

# Full Facepiece FR-M40 with Cartridges FR-C2A1 and FR-64

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Emergency response is a demanding and dangerous activity. Those who perform it deserve the very best system available. That's why 3M has taken the lead in developing a respirator that brings together a military-style facepiece with a cartridge that has proven-superior carbon filtering capabilities. This NIOSH-approved\* combination puts 3M at the forefront of innovative solutions for personal safety.

Not intended for fire-fighting. This respirator is not NIOSH-approved for chemical warfare agents. There is no NIOSH approval schedule for chemical warfare agents.

### Features/Benefits

- This system provides security, safety and comfort for the user.
- Available in small, medium or large.
- A drinking tube can be used without removing the facepiece.
- The cartridge can be mounted on either side of the facepiece.
- System is NIOSH-approved for use against acid gases, CN, CS and as a P100 particulate filter.
- Cartridge meets the gas life criteria of U.S. MIL-PRF-51560A (EA) and EA-C-1704 for chemical warfare agents.
- The facepiece is made of a soft, conformable silicone material with a single flanged edge for a secure seal.
- An optional butyl rubber second skin fits easily over the facepiece to help protect it from chemicals.



3M™ Full Facepiece FR-M40 with Cartridge FR-C2A1 and FR-64

- An optional butyl rubber coated Nylon hood covers head and neck to help provide skin protection from many chemical agents. Meets MIL SPEC-C-51251A (EA). The butyl rubber hood must be used with second skin.
- Eyepiece outserts (clear or gray) protect the primary lenses against scratches/damage thereby prolonging the life of the facepiece.
- 3M... The leader in personal protective equipment for over 25 years.
- Mustard/Blister agents: H, HD, L.
- Tear agents: CN, CS, CR, OC.
- Blood agents: hydrogen cyanide (AC), cyanogen chloride (CK), arsine (SA).
- Choking agents: chlorine, phosgene, chloropicrin (PS), and diphenylchloroarsine (DA).

### Use for:

- Law enforcement agencies
- Security personnel
- Medical personnel
- Fire department response teams
- Hazmat teams
- Emergency medical technicians (EMTs)
- Domestic preparedness personnel
- Military personnel

### Cartridge Specifications

They can filter a wide range of chemical warfare agents such as:

- Nerve agents: tabun (GA), sarin (GB), soman (GD), VX.

\* This is a NIOSH-approved system only when the 3M™ Full Facepiece FR-M40 is used in combination with the 3M™ Cartridge FR-C2A1 or FR-64.

# 3M™ Full Facepiece FR-M40 with Cartridges FR-C2A1 and FR-64 (continued)

The following testing (in the table below) was performed on the cartridge alone, not with individual facepieces or other systems. Service life may be significantly shorter at other conditions such as higher flow

rates, which may be encountered in some powered air systems.

The FR-C2A1 also meets NIOSH cartridge approval schedules for acid gases (chlorine, hydrogen chloride, sulfur dioxide), canister

approvals for chloroacetophenone (CN) and o-chlorobenzylidene malonitrile (CS) and as a P100 filter per 42 CFR 84. NIOSH approval #TC-84A-3281.

Test Agent	Concentration (mg/m3)	Breakthrough Concentration (mg/m3)	Flow Rate* (LPM)	Humidification		Minimum Life Requirement (Min.)	Specification
				Pre-Test (%R.H.)	Test (%R.H.)		
Dimethyl Methylphosphonate**	3,000±400	0.04	50	—	—	59	1
Dimethyl Methylphosphonate**	3,000±400	0.04	30	—	—	175	2
Cyanogen Chloride	4,000±400	8.0	32 Cyclic Flow	80	80	30	1
Cyanogen Chloride	4,000±400	5.0	30	80	80	55	2
Cyanogen Chloride (aged 7 days at 45°C and 80% R.H.)	4,000±400	5.0	30	80	80	45	2
Phosgene	20,000±500	8.0	30	—	50	25	2
Hydrogen Cyanide	4,000±400	5.0 [as(CN) <sub>2</sub> ]	30	80	80	28	2

\* Constant flow unless indicated. \*\* Dimethyl Methylphosphonate is a surrogate test agent for GB.

