harness has elastic straps that are sewn into a rectangular head pad. The M9 mask series has neither provisions for drinking nor communication enhancement. ⁽⁴⁾

The only difference between the M9 and M9A1 masks is their carriers: the M9 is issued with the M11 carrier while the M9A1 is issued with the C15R1 carrier. ⁽⁴⁾

- **Total Weight:** 720 g (mask with canister). ⁽⁴⁾

Canister 260 g. ⁽⁴⁾

Facepiece 460 g. ⁽⁴⁾

- **Stock Number(s):**

Antifogging Kit 6850-00-127-7193 (NSN). ⁽⁴⁾

M3 Toxicological Agents Protective Mask Hood 8415-00-261-6690 (NSN). ⁽⁴⁾

M9 with Left Cheek Canister Mounting.

Small 4240-00-368-6092 (NSN). ⁽⁴⁾

Medium 4240-00-368-6090 (NSN). ⁽⁴⁾

Large 4240-00-368-6088 (NSN). ⁽⁴⁾

M9 with Right Cheek Canister Mounting.

Small 4240-00-368-6091 (NSN). ⁽⁴⁾

Medium 4240-00-368-6089 (NSN). ⁽⁴⁾

Large 4240-00-368-6087 (NSN). ⁽⁴⁾

M9A1 with Left Cheek Canister Mounting.

Small 4240-00-368-6097 (NSN). ⁽⁴⁾

Medium 4240-00-368-6095 (NSN). ⁽⁴⁾

Large 4240-00-368-6093 (NSN). ⁽⁴⁾

M9A1 with Right Cheek Canister Mounting.

Small	4240-00-368-6098 (NSN). ⁽⁴⁾
Medium	4240-00-368-6096 (NSN). ⁽⁴⁾
Large	4240-00-368-6094 (NSN). ⁽⁴⁾

M11 Carrier 4240-00-368-6360 (NSN).⁽⁴⁾

- **Sizes Available:** Small, medium, and large.⁽⁴⁾
- **Use(s):** Formerly used by U.S. Army infantrymen as a general purpose mask, the U.S. M40 mask has replaced the M9/M9A1 for this purpose. The M9 series is still being used by the U.S. Army for special applications such as during field tests and by Explosive Ordinance Disposal (EOD) personnel and Technical Escort Units.⁽⁴⁾
- **Component(s):**
 - Canister Uses the M11 canister.⁽⁴⁾
 - Canister Mount Non-NATO, threaded type. There are two versions of the M9 mask series; left cheek canister mounting to accommodate right-handed wearers and right cheek canister mounting to accommodate left-handed wearers.⁽⁴⁾
 - Eyepiece(s) The two triangular eyepieces are made of safety glass (laminated glass or plastic) and held in place by metal eyerings.⁽⁴⁾
 - Facepiece Composed of molded natural rubber.⁽⁴⁾
 - Head Harness Consists of six elastic straps sewn to a rectangular head pad.⁽⁴⁾
 - Nosecup Composed of soft rubber, two check valves prevent moist exhaled air from fogging the lenses.⁽⁴⁾
- **Breathing Resistance:** Not available.
- **Airflow:** No positive airflow available.⁽⁴⁾
- **Communications Enhancement:** This mask does not have a voicemitter or any other form of communications enhancement.⁽⁴⁾
- **Protection Afforded:** Protects the wearer's face, eyes, and respiratory tract from field concentrations of chemical and biological agents.⁽⁴⁾
- **Manufacturer(s):** No longer manufactured.

Formerly
Manufactured by: Firestone

- **Compatibility:** Military helmets, hoods, and clothing, shoulder fired weapons, and military sighting devices. ⁽⁴⁾
- **Storage Life:** Not available.
- **Donning Time:** Less than 9 seconds. ⁽⁴⁾
- **Field of Vision:** Adequate for mission. ⁽⁴⁾
- **Accessories:**

Antifogging Kit Consists of a small metal or plastic can containing a piece of cotton flannel that has been impregnated with a compound that prevents fogging. ⁽⁴⁾

C15R1 Carrier Used with the M9A1 mask. ⁽⁴⁾

M1 Waterproof Bag Keeps the mask dry in wet environments. ⁽⁴⁾

M1 Winterizing Kit ⁽⁴⁾

M3 Toxicological Agents Protective Mask Hood Made of butyl rubber-coated fabric. ⁽⁴⁾

M11 Carrier Used with the M9 mask. It is made of water-repellant olive drab cotton duck. ⁽⁴⁾

Spectacles Prescription spectacles are designed for insertion inside the eyering of the mask. ⁽⁴⁾

- **Decontaminability:** Meets AR 70-71 requirements. ⁽⁴⁾
- **Fogging Characteristic(s):** Two mechanisms help prevent the eyepieces from fogging: deflector tubes direct inhaled air over the eyepieces and check valves on the nosecup prevent exhaled air from fogging the lenses. ⁽⁴⁾

In addition, the M9 series is issued with an Antifogging Kit. ⁽⁴⁾

- **Deployment:** Variations of the U.S. M9 series have been adopted by several countries. Variants include the KM9A1 manufactured in South Korea by Daewoo Corporation, the M51 manufactured in Sweden by both Trelleborg AB and Forsheda AB and the Finnish M76 manufactured by Kemira Oy.
- **Miscellaneous:** The M9 mask series was developed by the U.S. Army Chemical Research, Development, and Engineering Center, Edgewood Area, Aberdeen Proving Ground, MD 21010-5423. ⁽⁴⁾

The U.S. M17A2 has two internal "pork pork" filters on the right and left cheeks.



Photos courtesy of CBIAC personnel.

The hood on the M17 series protects the facepiece.

- **Designator(s):** M17 Mask Series
- **Item Name(s):** M17 Mask
M17A1 Mask
M17A2 Mask
- **Item Description:** The U.S. M17 mask series features a facepiece composed of an elastomeric material, two eyepieces, an internal nosecup with two check valves, and an integral exhalation valve/voicemitter assembly located over the mouth region. The company initials and year of production are clearly noted on the facepiece. The six-point adjustable head harness suspension is also made of an elastic webbing material. The straps of the harness join in the back of the head to a woven, rectangular-shaped head patch. This mask series is uniquely designed to be worn with two M13A2 "pork chop" filter elements held inside the two cheek pouches. All masks in the M17 series are designed to be worn with M6A2 hood. ^(4, 14)

The various models in the M17 series include the M17, M17A1, and M17A2. The M17 is the earliest member of this mask family and does not have a drink system or resuscitation device. All three models accommodate optical inserts for personnel requiring prescription lenses. However, the M17 is used with wireframe optical inserts whereas both the M17A1 and M17A2 have molded-in mounting blocks for optical inserts thus accommodating prong-type optical inserts. The M17A1 has both a drink system and resuscitation device while the M17A2 has only the drink system. Also, the M17A2 comes in an additional size, extra-small. ⁽⁴⁾

- **Total Weight:** 1,410 g (mask with carrier). ⁽⁴⁾
 - Facepiece 618.4 g. ⁽⁴⁾
 - Filter Element Set 181.6 g. ⁽⁴⁾
- **Stock Number(s):**
 - M1 Waterproofing Bag 4240-00-377-9401 (NSN). ⁽²⁾
 - M6A2 Hood 4240-00-999-0420 (NSN). ⁽²⁾
 - M13A2 Filter Element Set 4240-00-165-5026 (NSN). ⁽²⁾
 - M15A1 Carrier 4240-00-933-2533 (NSN). ⁽²⁾
 - M17
 - Small 4240-00-542-4450 (NSN). ⁽⁴⁾
 - Medium 4240-00-542-4451 (NSN). ⁽⁴⁾
 - Large 4240-00-542-4452 (NSN). ⁽⁴⁾

M17A1		
Small	4240-00-926-4199 (NSN).	(4)
Medium	4240-00-926-4201 (NSN).	(4)
Large	4240-00-926-4200 (NSN).	(4)

M17A2		
X-small	4240-01-143-2017 (NSN).	(4)
Small	4240-01-143-2018 (NSN).	(4)
Medium	4240-01-143-2019 (NSN).	(4)
Large	4240-01-143-2020 (NSN).	(4)

- **Sizes Available:** Small, medium, and large for the M17. Extra-small, small, medium, and large for the M17A2. (4)

- **Use(s):** Used as a general purpose mask by infantrymen in all branches of the U.S. armed forces. (4)

- **Component(s):**

Canister Uses the M13A2 Filter Element Set (2 filters per set) internally mounted within cheek pouches. Each M13A2 filter element is "pork chop" shaped and has filter materials consisting of an activated charcoal gas filter paper and a particulate filter laminated together. (4)

Drink System Available on the M17A1 and M17A2 versions. The drink assembly allows for the ingestion of one quart of fluid in less than 11 minutes. The drink system couples with the M1 canteen cap. (4)

Head Harness Forehead straps, temple straps, and cheek straps come together at a head pad.

