



## What's special about CBRN self-contained breathing apparatus (SCBA)?

### NIOSH Fact Sheet

In December 2001, the National Institute for Occupational Safety and Health (NIOSH) implemented a voluntary approval program for Chemical, Biological, Radiological, and Nuclear (CBRN) self-contained breathing apparatus (SCBA) respirators. NIOSH issues certificates of approval to SCBA in accordance with the requirements of Title 42 Code of Federal Regulations (CFR) Part 84.

NIOSH approves open-circuit positive pressure SCBA as tight-fitting full face respirators (Subpart H) with compressed air cylinders. NIOSH "13F" approvals refer to SCBA, including CBRN SCBA. The 13F number/letter designation contained in the NIOSH approval number refers to the original U.S. Bureau of Mines (NIOSH predecessor) test schedule and the letter designates the revision level. These respirators may be used for entry into and escape from oxygen-deficient atmospheres and those immediately dangerous to life or health (IDLH).

The Occupational Safety and Health Administration (OSHA) defines an IDLH value in their hazardous waste operations and emergency response regulation as follows: An atmospheric concentration of any toxic, corrosive or asphyxiant substance that poses an immediate threat to life or would cause irreversible or delayed adverse health effects or would interfere with an individual's ability to escape from a dangerous atmosphere (29 CFR 1910.120).

CBRN SCBA respirators are different from other NIOSH-approved SCBA in that they must also comply with additional requirements and special tests defined by NIOSH in accordance with §84.63(c), including chemical agent permeation and penetration resistance against distilled sulfur mustard (HD) and sarin (GB), and laboratory respirator protection level (LRPL) tests. In addition, NIOSH also requires CBRN SCBA to meet the applicable National Fire Protection Association (NFPA) 1981 Standard for Open-Circuit Self-Contained Breathing Apparatus for Emergency Services.

### What is the significance of CBRN SCBA standards and test procedures?

The standards and test procedures have significant impact on selection, use, and maintenance procedures of CBRN SCBA as compared to other NIOSH-approved SCBA respirators. To properly care for and effectively use a CBRN SCBA respirator, you should understand the standards and test procedures for CBRN SCBA. A summary is described below. These standards and test procedures are posted on the NIOSH National Personal Protective Technology Laboratory (NPPTL) website at: <http://www.cdc.gov/niosh/npptl/respstds.html#approved> and [http://www.cdc.gov/niosh/npptl/stps/respirator\\_testing.htm#STP\\_ASR\\_CBRN](http://www.cdc.gov/niosh/npptl/stps/respirator_testing.htm#STP_ASR_CBRN).

*In addition, always refer to and understand the manufacturer's user instructions and*

*the complete NIOSH respirator approval label provided with the respirator.*

### ***Chemical Agent Permeation and Penetration Tests***

Chemical agent permeation and penetration tests assure that under specified laboratory conditions the materials used in the CBRN SCBA construction (facepiece, valves, lens, hose, gaskets, etc.) resist chemical warfare agent (CWA) migration through the materials of the respirator assembly. Components and materials of a CBRN SCBA and other NIOSH-approved SCBA are different. Thus, only those components with exact part numbers shown on the full NIOSH CBRN SCBA approval label can be a component of the respirator assembly. Do not replace these components and materials with others that are not on the label even if they appear to be similar.

***Use of components not listed on the complete NIOSH respirator approval label constitutes configurations not included in the NIOSH approval and can result in serious injury and/or death to the wearer.***

Open-circuit positive-pressure SCBA, including all components and accessories except the air cylinder (shell) must resist the permeation and penetration of HD and GB chemical agents when tested for a period of 6 hours on an upper-torso manikin connected to a breathing machine operating at an air flow rate of 40 liters per minute (lpm), 36 respirations per minute, 1.1 liters tidal volume. The agent concentrations used during the tests are specified in the standard and test procedure. ***Based on this laboratory test, CBRN SCBA should not be used beyond 6 hours after initial***

***exposure to chemical warfare agents (liquid or vapor) to avoid the possibility of agent permeation.***

A CBRN SCBA is considered to be contaminated and must be decontaminated and discarded after initial contact with any liquid or vapor phase chemical warfare agent, regardless of the duration or frequency of such contact. At or before the 6-hour mark, use must be discontinued and the entire CBRN SCBA must be decontaminated including the cylinder valve assembly. Decontamination and disposal must be done in accordance with manufacturer's instructions and applicable regulations.