Testing conducted at 3M Canada, Brockville, Ontario.

Temperature for all tests is 24±3°C.

1. MIL-PRF-51560A (EA) for C2A1 Canister.
2. EA-C-1704 for ASZM-TEDA Carbon; 1992-01-17, applied to full cartridge.

## 3M Air-Purifying Cartridges and Canisters for Air Purifying Respirators for Responder Applications

Air purifying respirators (APR) can be used when the contaminant and

concentration are known and below IDLH limits and sufficient oxygen is present. The maximum use concentration (MUC) in which an APR can be utilized, is the product of the assigned protection factor (APF)

multiplied by the airborne exposure limit (such as the TLV). This number however must be lower than the IDLH, otherwise the IDLH becomes the MUC.

Respirator	3M System	APF
Negative Pressure, Full Facepiece APR	FR-M40 Full Facepiece Respirator	50 <sup>1</sup>

NIOSH Approvals	TVL <sup>3</sup>	IDLH Limit <sup>4</sup>	3M Air-Purifying Cartridge or Canister – NIOSH Approvals <sup>2</sup>	
			FR-C2A1	FR-64
Organic Vapors	*	*		X
Sulfur Dioxide	2ppm TWA 5 ppm STEL	100 ppm	X	X
Hydrogen Chloride	5 ppm C	100 ppm	X	X
Chlorine	0.5 ppm TWA 1 ppm STEL	30 ppm	X	X
Chlorine Dioxide	0.1 ppm TWA 0.3 ppm STEL	10 ppm		X
Hydrogen Fluoride	3 ppm C	30 ppm		X
Ammonia	25 ppm TWA 35 ppm STEL	500 ppm		X
Methylamine	5 ppm TWA 15 ppm STEL	100 ppm		X
Formaldehyde	0.3 ppm C	30 ppm		X
Hydrogen Sulfide (escape) <sup>5</sup>	10 ppm TWA 15 ppm STEL	300 ppm		X
Phosphine	0.3 ppm 1 ppm STEL	200 ppm		X
CN <sup>6</sup>	0.3 mg/m <sup>3</sup> TWA	101 mg/m <sup>3</sup>	X	X
CS <sup>6</sup>	0.39 mg/m <sup>3</sup> C	1.9 mg/m <sup>3</sup>	X	X
P100 Particulates <sup>5</sup>	*	*	X	X

Military Specification Testing <sup>7</sup>	TVL <sup>3</sup>	IDLH Limit <sup>4</sup>	3M Air-Purifying Cartridge or Canister – Common Military Agents <sup>2</sup>	
			FR-C2A1	FR-64
Diethyl Methylphosphonate (DMMP) <sup>8</sup>	NA	NA	X	X
Hydrogen Cyanide	4.7 ppm C	50 ppm	X	X
Cyanogen Chloride	0.3 ppm	ND	X	X
Chloropicrin	0.1 ppm TWA	4 ppm	X	X
Phosgene	0.1 ppm TWA	2 ppm	X	X
CN <sup>6</sup>	0.3 mg/m <sup>3</sup> TWA	101 mg/m <sup>3</sup>	X	X
CS <sup>6</sup>	0.39 mg/m <sup>3</sup> C	1.9 mg/m <sup>3</sup>	X	X
	<b>OASG limit value<sup>9</sup></b>	<b>OASG limit value<sup>9</sup></b>		
Sarin (GB)	0.0001 mg/m <sup>3</sup>	>0.2 mg/m <sup>3</sup>	X	X

TWA = time weighted average, C = Ceiling Limit, STEL = short term exposure limit, NA = not applicable, ND = not determined

\*Limits depend on specific contaminant.

However, exposure limits have been set for particulates not otherwise classified (PNOC) and particulates not otherwise regulated (PNOR).

<sup>1</sup>APF applies only when respirator has been quantitatively fit tested. If fit tested qualitatively, an APF of 10 applies.