- **Breathing Resistance:**

Inhalation Resistance Less than 55 mm H₂O at an airflow of 85 L/min (continuous flow). (18)

Exhalation Resistance Less than 23 mm of H₂O at an airflow of 85 L/min (continuous flow). (18)

- **Airflow:** No positive airflow available. (14)

- **Communications Enhancement:** Single voicemitter. (4)

- **Protection Afforded:** Protects the face, eyes, and respiratory tract from field concentrations of CB agents. (18, 19)

- **Manufacturer(s):** No longer manufactured.

Formerly Mine Safety Appliances Company (MSA)
Manufactured by: Defense Products Department
 P.O. Box 428
 Pittsburgh, PA 15230
 Tel: (412) 733-9270
 Fax: (412) 733-8573 ⁽⁴⁾

- **Compatibility:** Compatible with shoulder-fired weapons, night vision devices, and military sighting devices. ⁽⁴⁾

- **Storage Life:** Storage life as not been determined. ⁽⁴⁾

- **Donning Time:** Less than 9 seconds for the mask with an additional 6 seconds to complete donning/adjustment of the hood. ⁽⁴⁾

- **Field of Vision:** Adequate for mission. ⁽⁴⁾

- **Accessories:**
 - M1 Waterproof Bag Keeps the mask dry in wet environments. ⁽¹⁶⁾

 - M4 Winterization Kit Used in temperatures of -7°C or below. ⁽⁴⁾

 - M6A2 Hood Worn over the M17/M17A1/M17A2, it serves to protect the wearer's head and neck from CB agent vapors and droplets. The hood, weighing 230 grams, is made of butyl rubber-coated nylon cloth and has openings to accommodate the eyerings, canister mounts, and exhalation valve/voicemitter assembly. ⁽¹⁷⁾

 - M15A1 Carrier Made of mildew-resistant, water-repellent cotton or nylon duck and worn on either the left shoulder or left leg. ⁽¹⁶⁾

 - Optical Inserts Available for personnel requiring prescription lenses. ⁽⁴⁾

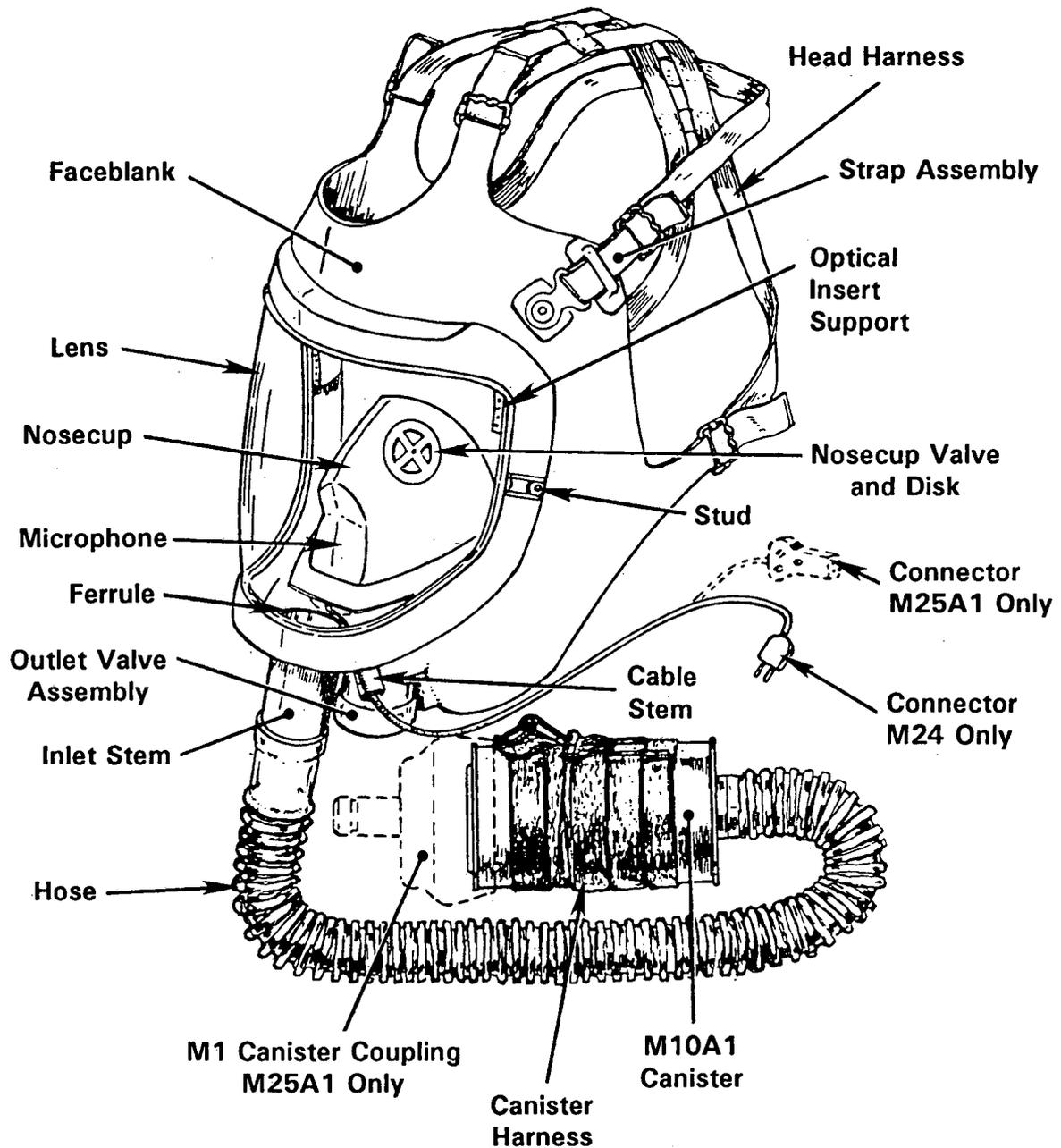
 - Outserts Plastic eyelens outserts are surrounded by a soft rubber ring that fits over the mask's eyering. The outserts prevent lenses from scratching. The lens outserts also serve to reduce fogging during cold temperatures by acting as a storm window. ⁽¹⁶⁾

- **Decontaminability:** Meets AR 70-71 requirements. ⁽⁴⁾

- **Fogging Characteristic(s):** Check valves on the nosecup prevent exhaled air from fogging the lenses. ⁽¹⁴⁾

- **Deployment:** Not available.

- **Miscellaneous:** The M17 mask series is currently being replaced by the U.S. M40. The M17 mask series was developed by U.S. Army Chemical Research, Development, and Engineering Center, Edgewood Area, Aberdeen Proving Ground, MD, 21010-5423.⁽⁴⁾



Sketch courtesy of U.S. Army, CRDEC.

The U.S. M24 and M25A1

- **Designator(s):** M24/M25A1 Mask Series
- **Item Name(s):** M24 Mask
M25A1 Mask
- **Item Description:** The U.S. M24/M25A1 mask series consists of a elastomeric facepiece with a large one-piece integral lens. The eyepiece is cemented in place. The company initials and year of production are clearly noted on the facepiece. The internal nose cup has two check valves that prevent exhaled air from fogging the lenses. The inhalation valve is located at the chin position with the exhalation valve immediately behind it. The inlet valve connects to the M10A1 canister via a two-foot corrugated hose. The M24/M25A1 mask series does not have a drinking capability or voicemitter. This mask has a six-point adjustable head harness suspension. ^(2, 4, 14, 22)

Two variants in this mask series are the M24 aircrew mask and the M25A1 tankers mask. The two masks are identical with the exception of the following features. The M25A1 uses the M1 canister coupling to interface between vehicle collective protection systems and the M10A1 canister. In addition, it uses the M116 dynamic microphone and specific connector which interfaces with Combat Vehicle Crew (CVC) helmets. The M24 mask employs a canister coupling that attaches to the M8 Aircraft-Mask Adapter when the mask is used in aircraft at altitudes that require oxygen. It is used with the M133 microphone and a specific microphone connector that interfaces with Special Purpose Helmet 4 (SPH4). In addition to the features described above, the differences in accessories used with the two masks are described below. ^(2, 4, 20, 21)

	<u>M24</u>	<u>M25A1</u>
Hood	M7	M5
Carrier	M17	M13A1
Canister Coupling	None	M1
Carrying Sling	None	Yes
● Total Weight:	2,830 g (mask with carrier). ⁽⁴⁾	
Canister	560 g. ⁽⁴⁾	
Facepiece	600 g. ⁽⁴⁾	
● Stock Number(s):		
Facepiece		
Small	4240-00-994-8751 (NSN). ⁽²⁰⁾	
Medium	4240-00-994-8750 (NSN). ⁽²⁰⁾	
Large	4240-00-994-8752 (NSN). ⁽²⁰⁾	