### ***Laboratory Respirator Protection Level (LRPL) Tests***

The measured laboratory respirator protection level (LRPL) for each CBRN open-circuit positive pressure self-contained breathing apparatus must be  $\geq 500$ , when the SCBA facepiece is tested in a negative pressure mode in an atmosphere containing 20–40 mg/m<sup>3</sup> corn oil aerosol of a mass median aerodynamic diameter of 0.4 to 0.6 micrometers. The test uses a panel of 25 to 40 human test subjects having facial sizes and shapes that approximate the distribution of sizes and shapes of the general U.S. working population. This test assesses the respirator's ability to fit a wide range of facial sizes and shapes. It also ensures that instructions for the facepiece size selection and donning can be understood, and effective.

This test is not a replacement for a fit test of each individual wearer in accordance with applicable requirements of agencies with jurisdiction (OSHA, ANSI). The manufacturer's user instructions will

address the fit factor (e.g., 500) requirement for quantitative fit testing of each SCBA wearer.

## How to determine if an SCBA is NIOSH-approved for CBRN protection level?

There are three NIOSH labels for a CBRN SCBA:

1. NIOSH Respirator Approval Label provided in the manufacturer's user instructions or as an insert to the user instructions. This is a paper label.
2. SCBA harness label placed on the backframe carrier/harness assembly (adhesive label).
3. CBRN Agent Approved Label placed on the backframe carrier/harness assembly (adhesive label).

### ***NIOSH CBRN Respirator Approval Label***

This is a full respirator approval label and contains important information to assist users in understanding the respirator, its protections, cautions and limitations, ***and exact approved configuration of components.***

To determine the NIOSH-approved CBRN protection level and proper configuration of components this label should be examined and understood.

The NIOSH Respirator Approval Label contains the following information:

- Department of Health and Human Services (DHHS) and National Institute for Occupational Safety and Health (NIOSH) Logos.
- NIOSH approval number (TC-13F-XXXXCBRN) shown with a row of

components representing the approved configuration. The "CBRN" suffix in the approval number will always appear in the entire NIOSH respirator approval label regardless of the SCBA manufactured and approval dates.

***If the approval number (TC) on this label does not include a CBRN suffix, it is not approved by NIOSH for CBRN protection level.***

- CBRN level of protection (e.g., SC/PD/CBRN 30 min 2,216 pounds per square inch (psig) listed within each row.
- Exact part numbers of components in the approved CBRN configuration.
- Cautions and limitations statements listed in each row.
- NIOSH CBRN Agent Approval Label shown as a complete label.

### ***NIOSH CBRN SCBA Harness Label***

This adhesive label is placed on the SCBA backframe carrier/ harness assembly.

This label contains:

- Department of Health and Human Services (DHHS) and National Institute for Occupational Safety and Health (NIOSH) Logos.
- Type and level of protection—NIOSH (TC-13F-XXXX) number and level of protection (e.g., SC/PD/30 min 2,216 psig).
- Cautions and limitations statements

It does not contain exact part numbers and the approved CBRN configuration of components.

The approval number and caution and limitation statements on this harness label vary depending on the date NIOSH issued the approval and the applicable

NFPA Standard 1981 version (1997, 2002, or 2007) that it meets.

For CBRN SCBA manufactured after August 31, 2007, the label will contain:

- The suffix “CBRN” in the approval number (e.g., TC-13F-0132CBRN).
- NIOSH standard SCBA and special CBRN cautions and limitations statements.

For CBRN SCBA manufactured prior to August 31, 2007, the label:

- Will not contain the letters “CBRN” in the approval number (e.g., TC-13F-0123). See the full label to confirm the SCBA is approved by NIOSH for CBRN protection.
- Will contain only NIOSH standard industrial SCBA cautions and limitations statements.