<sup>2</sup>Assumes that the criterion for using air-purifying respirators is met: the agent and concentration are known and are below maximum use concentrations and IDLH limits and sufficient oxygen is present.

<sup>3</sup>TLV = threshold limit value from the American Conference of Governmental Industrial Hygienists. ACGIH Threshold Limit Values and Biological Exposure Indices, 2000.

<sup>4</sup>IDLH = immediately dangerous to life or health limit. NIOSH Pocket Guide to Chemical Hazards, 1990. DHHS (NIOSH) Publication No. 90-117.

<sup>5</sup>H<sub>2</sub>S escape only and P100 approvals are available for negative pressure, air-purifying respirators only.

<sup>6</sup>CN, CS approvals are available for tight-fitting, air-purifying respirators only.

<sup>7</sup>**3M Respirators are not NIOSH-approved for these agents.** There are no NIOSH approval schedules for DMMP, GB, hydrogen cyanide,

cyanogen chloride, chloropicrin, and phosgene. See footnote 6 for explanation of CN and CS.

<sup>8</sup>DMMP is a common surrogate test agent for the nerve agents.

<sup>9</sup>TLV and IDLH limit values have not been established for sarin. The values listed for sarin (GB) are the airborne exposure limit and the limit for which an SCBA is the only acceptable respiratory protection. The Office of the US Army Surgeon General (OASG) established these values.

**Ordering Information**

Description	Part No.
Full Facepiece, S	FR-M40-10
Full Facepiece, M	FR-M40-20
Full Facepiece, L	FR-M40-30
Cartridge	FR-C2A1
Cartridge	FR-64

**Replacement Parts and Accessories**

Description	Part No.
Eyepiece Outsert, Clear	FR-M40-1
Eyepiece Outsert, Gray	FR-M40-2
Quick Doff Hood	FR-M40-3
Spectacle Kit	FR-M40-4
Second Skin, S	FR-M40-5
Second Skin, M/L	FR-M40-6



**▲ WARNING**

This respirator helps to reduce exposure to certain airborne contaminants, but does not eliminate exposure or the risk of contracting disease or infections. Misuse may result in sickness or death. Before use, the wearer must read and understand *User Instructions* provided as a part of product packaging. Time use limitations may apply. Do not use this respirator when the concentration of contaminants is unknown or is immediately dangerous to life or health (IDLH) or is above 10X the PEL or airborne exposure limit when fit tested qualitatively or 50X the PEL or airborne exposure limit when quantitatively fit tested. This respirator does not supply oxygen when used in the air purifying mode. Do not use in atmospheres containing less than 19.5% oxygen. Call 3M OH&ESD Technical Service at 1-800-243-4630.

**Important**

Before using these respirators, you must determine the following:

1. If the end user has been trained by the employer.
2. The type of contaminant(s) for which the respirator is being selected.
3. The concentration level of contaminant(s).
4. Whether the respirator can be properly fitted on the wearer's face. All respirator instructions, warnings and use and time limitations must also be read and understood by the wearer before use.

**Technical Assistance U.S.**

1-800-243-4630

**Sales Assistance U.S.**

1-800-896-4223

**Fax On Demand U.S. and Canada**

1-800-646-1655

**Fax On Demand Outside U.S. and Canada**

651-732-0131

**Internet**

[www.3M.com/occsafety](http://www.3M.com/occsafety)

**E-mail**

[occsafety@mmm.com](mailto:occsafety@mmm.com)

**For other 3M products**

1-888-3M HELPS

**In Canada, contact:**

3M Canada Company, OH&ESD

P.O. Box 5757

London, Ontario N6A 4T1

1-800-267-4414

or 1-800-265-1840, ext. 6137

**Internet**

[www.3M.com/intl/CA/ohes.html](http://www.3M.com/intl/CA/ohes.html)

**3M Canada E-mail**

[ohes@ca.mmm.com](mailto:ohes@ca.mmm.com)

**Technical Assistance In Mexico**

01-800-712-0646

**Technical Assistance In Brazil**

0800-5550705