M5 Hood	4240-00-860-8987 (NSN). ⁽²⁾
M7 Hood	4240-00-021-8695 (NSN). ⁽²⁾
M10A1 Canister	4240-00-127-7186 (NSN). ⁽²⁾
M13A1 Carrier	4240-00-910-3657 (NSN). ⁽²⁾
M17 Mask Carrier	4240-00-476-2541 (NSN). ⁽²⁾
Canister Coupling	4240-00-300-6457 (NSN). ⁽²⁾
Carrying Sling	4240-00-831-2184 (NSN). ⁽²⁾

- **Sizes Available:** Small, medium, and large. ⁽²⁰⁾
- **Use(s):** The M24 is used by aircrews; the M25A1 is used by tank crews. ^(20, 22)
- **Component(s):**
 - Canister Uses the M10A1 canister, which conforms to MIL-C-13864. ⁽²⁾
 - Facepiece Composed of black, molded rubber with two supports for optical inserts molded into the inside of the faceblank. ⁽⁴⁾
 - Head Harness Six elastic straps sewn to a rectangular head pad. ⁽⁴⁾
 - Nosecup Molded of soft rubber with a molded pocket designed to hold a microphone. The nosecup is buttoned to the facepiece at the cheek position. ⁽⁴⁾
- **Breathing Resistance:** Exhalation resistance is less than 25 mm of H₂O at an airflow of 85 L/min. ⁽²¹⁾
- **Airflow:** The M25A1 integrates with vehicle collective protection systems via the M1 canister coupling. ⁽²⁰⁾
- **Communications Enhancement:** The M24 uses the M133 dynamic microphone while the M25A1 uses the M116 dynamic microphone. ⁽⁴⁾
- **Protection Afforded:** Protects the eyes, face, and respiratory tract against field concentrations of CB and riot control agents. ⁽²⁰⁾

- **Manufacturer(s):** No longer manufactured. ⁽¹⁷⁾

Formerly
Manufactured by

Gentex
Western Operations
2824 Metropolitan Place
Pomona, CA 91767
Tel: (714) 596-6512 ⁽²⁰⁾

Mine Safety Appliances Company (MSA)
Defense Products Department
P.O. Box 428
Pittsburgh, PA 15230
Tel: (412) 733-9270
Fax: (412) 733-8573 ⁽⁴⁾

- **Compatibility:** The M24 and M25A1 are compatible with aircraft and combat vehicle sighting systems, respectively. ⁽⁴⁾
- **Storage Life:** Storage life has not been determined. ⁽⁴⁾
- **Donning Time:** Less than 9 seconds. ⁽⁴⁾
- **Field of Vision:** Adequate for mission. ⁽⁴⁾
- **Accessories:**

Carrying Sling Used with the M25A1 mask. ⁽²⁾

M1 Canister Coupling Integrates with the M10A1 canister. The coupling serves as an interface between the canister and vehicle collective protection systems when used with the M25A1 mask. The M1 coupling used with the M24 mask serves as an interface between the canister and the M8 Aircraft-Mask Adapter that is connected to the aircraft oxygen system. ⁽⁴⁾

M2 Antiglare Eyelens. ⁽⁴⁾

M3 Winterization Kit. ⁽⁴⁾

M5 Mask Hood Worn with the M25A1. ⁽²⁾

M7 Hood Worn with the M24. ⁽²⁾

M8 Aircraft CB Mask
Oxygen Supply Adapter Connects the M24 mask to aircraft oxygen supply systems. ⁽⁴⁾

M13A1 Carrier Used with the M25A1. ⁽²⁾

M17 Mask Carrier Used with the M24, composed of butyl rubber coated nylon cloth. ⁽⁴⁾

Optical Inserts Available for personnel requiring prescription lenses. ⁽⁴⁾

- **Decontaminability:** Meets AR 70-71 requirements. ⁽⁴⁾
- **Fogging Characteristic(s):** Check valves are located on the nosecup to prevent exhaled air from fogging the lens. Additionally, an antifogging kit included with the mask may be used to reduce surface tension on the lens and keep moisture from forming on the lens. ⁽²⁰⁾
- **Deployment:** Not available.
- **Miscellaneous:** The M24 mask is currently being replaced by the M43A1, and the M25A1 mask is being replaced by the M42. They were developed by U.S. Army Chemical Research, Development, and Engineering Center, Edgewood Area, Aberdeen Proving Ground, MD, 21010-5427. ⁽⁴⁾



Photo courtesy of ILC Dover Inc.

The U.S. M40 is an infantrymen's mask and is currently replacing M9 and M17 mask series.

The U.S. M42 is used by tank crews and is replacing the M25.



Photo courtesy of CBIAC personnel.

- **Designator(s):** M40 Mask Series
- **Item Name(s):** M40 Mask
M42 Mask
- **Item Description:** The U.S. M40 mask features a facepiece composed of molded silicone rubber that fits tightly against the face and has an internal peripheral seal. The company initials and year of production are clearly noted on the facepiece. The two eyepieces are made of CR39 and are held in place by metal eyerings. Below the eyepieces and over the mouth region is the front primary voicemitter. A secondary voicemitter fits into the unused canister mount. The M40 has both right- and left-side canister mounts to accommodate both left- and right-handed wearers. The internal noseclip, also made of silicone rubber, has two check valves to prevent exhaled air from fogging the lenses. This mask has a six-point adjustable head harness. It is worn with a hood composed of butyl-coated nylon and EPDM rubber for use in a chemically contaminated environment. ^(4, 9, 12, 14)

The variants in the M40 series include the M40, which is designed for use by infantrymen and civilian surety workers, and the M42, which is worn in combat vehicles. In the M40, the canister is attached directly to the mask, whereas the M42 mask is attached to the canister via a corrugated hose, and the canister is housed in a specially designed canister carrier. The M42 also has the M116 dynamic microphone that integrates with combat vehicles via a microphone cable, the same microphone used in the M25A1 mask. ^(4, 12, 13)

The M40 series was designed to replace the currently used M9A1, M17A2, and M25A1. Specifically, the M40 is replacing the M9 and M17 series, the M42 is replacing the M25, and the M40 special purpose mode is replacing the M9. ⁽⁴⁾

Production contracts were awarded to both ILC Dover, Inc. and Mine Safety Appliances Company and are currently underway. ⁽¹²⁾

Several preplanned product improvements will be incorporated into the M40 series design including improved vision correction, ballistic and laser eye protection, a quick-doff hood/second skin, interchangeable microphone system, voice amplification unit, and canister interoperability system. ^(4, 15)

- **Total Weight:** 785 g (M40 facepiece and canister). ⁽⁴⁾
1,025 g (M42 facepiece and canister). ⁽⁴⁾

Canister 275 g. ⁽⁴⁾

Facepiece 510 g (M40 mask). ⁽⁴⁾
750 g (M42 mask). ⁽⁴⁾

- **Stock Number(s):**

M40

Small	4240-01-258-0061. ⁽⁴⁾
Medium	4240-01-258-0062. ⁽⁴⁾
Large	4240-01-258-0063. ⁽⁴⁾

M42

Small	4240-01-258-0064. ⁽⁴⁾
Medium	4240-01-258-0065. ⁽⁴⁾
Large	4240-01-258-0066. ⁽⁴⁾

- **Sizes Available:** Small, medium, and large. ^(9, 10)
- **Use(s):** The M40 is used by the infantry and civilian surety workers and the M42 is used by combat vehicle crews. Both masks are used by the U.S. Army and Marine Corps. Also used in a special purpose mode by EOD. ^(4, 12)

- **Component(s):**

Canister	Uses the C2 canister or any other NATO standard thread canister. The canister may be worn on either the left- or right-side canister mount. ⁽⁹⁾
Canister Mount	NATO standard. ⁽⁹⁾
Drinking Device	Compatible with U.S. drink systems. ⁽⁹⁾ Consists of internal and external drink tubes, external tube has quick-disconnect coupling which connects with the M1 canteen cap. ⁽⁴⁾
Exhalation Valve	Releases exhaled air while preventing unfiltered air from entering the mask. ⁽⁴⁾
Eyepiece(s)	CR39 material. ⁽⁹⁾
Facepiece	Composed of silicone rubber with an internal peripheral seal. ^(9, 12)
Head Harness	Six-point adjustable harness with elastic straps located at the forehead, temples, and cheeks which come together at a rectangular head pad. ⁽⁴⁾
Inhalation Valve	Allows filtered air to enter the mask and prevents moist exhaled air from entering the canister. ⁽⁴⁾
Nosecup	Composed of silicone rubber, with two nosecup check valves. ⁽⁹⁾