### ***NIOSH CBRN Agent Approved Label***

For each NIOSH-approved CBRN SCBA there may also be a version of that SCBA model approved only for traditional firefighting/emergency services. Only the SCBA models approved for use in CBRN environments will have a label indicating “CBRN Agent Approved” on the backframe carrier/harness assembly.

***If the NIOSH CBRN Agent Approved label is not on the backframe carrier/harness assembly, it should not be used in CBRN environments.***

There are four versions of the CBRN Agent Approved Label depending on the approval date of the CBRN SCBA:

- Before December 5, 2005, the label will contain Centers for Disease Control and Prevention (CDC) and NIOSH logos for both new and upgraded/retrofit SCBA.

- On or after December 5, 2005 the label will contain only a NIOSH logo for both new and upgraded/retrofit SCBA.
- Either label may contain the word “Retrofit” to indicate SCBA originally approved to the 42CFR84 NIOSH 13F standards (industrial SCBA) and upgraded to meet CBRN standards.



For more details NIOSH approval labels, refer to the NIOSH Fast Fact sheet on *NIOSH Approval Labels—Key Information to Protect Yourself*.

### ***NFPA/SEI Approval Label***

Safety Equipment Institute Inc. (SEI) is a third-party certification authority that ensures compliance with NFPA safety standards. An SEI label is on the backframe carrier/harness assembly (adhesive). There may be one or two of these labels signifying the NFPA standards that SEI has certified the respirator meets including: NFPA 1981: Standard on Open-Circuit Self-Contained Breathing

- Apparatus (SCBA) for Emergency Services.
- NFPA 1982: Standard on Personal Alert Safety Systems (PASS).

### ***Retrofitting a Field Deployed SCBA to CBRN Protection Level***

A NIOSH approved retrofit kit is required to upgrade a NIOSH-approved SCBA to CBRN protection. The retrofit program requires that:

- A field-deployed SCBA selected for retrofitting to NIOSH CBRN protection level must meet the criteria established by the respirator manufacturer for the retrofit approval.
- Upgrading is done by an authorized manufacturer's trained technician or the SCBA manufacturer.
- Components and labels are installed per the NIOSH-approved CBRN Retrofit kit and instructions.

The manufacturer's user instructions are very important and address key selection, use, and maintenance information. For instructions applicable to your SCBA, refer to the manufacturer's user instructions.

Authors:

Richard W. Metzler, Program Analyst, DHHS, Federal Occupational Health Program, Environmental Health Services Division

Jonathan V. Szalajda, Engineer, National Institute for Occupational Safety and Health, National Personal Protective Technology Laboratory

To receive other documents or other information about occupational safety and health topics, contact NIOSH at

Telephone: 1-800-CDC-INFO (1-800-232-4636)

TTY: 1-888-232-6348 ■ E-mail: [cdcinfo@cdc.gov](mailto:cdcinfo@cdc.gov)

or visit the NIOSH Web site at [www.cdc.gov/niosh](http://www.cdc.gov/niosh)

For a monthly update on news at NIOSH, subscribe to NIOSH *eNews* by visiting [www.cdc.gov/niosh/eNews](http://www.cdc.gov/niosh/eNews).

---

**This document is in the public domain and may be freely copied or reprinted.**

---

As part of the Centers for Disease Control and Prevention, NIOSH is the Federal agency responsible for conducting research and making recommendations to prevent work-related illnesses and injuries. Fact sheets describe how worker exposures to hazardous agents or activities can be reduced.

Mention of any company or product does not constitute endorsement by NIOSH. In addition, citations to Web sites external to NIOSH do not constitute NIOSH endorsement of the sponsoring organizations or their programs or products. Furthermore, NIOSH is not responsible for the content of these Web sites.

DHHS (NIOSH) Publication No. 2011-183

SAFER • HEALTHIER • PEOPLE™

June 2011

**DEPARTMENT OF HEALTH AND HUMAN SERVICES**

Centers for Disease Control and Prevention  
National Institute for Occupational Safety and Health  
4676 Columbia Parkway  
Cincinnati, OH 45226-1998

Official Business  
Penalty for Private Use \$300