- **Breathing Resistance:**

Inhalation Resistance	Less than 55 mm of H ₂ O at an airflow of 85 L/min (for M40). ^(10, 11) Less than 65 mm of H ₂ O at an airflow of 85 L/min (for M42). ⁽¹³⁾
Exhalation Resistance	Less than 26 mm of H ₂ O at an airflow of 85 L/min. ^(10, 11)

- **Airflow:** The M42 integrates with combat vehicle collective protection systems. ⁽⁴⁾
- **Communications Enhancement:** Voicemitters are located on the front and side of the mask, the M42 also has a M116 dynamic microphone which interfaces with combat vehicle communication systems via the microphone cable. ⁽⁴⁾
- **Protection Afforded:** Provides protection of the eyes and respiratory system against chemical and biological agents. It is not intended to provide protection against carbon monoxide or ammonia. ^(10, 11, 13)

Duration of protection is greater than 330,000 mg-min/m³ for nerve agents and mustard. ⁽⁴⁾

- **Manufacturer(s):**
 - ILC Dover Inc.
P.O. Box 266
Harrington Road
Frederica, DE 19946
Tel: (302) 335-3911
Fax: (302) 335-0762 ⁽¹²⁾
 - Mine Safety Appliances Company
Defense Products Department
P.O. Box 428
Pittsburgh, PA 15230
Tel: (412) 733-9270
Fax: (412) 733-8573 ^(4, 12)

- **Compatibility:** Compatible with shoulder-fired weapons and military sighting devices. ⁽⁴⁾
- **Storage Life:** Storage life has not been determined. ⁽⁴⁾
- **Donning Time:** Less than 9 seconds. ⁽⁴⁾
- **Field of Vision:** Adequate for mission. ⁽⁴⁾
- **Accessories:**

Carrier Made of mildew-resistant, water-repellent, polyethylene coated nylon. ⁽⁴⁾

Hood Made of butyl-coated nylon and EPDM rubber protects head and neck against CB agents. ⁽⁴⁾

Hose and
Canister Carrier Available only with the M42 mask. ⁽⁴⁾

M1 Waterproofing Bag ⁽⁴⁾

Optical Inserts Available for personnel requiring prescription lenses. ⁽⁴⁾

Outserts

Two sets of outserts are provided, clear plastic and neutral gray. Outserts minimize fogging during cold weather and protect primary lens from scratches. The gray outserts reduce sunglare. Laser and ballistic outserts are also available as part of the Preplanned Product Improvement program. ⁽⁴⁾

- **Decontaminability:** Meets AR 70-71 requirements. M258A1 Skin Decon Kit is stored in the carrier. The M258A1 is being replaced with M291 and will not be stored in the carrier. ⁽⁴⁾
- **Fogging Characteristic(s):** Check valves on the nose cup prevent exhaled air from fogging the lenses. Air deflector directs inhaled air over the lenses to help prevent fogging. ^(4, 9)
- **Deployment:** Not available.
- **Miscellaneous:** As of March, 1992 the price of the M40 mask was less than \$150 and the price of the M42 mask was less than \$250. ⁽⁴⁾

The mask was developed by U.S. Army Chemical Research, Development, and Engineering Center, Edgewood Area, Aberdeen Proving Ground, MD, 21010-5423. ⁽⁴⁾



Photo courtesy of CRDEC.

The U.S. M43A1 with accessories

- **Designator(s):** M43 Mask Series
- **Item Name(s):** M43 Mask (Type I)
M43 Mask (Type II)
M43A1 Mask (Type I)
M43A1 Mask (Type II)
- **Item Description:** The U.S. M43 mask features a form-fitting bromobutyl/natural rubber facepiece with an integral butyl hood that is single skirted. The M43 has two models, designated as Type I and Type II. The two models are identical with the following exceptions: the Type I model has a notch in the right eyepiece that accommodates a special sighting device used by Apache helicopter pilots and uses the M171/AIC microphone for communication while the Type II has two spherical lenses and uses the M133/U dynamic microphone. Type II is issued to all U.S. Army aircrew personnel exclusive of Apache helicopter pilots. Both microphones interface with helicopter communication systems. The M43 mask series has a voicemitter located over the mouth area. Located on the left cheek is a hose assembly which attaches to two C2 canisters via a corrugated hose. The two C2 canisters are attached to the 4 CFM motor blower unit. The blower may be powered using aircraft electrical power or a battery. The M43 mask series has a drink capability consisting of an internal drink tube, external drink tube, and quick disconnect coupling. The drink system couples with the M1 canteen cap. The M43 mask series has the company initials and year of production clearly noted on the facepiece. ⁽⁴⁾

The M43A1 is the most recent of the M43 series. As with the M43, there are two models designated as Type I and Type II. The Type I designation for both the M43 and M43A1 mask has a notched right lens for compatibility with the Apache Helicopter Helmet Sighting Systems. The Type II designation for both masks has spherical lenses. However, the M43A1 models also have upgraded features. First, the M43A1 accommodates vision correction outserts for personnel requiring prescription lenses. The M43A1 hood is "double skirted" to provide additional protection. There is an auxiliary motor blower that is used in the event of an aircraft power failure, motor blower failure, or emergency egress. In addition, the primary motor blower has been redesigned to use standard U.S. Army inventory batteries. ⁽⁴⁾

- **Total Weight:** 1,560 g (facepiece and two canisters). ⁽⁴⁾
Canister 275 g. ⁽⁴⁾
Facepiece 1,010 g (for both the M43 and M43A1 masks). ⁽⁴⁾
M43 Blower with Battery 3,000 g. ⁽⁴⁾
M43 Carrier and Winterization Kit 1,040 g. ⁽⁴⁾

- **Stock Number(s):**

M43 (Type I)

Small	4240-01-208-6966 (NSN). ⁽⁴⁾
Medium	4240-01-208-6967 (NSN). ⁽⁴⁾
Large	4240-01-208-6968 (NSN). ⁽⁴⁾
X-large	4240-01-208-6969 (NSN). ⁽⁴⁾

M43 (Type II)

Small	4240-01-265-2677 (NSN). ⁽⁴⁾
Medium	4240-01-265-2679 (NSN). ⁽⁴⁾
Large	4240-01-265-2678 (NSN). ⁽⁴⁾
X-large	4240-01-265-2680 (NSN). ⁽⁴⁾

M43A1 (Type I)

Small	4240-01-319-5365 (NSN). ⁽⁴⁾
Medium	4240-01-320-8949 (NSN). ⁽⁴⁾
Large	4240-01-319-5364 (NSN). ⁽⁴⁾
X-large	4240-01-320-5366 (NSN). ⁽⁴⁾

M43A1 (Type II)

Small	4240-01-319-5367 (NSN). ⁽⁴⁾
Medium	4240-01-319-5368 (NSN). ⁽⁴⁾
Large	4240-01-319-5369 (NSN). ⁽⁴⁾
X-large	4240-01-319-5370 (NSN). ⁽⁴⁾

- **Sizes Available:** Small, medium, large, and extra-large.⁽⁵⁾
- **Use(s):** Used by aircrew personnel of the U.S. Army.⁽⁴⁾

Both the M43 (Type I) and M43A1 (Type I) are designed for use by AH-64 Apache helicopter crewmen.⁽⁴⁾

- **Component(s):**

Canister Uses two U.S. C2 canisters.⁽⁵⁾

Canister Mount NATO standard.⁽⁴⁾

- **Breathing Resistance:**

Inhalation Resistance Less than 55 mm H₂O at an airflow of 85 L/min.⁽⁴⁾

Exhalation Resistance Less than 32 mm H₂O at an airflow of 85 L/min.⁽⁴⁾

- **Airflow:** The M43 and M43A1 use a 4 CFM motor blower unit, the M43A1 has a secondary auxiliary blower as well. ⁽⁴⁾
- **Communications Enhancement:** The M43 series employs both the M171/AIC electronic microphone and M133/U dynamic microphone for Types I and II, respectively. ⁽⁴⁾
- **Protection Afforded:** Provides protection of the eyes, face, and respiratory tract against CB agents. Not intended for use against carbon monoxide or ammonia or in a low-oxygen environment. ⁽⁵⁾
- **Manufacturer(s):**
 - Mine Safety Appliances Company (MSA)
 - Defense Products Department
 - P.O. Box 428
 - Pittsburgh, PA 15230
 - Tel: (412) 733-9270
 - Fax: (412) 733-8573 ⁽⁴⁾
- **Formerly Manufactured by:**
 - ILC Dover Inc.
 - P.O. Box 266
 - Harrington Road
 - Frederica, DE 19946
 - Tel: (302) 335-3911
 - Fax: (302) 335-0762 ⁽²⁷⁾
- **Compatibility:** Compatible with the Integrated Helmet and Display Sighting System (IHADSS) and night vision devices. ⁽⁴⁾
- **Storage Life:** Storage life has not been determined. ⁽⁴⁾
- **Donning Time:** Less than 9 seconds. ⁽⁴⁾
- **Field of Vision:** Adequate for mission. ⁽⁴⁾
- **Accessories:**
 - Auxiliary Blower Assembly M43A1 only. ⁽⁴⁾
 - Auxiliary Blower Carrier M43A1 only. ⁽⁴⁾
 - Blower Assembly M43 and M43A1. ⁽⁴⁾
 - Eyelens Cushions M43 and M43A1. ⁽⁴⁾
 - Facepiece Carrier M43 and M43A1. ⁽⁴⁾
 - Harness Assembly M43 and M43A1. ⁽⁴⁾

Mask Carrier	M43 and M43A1. ⁽⁴⁾
Nuclear Hood	M43A1 only. ⁽⁴⁾
Vision Correction Outserts	M43A1 only. ⁽⁴⁾
Winterization Kit	M43 and M43A1. ⁽⁴⁾

- **Decontaminability:** Meets AR 70-71 requirements. M258A1 Skin Decon Kit is stored in the carrier. The M258A1 is being replaced with the M291 and will not be stored in the carrier. ⁽⁴⁾
- **Fogging Characteristic(s):** -13.9°C to 69.4°C antifog/defog capability. Blower prevents lenses from fogging. ⁽⁴⁾
- **Deployment:** Not available.
- **Miscellaneous:** Developed by U.S. Army Chemical Research, Development, and Engineering Center, Edgewood Area, Aberdeen Proving Ground, MD, 21010-5423. ⁽⁴⁾

The U.S.
MBU-19/P



Photo courtesy of ILC Dover Inc.

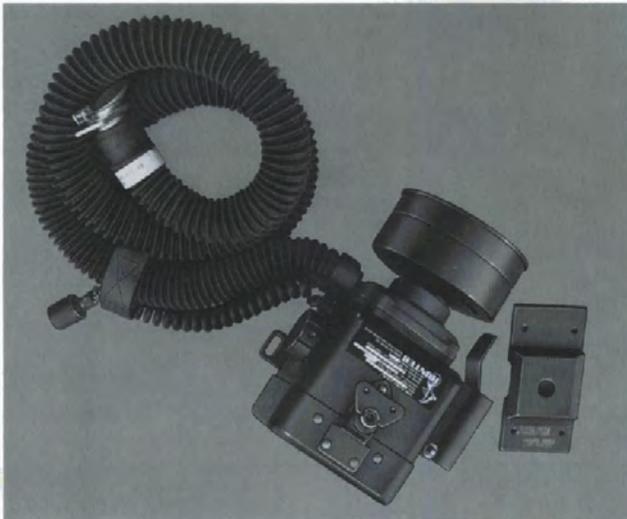


Photo courtesy of Hunter Manufacturing Company.

This Hunter-manufactured blower, designated as CQU-7/P, is designed for use with the U.S. MBU-19/P.

- **Designator(s):** MBU-19/P
- **Item Name(s):** MBU-19/P Mask
Protective Integrated Hood/Mask (PIHM)
Aircrew Eye Respiratory Protection (AERP)
- **Item Description:** This mask-hood assembly features several subsystems designed to protect aircrew from toxic chemical exposure. The subsystems include the mask-hood subsystem, breathing subsystem, blower subsystem, and communication subsystem. ⁽²³⁾

The basic equipment incorporates a hood assembly that integrates an MBU-12/P pressure-demand O₂ mask, hood, a chemical-biological filter and pigtail adapter hose assembly, blower assembly, and a ground intercommunication unit (IU). The hood assembly is worn with the HGU-55P air crew helmet using standard offset bayonet connectors. The shoulder cowl of the hood assembly is worn under the flight suit and over the standard chemical defense inner coverall. ⁽²³⁾

The AERP mask-hood subsystem has a hood composed of a bromobutyl coated fabric that incorporates a standard MBU-19/P O₂ mask, clear plastic lens, neckdam, drinking facility, and communication connections. The integrated hood and mask can be worn under a standard HGU-55P helmet. ⁽²³⁾

The MBU-19/P breathing subsystem consists of a delivery hose that is chemical resistant, a CB canister, in-line filter, and manifold assembly including an emergency O₂ filter. The breathing system will operate during O₂ or non-O₂ operations. The O₂ operations pass regulated aircraft breathing gas through the CB canister for breathing, and filtered ambient air from the blower is directed to the hood for ventilation and lens defogging. This provides a positive pressure condition in the hood that is vented through the exhaust valve at the rear of the hood. During non-O₂ operations, the blower provides breathing air and demisting capabilities by passing ambient air through the CB canister. Connections to the normal aircraft O₂ system and blower are provided by quick-disconnect fittings. The manifold assembly provides a connection for the CB canister and has an internal in-line filter assembly, emergency O₂ filter, and bayonet connector. Additionally, the manifold provides for a bracket to attach it to a parachute harness, and another bracket for attaching support straps when the parachute harness is not worn. ⁽²³⁾

The blower system, otherwise noted as the CQU-7/P P/N 560-14000, incorporates a variable-speed motor, battery, external power supply cable, housing assembly, control switch, chemical-biological canister, and a means of securing the blower while the crew member is mobile. The blower supplies filtered air to the crew member for breathing and/or lens demist. ⁽²³⁾

The communication system consists of the intercommunication unit (MXU-835/P) P/N 6012, battery, electrical branch cord assembly, microphone, and bracket. While on the ground or in high noise areas, the battery-powered MXU-835/P is designed to aid audible communication between crew members. The gain automatically adjusts the volume relative to the background noise. The MXU-835/P has a four-position switch that controls the communication function. The four positions are described below: ⁽²³⁾

First position (white dots aligned) – Off – MXU-835/P is off.

Second position – Listen Only – Communications are received via the MXU-835/P microphone.

Third position – Talk/Listen (Acoustic) – Communications are transmitted and received via the MXU-835/P speaker and microphone.

Fourth position – Talk/Listen (Hardware) – Communications are received and transmitted via hardwire (when another crew member's electrical branch cord is plugged into the hardwire jack) between crew member's. This function bypasses the MXU-835/P microphone and speaker.

- **Total Weight:** Not available.
- **Stock Number(s):** Not available.
- **Sizes Available:** Small, medium, large, and extra-large. ⁽²³⁾
- **Use(s):** Used by U.S. Air Force aircrew personnel (including cargo, bomber, observation, and helicopter aircraft). ⁽²⁶⁾
- **Component(s):**

Canister Uses the C2 canister, which interfaces with the CQU-7/P blower. ⁽²³⁾

Canister Mount NATO standard. ⁽²³⁾

CQU-7/P Blower
Assembly Uses a variable-speed motor, two BA-5588 lithium-sulfur dioxide batteries, external power supply cable, housing assembly, control switch, and canister. ⁽²³⁾

Drinking Device

Eyepiece(s) One-piece clear plastic lens. ⁽²³⁾

Hood Bromobutyl rubber. ⁽²³⁾

Manifold Assembly

MXU-835/P Intercom
Unit

Neckdam

Pigtail Adapter Hose
Assembly

Rip Facility

Tearaway Facepiece Strip

- **Breathing Resistance:** Not available.
- **Airflow:** Interfaces with the CQU-7/P Blower Assembly or Aircraft Oxygen System. ⁽²³⁾
- **Communications Enhancement:** The MXU-835/P Intercom Unit, powered by one MN1604 nonrechargeable alkaline battery, is used to enhance person-to-person communication. ⁽²³⁾
- **Protection Afforded:** Protects the head, neck, face, eyes, and respiratory tract from toxic chemical agents. ⁽²³⁾
- **Manufacturer(s):**

MBU-19/P Mask-Hood Assembly ILC Dover, Inc.
P.O. Box 266
Frederica, DE 19946
Tel: (302) 335-3911
Fax: (302) 335-0762 ⁽²²⁾

CQU-7/P Blower Hunter Manufacturing Company
30525 Aurora Road
Cleveland, OH 44139
Tel: (316) 248-6111
Fax: (316) 248-1691 ⁽²⁴⁾

MXU-835/P Intercommunication Unit Gentex
P.O. Box 315
Belmonte Street
Carbondale, PA 18407 ⁽²⁵⁾

- **Compatibility:** The mask-hood assembly is worn under the HGU-55P helmet, which uses standard offset bayonet connectors. ⁽²³⁾
- **Storage Life:** 10 years. ⁽⁴⁾
- **Donning Time:** Less than 9 seconds. ⁽⁴⁾
- **Field of Vision:** Not available.
- **Accessories:** Not available.
- **Decontaminability:** Not available.
- **Fogging Characteristic(s):** The blower or aircraft oxygen system keeps the eyepiece from fogging. ⁽²³⁾

- **Deployment:** Not available.
- **Miscellaneous:** Not available.

The U.S. MCU-2A/P

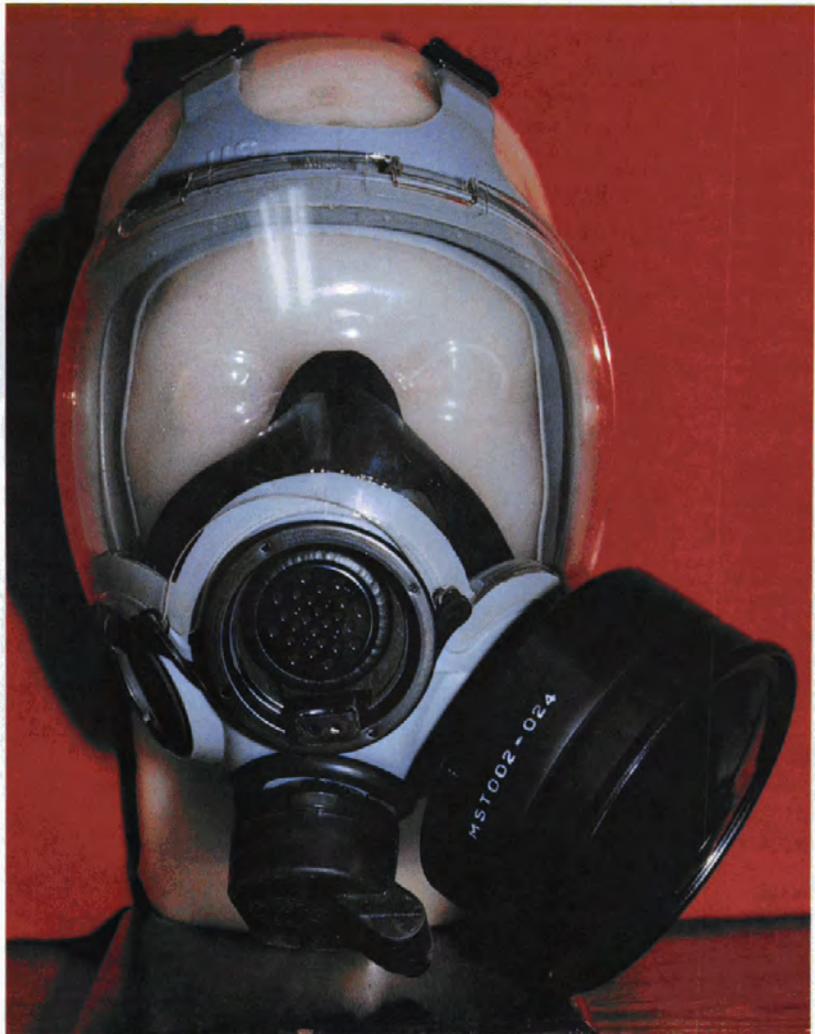


Photo courtesy of CBLAC personnel.



Photo courtesy of ILC Dover Inc.

The HGU-65/P hood is designed for use with the MCU-2/P series explosive ordnance disposal configuration where both canisters are worn.

- **Designator(s):** MCU-2/P Series
- **Item Name(s):** MCU-2/P
MCU-2A/P
- **Item Description:** The MCU-2/P is composed of a molded silicone rubber facepiece material with an integral molded polyurethane one-piece panoramic lens bonded to it. Each mask is issued with an outsert, which protects the flexible lens while the mask is being stored. The mask features both right- and left-side canister mount options to accommodate both left- and right-handed wearers. The side voicemitter assembly with retaining ring may be inserted into the unused canister mount. The primary voicemitter is located over the mouth area. The internal nosecup has two check valves to deflect exhaled air away from the eyepiece to prevent fogging. Exhaled air is eliminated via the exhalation valve, which is located at the chin position and covered by an elastomeric valve cover. The MCU-2/P also has a drinking capability. The mask has a six-point adjustable head harness suspension made of elastic, which comes together in the center back of the head into a rectangular-shaped patch of woven material. ^(7, 14)
- **Total Weight:** 773 g (weight of large-size facepiece and C2 canister). ⁽¹⁴⁾
 - Canister 275 g. ⁽¹⁴⁾
 - Facepiece 498 g (weight of large-size mask). ⁽¹⁴⁾
- **Stock Number(s):**
 - Small 4240-01-327-3299 (NSN). ⁽⁷⁾
 - Medium 4240-01-327-3300 (NSN). ⁽⁷⁾
 - Large 4240-01-327-3301 (NSN). ⁽⁷⁾
- **Sizes Available:** Small, medium, and large. ⁽⁷⁾
- **Use(s):** Used by the U.S. Air Force personnel as a general purpose respirator. Also used by the following U.S. agencies: FBI, Secret Service, Drug Enforcement Agency, Coast Guard, Department of Energy, and Navy. ⁽⁷⁾
- **Component(s):**
 - Canister Uses C2 canister or any other NATO standard thread canister. ⁽⁷⁾
 - Canister Mount NATO standard. ⁽⁷⁾
 - Drinking Device The mask has both internal and external drink tubes. The external drink tube attaches to a canteen and allows for the intake of 2 L/min of fluid. ⁽⁷⁾

- Eye(s)** One piece lens made of clear molded urethane is bonded to the facepiece. ⁽⁷⁾
- Facepiece** The molded silicone rubber facepiece forms an effective seal around the users face. ⁽⁷⁾
- Head Harness** The head harness consists of a six-point suspension with adjustable elastic straps. A webbing head pad joins the straps together and has a quick-don pull tab sewn to its bottom. ⁽¹⁴⁾
- Nosecup** Two nosecup disc valves deflect air over the eyelens to reduce fogging. ⁽⁷⁾
- **Breathing Resistance:** Less than 55 mm H₂O at an airflow of 85 L/min. ⁽⁴⁾
 - **Airflow:** No positive airflow available. ⁽¹⁴⁾
 - **Communications Enhancement:** A side voicemitter assembly is inserted in the unused canister mount and a front voicemitter is located over the mouth area. The MCU-2A/P configuration also provides a voice and telephone communication capability via the M101/A1C microphone which is also located over the mouth area. ⁽⁷⁾
 - **Protection Afforded:** Exceeds the required protection factor of 10⁴. ⁽⁷⁾
- Protects the wearer from chemical and biological agents and radioactive dust. ⁽⁷⁾
- **Manufacturer(s):** Mine Safety Appliances Company (MSA)
Defense Products Department
P.O. Box 428
Pittsburgh, PA 15230
Tel: (412) 733-9100
Fax: (412) 733-8573 ⁽⁷⁾
 - **Compatibility:** Compatible with groundcrew protective clothing and explosive ordnance disposal clothing. ⁽⁷⁾
 - **Storage Life:** Indefinite shelf life. ⁽⁷⁾
 - **Donning Time:** Less than 9 seconds, an additional 6 seconds to don/adjust the hood. ⁽⁴⁾
 - **Field of Vision:** Excellent optical properties including an enhanced peripheral field. ⁽⁷⁾
 - **Accessories:** This mask is issued to users in a kit consisting of the following items:
- Canisters** Three C2 canisters. ⁽⁷⁾
- Carrier** Mildew-resistant nylon bag with adjustable waist and shoulder straps. Pockets are provided inside and outside the carrier to store the other accessories. ⁽⁷⁾

- Hood(s)** The hood is made from a butyl rubber-coated nylon cloth, the face opening in the hood is made to fit tightly around the lenses. The mask is issued with three hoods. ⁽⁷⁾
- Additionally, a contract was let to ILC Dover for the production of an EOD hood that integrates with the MCU-2/P, designated as the HGU-65/P. This hood interfaces with the M3 Toxicological Agent Protective (TAP) Ensemble and incorporates an integrated MCU-2/P outsert lens for maximum field of view. It is designed to provide positive pressure (exhaled air) in the hood for maximum protection. When wearing the EOD hood two canisters are used, one in each canister mount on the mask. ⁽⁸⁾
- Outserts** Two outserts are issued, one optically clear and one tinted, both made of a polycarbonate shell and used to protect the lens when the mask is stored in the carrier. Also used to protect the wearer from chemical droplets and POLs. ⁽⁷⁾
- Waterproof Bag** A sealable bag is used to protect the mask from moisture in wet and damp climates. ⁽⁷⁾

- **Decontaminability:** Decontaminated using soap and water and/or isopropyl alcohol. ⁽⁷⁾
- **Fogging Characteristic(s):** Two disc valves located on the nose cup deflect air over the eyelens. ⁽⁷⁾
- **Deployment:** The MCU-2/P series has not been deployed to any foreign countries, although several nations did inquire about the mask during Operation Desert Storm. ⁽⁷⁾
- **Miscellaneous:** There are future plans to equip the MCU-2/P mask with an additional outsert that will provide laser protection. ⁽⁷⁾

The EOD hood was developed in the fall of 1990. The contract was awarded in March 1991 to ILC Dover. ⁽⁷⁾

The total inventory objective for this mask is 436,343 exclusive of replacements and condemnations. Prior to transitioning the program management of this mask series from the Aeronautical Systems Division at Wright Patterson Air Force Base to the Air Logistics Command at Warner Robbins Air Force Base in November 1988, 183,200 units were procured. Warner Robbins initiated acquisition plans and received approval to procure an additional 263,000 units for the Air Force and 461,000 for the Navy, with options. The total dollar value of the procurement was estimated at \$102.5 million over four years (firm fixed price and quantity). The contract was awarded to Mine Safety Appliances on 18 September 1989 for \$86,796,792.32. A cost savings of approximately \$15.7 million was due to a consolidated Air Force and Navy procurement. ⁽⁷⁾

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19. Military Specification MIL-M-51282D(EA). 14 November 1986. "Masks, Chemical-Biological, Field, M17A1."
20. "M25A1 Tank Mask Chemical/Biological Mask." Flyer from Gentex.
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23. "Commercial Operating and Maintenance Instructions for Mask-Hood Assembly, Chemical Protective, MBU-19/P (PIHM™ Hood-Mask Assembly) P/N 0000-110462." Prepared by ILC Dover, Inc.
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Chapter 23 – Yugoslavia

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A circular world map with green continents and blue oceans. A small yellow star is placed over the Balkan region, specifically highlighting the location of Yugoslavia.

23.1 RESPIRATORS



Photo courtesy of SDPR, Federal Directorate of Supply and Procurement.

The Yugoslav M2

- **Designator(s):** M2
- **Item Name(s):** Protective Mask M2
- **Item Description:** This mask features a green elastomeric facepiece with two inverted triangular eyepieces held in place by screw-tightened collars. An exhalation valve with a mushroom shaped cover is located over the mouth area. The M2 has a left-side canister mount and an adjustable, six-point head harness suspension with elastic straps. This mask has neither provisions for drinking nor communications enhancement. ⁽⁵⁾
- **Total Weight:** 800 g. ⁽²⁾
- **Stock Number(s):** Not available.
- **Sizes Available:** Small, medium, and large. ⁽²⁾
- **Use(s):** Used by Yugoslav armed forces as a general purpose respirator. ⁽²⁾
- **Component(s):**

Facepiece	Molds itself to any face contour and provides airtightness through adjustment and tightening of straps. ⁽²⁾
Head Harness	A fully airtight fit against the face is produced by adjusting the six elastic straps of the head harness. ⁽²⁾
- **Breathing Resistance:** Not available.
- **Airflow:** No means of positive airflow. ⁽⁵⁾
- **Communications Enhancement:** This mask does not have a voicemitter. ⁽⁵⁾
- **Protection Afforded:** Protects the respiratory system, eyes, and face against NBC contaminants in the form of gases, fumes, and solid and liquid particles in a battlefield environment where the concentration of oxygen is greater than 16%. ⁽²⁾
- **Manufacturer(s):** Federal Directorate of Supply and Procurement
11105 Beograd
9 Nemanjina Street
Yugoslavia YU11105
Tel: 038 37 621522
Fax: 038 11 324981 ⁽²⁾
- **Compatibility:** Compatible with the helmet and protective overall manufactured in Yugoslavia. ⁽²⁾
- **Storage Life:** Not available.

- **Donning Time:** Not available.
- **Field of Vision:** Not available.
- **Accessories:**
 - Carrying Bag ⁽²⁾
 - Cleaning Kit ⁽²⁾
- **Decontaminability:** Cleaned using the cleaning kit provided in the carrier bag. ⁽²⁾
- **Fogging Characteristic(s):** Incoming air is deflected over the eyepieces to prevent fogging. ⁽²⁾
- **Miscellaneous:** Mask is operational within the ambient temperature range of -30°C to +50°C. ⁽²⁾

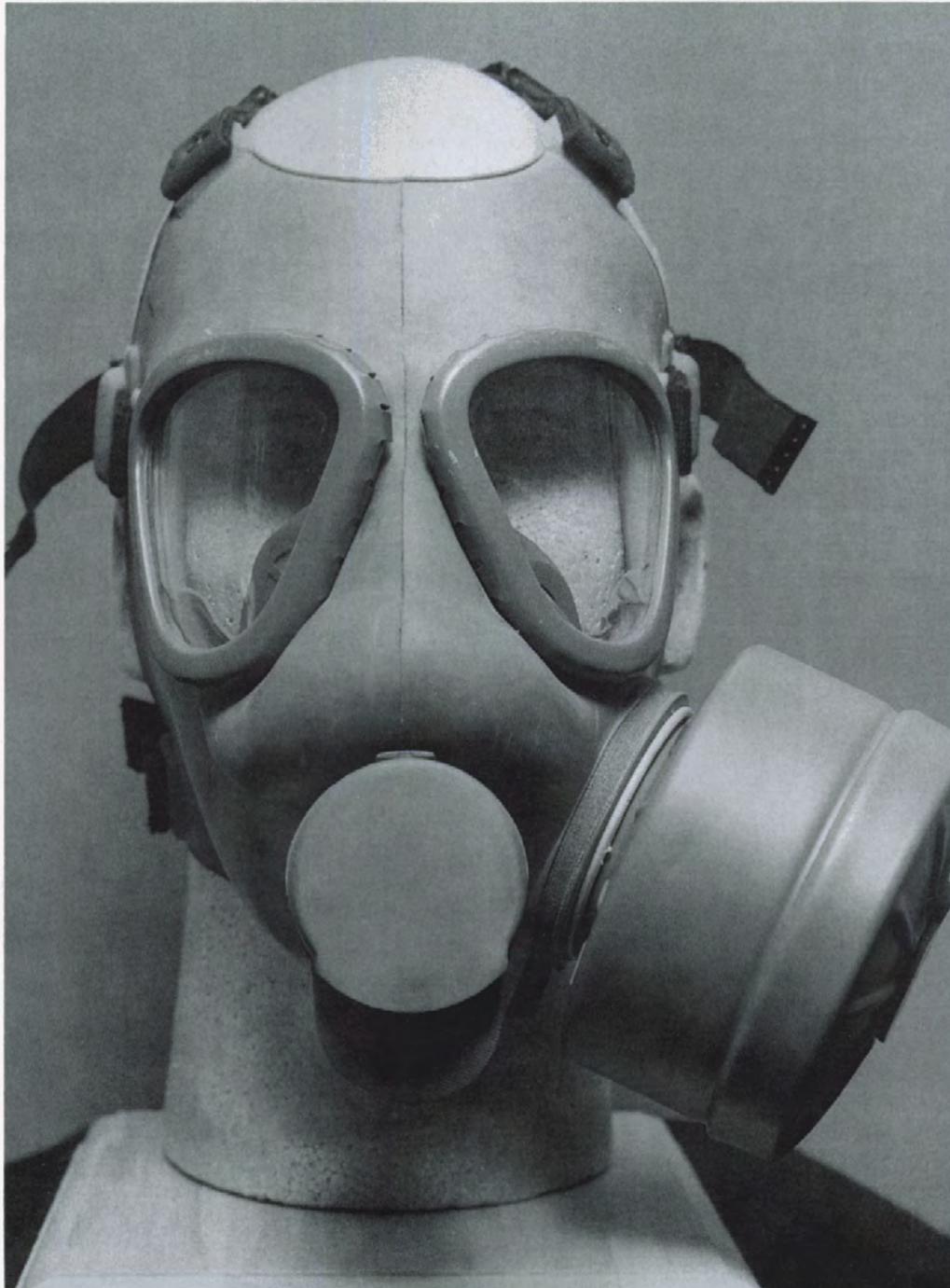


Photo courtesy of CBIAC Personnel.

The Yugoslav M59 Mask

- **Designator(s):** M59 Mask
- **Item Name(s):** M59 Mask
M1 Mask
MC1 Mask
- **Item Description:** The Yugoslav M59 is identical to the U.S. M9 series in physical appearance; however, it is an unlicensed reproduction of the U.S. M9 series. The mask features an elastomeric faceblank and two triangular lenses held in place by metal collars. There is an internal nosecup, a left-side canister mount, and an exhalation valve with a mushroom-shaped disk cover located over the mouth position. The mask is held in place by a six-point adjustable head harness suspension with elastic straps. This mask has neither provisions for drinking nor communication enhancement. ^(3, 4)
- **Total Weight:** Not available.
- **Stock Number(s):** Not available.
- **Sizes Available:** Not available.
- **Use(s):** Used by the Yugoslav armed forces. A civilian version, the MC1, is issued to Yugoslav civilians. ⁽¹⁾
- **Component(s):**

Canister	Uses the TU-51 filter canister. ⁽¹⁾
Canister Mount	Non-NATO. ⁽⁴⁾
Facepiece	Rubber, gray or olive in color. ^(1, 4)
Head Harness	Six-point suspension with plastic straps. ⁽⁴⁾
- **Breathing Resistance:** Not available.
- **Airflow:** No means of positive airflow. ⁽⁴⁾
- **Communications Enhancement:** This mask does not have a voicemitter. ⁽⁴⁾
- **Protection Afforded:** Intended for protection of the respiratory tract, eyes, and face from the effects of CBR weapons in the form of gas, vapor, and aerosol. ⁽¹⁾
- **Manufacturer(s):** Miloje Zakić
Industry - Kruševac
Yugoslavia
Tel: 037 22 328 ⁽¹⁾

Office
Miloje Zakić
Maršala Tolbuhina
Street 79/IV
Belgrade
Yugoslavia
Tel: 011 322 133 ⁽¹⁾

- **Compatibility:** Not available.
- **Storage Life:** 10 years. The MC-1 is kept in a closed polyethylene bag, which is opened immediately before use. ⁽¹⁾
- **Donning Time:** Less than 9 seconds. ⁽³⁾
- **Field of Vision:** Not available.
- **Accessories:** The mask, filter, and soapy flannel cloth are stored in a polyethylene carrying bag. ⁽¹⁾
- **Decontaminability:** Not available.
- **Fogging Characteristic(s):** Prior to wear the lenses are wiped from the inside using the soapy flannel cloth to prevent fogging. ⁽¹⁾
- **Deployment:** The Yugoslav M59 (M1) mask used with the CTU-51 filter canister was confiscated from Iraqi troops during Operation Desert Shield/Storm. ⁽³⁾
- **Miscellaneous:** Not available.

23.3 REFERENCES

1. "Operational Instruction: Personal Kit with MC-1 Mask for Civilian Protection." Brochure provided by the Federal Directorate of Supply and Procurement.
2. "NBC Defense." Information provided by the Federal Directorate of Supply and Procurement.
3. Interview with CRDEC personnel, Individual Protection Division, Edgewood Area, APG, MD, 21010-5423.
4. Analysis based on physical evaluation of the mask by CBIAC personnel.
5. Analysis based on photo evaluation of the mask by CBIAC personnel.

APPENDIX A**GLOSSARY OF TERMS**

AC	Hydrogen cyanide.
ACDVS	Aircrew Chemical Defense Ventilator System.
AERP	Aircrew Eye/Respiratory Protection.
AFB	Air Force Base.
AFV	Armored Fighting Vehicle.
ANP	Appareil Normal de Protection.
APG	Aberdeen Proving Ground, MD.
AQAP	Allied Quality Assurance Publication.
ASC	Coal based granular charcoal impregnated with copper, silver and chromium.
ASZM	Coal based granular charcoal impregnated with copper, silver, and zinc, exclusively used for military purposes.
Baumé	A measure of specific gravity or concentration for a solution.
C	Celsius.
CASU	Compact Air Supply Unit.
CB Agents	Chemical and Biological Agents.
CBDE	Chemical and Biological Defense Establishment, UK.
CBR	Chemical, Biological and Radiological.
CFM	Cubic Feet per Minute.
CG	Phosgene.
CIS	Commonwealth of Independent States, formerly USSR. Countries include Armenia, Azerbaijan, Belarus, Georgia, Moldova, Russia, and Ukraine.
CK	Cyanogen chloride.
Chl-Bio	Chemical-Biological.
CN	Chloroacetophenone, tear agent.
CO	Carbon monoxide.
CoCl₂	Cobalt chloride.
CP	Collective Protection.
CR39	Allyl carbonate, a lens material.

CR	Dibenz (b,f) (1,4) oxazepine, riot control agent.
CRDEC	U.S. Army Chemical Research, Development and Engineering Center, APG, MD.
CS	O-Chlorobenzamalonitrile, tear agent.
Ct	Concentration multiplied by time, refers to integrated area under an exposure curve.
CVC	Combat Vehicle Crews.
CW	Chemical Warfare.
Czech	Czechoslovakia.
dB	Decibel.
DC	Direct Current.
DIN	Data Item Number.
dm	Decimeter.
DMMP	Dimethyl methylphosphonate, G agent simulant.
DND	Department of National Defense, Canada.
DOA	Department of the Army.
DOP	Diocetyl pthalate, simulates agent aerosol behavior.
DREO	Defense Research Establishment, Ottawa.
DS2	Decontaminating Solution Number 2. Consists of a mixture of diethylenetriamine (70%), sodium hydroxide (2%) and ethylene glycol monomethyl ether (28%).
EOD	Explosive Ordinance Disposal.
EPDM	Ethylene Propylene Diene Rubber.
F	Fahrenheit.
FINABEL	A consortium of European countries including France, Italy, Netherlands and Belgium.
FFr	French Francs.
FOA	National Defence Research Establishment, Sweden.
g	Gram.
GB	Sarin, nerve agent.
GD	Soman, nerve agent.
GIAT	Groupement Industriel des Armements Terrestres, France.
H₂O	Water.

H₂S	Hydrogen sulfide.
HCN	Hydrogen cyanide.
HD	Distilled mustard, blister agent.
HEPA	High Efficiency Particulate Aerosol.
HOI	Hypoiodic acid.
HTH	High-Test Hypochlorite.
Hz	Hertz, a unit of frequency.
IHADSS	Integrated Helmet and Display Sighting System.
IR	Infrared.
IU	Intercommunication Unit.
kg	Kilogram.
L	Liter.
M	Mega, 10 ⁶ .
m	Meter.
mbar	Millibar, a unit of pressure.
microns	10 ⁻⁶ meters.
min	Minute.
ml	Milliliter.
mm	Millimeter.
MoD	Ministry of Defense.
MOD DEF STAN 05-21	Ministry of Defense, Defense Standard 05-21.
MOU	Memorandum of Understanding.
MPa	Megapascals.
NATO	North Atlantic Treaty Organization. Current member nations include Belgium, Canada, Denmark, Germany, Greece, Iceland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Turkey, United Kingdom and United States. France withdrew in 1966 but is still a member of the alliance.
NATO Standard Thread	Canister thread size where outermost diameter is equal to 40 mm and pitch is equal to 3.63 mm or 1/7 inch. Designated as 40 x 3.63 mm or 40 x 1/7 inch. Conforms to STANAG 4155.
NBC	Nuclear, Biological and Chemical.
NH₃	Ammonia.

NIOSH	National Institute of Occupational Safety and Health.
NSN	National Stock Number.
P³I	Preplanned Product Improvements.
PF	Protection Factor. Ratio of external concentration of chemical agent over concentration of agent within the respirator when tested in a chamber.
PIHM	Protective Integrated Hood Mask.
POL	Petroleum, Oil, Lubricant.
pphm	Parts per hundred million.
PS	Chloropicrin.
PSI	Pounds per Square Inch.
PVC	Polyvinyl chloride.
QSTAG	Quardripartite Standardization Agreement. Participants include the United States, Australia, Canada and the United Kingdom.
QSTAG 496	QSTAG entitled "Standards for NBC Protective Mask and Filter Canister Screw Threads".
QSTAG 695	QSTAG entitled "Standards for General Service Respirators and Masks out to the Year 2005."
RH	Relative Humidity.
RPM	Rotations Per Minute.
SA	Arsine, blood agent.
SDSM	Hypochlorite decontamination solution at 20° Baumé, used by the French Army.
SGE	Società Generale Elastomeri, Italy.
SO₂	Sulfur dioxide.
SPH4	Special Purpose Helmet 4.
STANAG 4155	NATO Standardization Agreement entitled "NBC Protective Mask and Filter Canister Screw Threads".
TAP	Toxicological Agent Protective.
TDP	Technical Data Package.
TECOM	U.S. Army Test and Evaluation Command, APG, MD.
TEDA	Triethylenediamine.
tesla	A unit of magnetic flux density equal to one weber per square meter.

TNO	TNO Prins Maurits Laboratory, The Netherlands.
TPI	Turns Per-Inch.
TRIPTYCH	NATO guide for designers which covers combined operational characteristics, technical specifications and evaluation criteria for a given item.
UK	United Kingdom.
U.S.	United States.
vdc	Voltage direct current.
VX	S-2 diisopropylaminoethyl methylphosphonothioate, nerve agent.
Warsaw Pact	This treaty was originally signed in Warsaw, Poland in May 1955 and included Bulgaria, Czechoslovakia, Hungary, Poland, Romania and the USSR (presently CIS) as signatories. The Warsaw Pact has been dissolved.

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