

Fire and Emergency Services - NL Self-Contained Breathing Apparatus Guidance Document For Emergency Services Applications

This guidance document is intended to assist fire departments in the selection, care and maintenance of their Open Circuit Self-Contained Breathing Apparatus (SCBA) and to put a respiratory protection program in place.

Referenced publications are available from the Newfoundland and Labrador Association of Fire Services office in Gander, call 709-651-2361.

There are a number of components to an appropriate SCBA / respiratory protection program:

- Selection and Purchase of New Sets
- Set Care and Maintenance
- SCBA Compliance – Upgrades and Retirement
- Cylinder Hydrostatic Testing and Replacement
- Proper air compressor maintenance - safety equipment and procedures
- Firefighter Training in the Use and Operation

NOTE: This document does not address compressed breathing air combination open-circuit self-contained breathing apparatus and supplied air respirators (SCBA/SAR's) or closed-circuit SCBA.

Selection and Purchase of New Sets

There are a number of items that should be considered prior to starting the selection and purchase process for new SCBA. These include, but are not limited to, expected hazards, frequency of use, size, weight, rated service time, ease of donning and doffing, comfort, and availability of servicing. Chapter 5 of “*NFPA 1852, Standard on Selection, Care, and Maintenance of Open-Circuit Self-Contained Breathing Apparatus*” 2013 Edition, should be referenced prior to purchasing new SCBA sets.

Section 5.1.7.2 of NFPA 1852 states that “For both *NFPA 1981, Standard on Open-Circuit Self-Contained Breathing Apparatus (SCBA) for Emergency Services*, and *NFPA 1982, Standard on Personal Alert Safety Systems (PASS)*, the edition of the respective standard(s) that is the current edition at the time of purchase shall be the edition specified.” The current edition of both is 2013.

NFPA 1981 specifies the minimum requirements for the design, performance, testing and certification of new compressed breathing air open-circuit self-contained breathing apparatus and their replacement parts, components and add-on accessories.

NFPA 1982 specifies the minimum requirements for the design, performance, testing and certification for all new Personal Alert Safety Systems (PASS) for emergency services personnel, including but not limited to stand-alone PASS and integrated PASS. While a

PASS device is still not mandatory it is strongly supported. When ordering you will have to specify this option; units integrated into the airline are recommended.

Fire departments who are considering purchasing used or reconditioned sets shall ensure that the sets have received servicing (rebuild) and functional flow testing (bench testing) by a technician and servicing centre that are authorized by the manufacturer of that particular brand and receive documentation to that effect.

Used or reconditioned sets shall meet the certification conditions as described in the **SCBA Compliance – Upgrades and Retirement** section.

It is strongly recommended that fire departments operate with only one brand name of SCBA within their organization. This will simplify maintenance and training requirements and will prevent the interchanging of air cylinders with different brands. The interchanging of air cylinders with different brand names is not approved and only acceptable as a last resort in emergency situations.

Set Care and Maintenance

The care and maintenance of SCBA is one that is often overlooked by many fire departments but is one of utmost importance.

Follow the manufacturer's recommended procedures for cleaning and disinfecting your sets including the face piece. Excellent information can also be found in Chapter 5, *Essentials of Fire Fighting*, 5th Edition and Chapter 6 of NFPA 1852 on the care of SCBA.

All current in-service SCBA sets should be "ready for use", that is a set that has been inspected and is ready to be donned by the firefighter. The interval between inspections should not exceed one week.

Annually, a functional flow test (bench test) is required on SCBA, follow the manufacturer's instructions or your organization's SOP's or GOP's. Each manufacturer also provides a recommended schedule for periodic rebuild (overhaul) of their sets. We strongly recommend that each fire department review these requirements and follow the schedule as closely as possible.

Fire departments must develop a Standard Operating Procedure (SOP) or General Operating Procedure (GOP) to provide a uniform, consistent procedure in the care and maintenance of their SCBA. Fire departments must also ensure that written documentation is kept on all use, maintenance, servicing, and upgrading related to each SCBA unit and cylinder.

Chapter 5, *Essentials of Fire Fighting*, 5th Edition and Chapter 7 of NFPA 1852 can be referenced for inspection and maintenance information.

SCBA Compliance – Upgrades and Retirement

The issue of upgrading and/or retiring of SCBA sets have created a lot of confusion within the fire service. Fire and Emergency Services - NL has not formally adopted “*NFPA 1852, Standard on Selection, Care, and Maintenance of Open-Circuit Self-Contained Breathing Apparatus*”, 2013 Edition; however we do recommend that fire departments use it as a guide to manage their SCBA program. It is not our intention to have fire departments throw down their current SCBA sets just because they may not meet the current standard. Rather, we would encourage fire departments to use the standard to evaluate their entire SCBA program.

The following excerpt from NFPA 1852 addresses currently in service sets, upgrades and retirement:

4.4.1 SCBA that are currently in service shall be certified as compliant with at least one of the following standards:

- (1) NFPA 1981, *Standard on Open-Circuit Self-Contained Breathing Apparatus for the Fire Service*, 1997 edition
- (2) NFPA 1981, *Standard on Open-Circuit Self-Contained Breathing Apparatus for Fire and Emergency Services*, 2002 edition
- (3) NFPA 1981, *Standard on Open-Circuit Self-Contained Breathing Apparatus (SCBA) for Emergency Services*, 2007 edition
- (4) NFPA 1981, *Standard on Open-Circuit Self-Contained Breathing Apparatus (SCBA) for Emergency Services*, 2013 edition

4.4.2* Where currently-in-service SCBA *do not meet the requirements of 4.4.1* and are covered by any of the following four categories, such SCBA shall be upgraded as specified in 4.4.3 or shall be retired as specified in 4.4.5:

- (1) Currently-in-service SCBA that were *not* certified as compliant with the 1997 edition of NFPA 1981, *Standard on Open-Circuit Self-Contained Breathing Apparatus for the Fire Service*, when the SCBA was manufactured
- (2) Currently-in-service SCBA that were *not* certified as compliant with the 2002 edition of NFPA 1981, *Standard on Open-Circuit Self-Contained Breathing Apparatus for Fire and Emergency Services*, when the SCBA was manufactured
- (3) Currently-in-service SCBA that were *not* certified as compliant with the 2007 edition of NFPA 1981, *Standard on Open-Circuit Self-Contained Breathing Apparatus (SCBA) for Emergency Services*, when the SCBA was manufactured
- (4) Currently-in-service SCBA that were *not* certified as compliant with the 2013 edition of NFPA 1981, *Standard on Open-Circuit Self-Contained Breathing Apparatus (SCBA) for Emergency Services*, when the SCBA was manufactured

4.4.2.1 The provisions of 4.4.4 shall apply to SCBA that are not covered by any of the four categories specified in 4.4.2.

4.4.3 SCBA shall be permitted to be upgraded to be compliant with the 2013 edition of NFPA 1981, *Standard on Open-Circuit Self-Contained Breathing Apparatus (SCBA) for Emergency Services*, in accordance with the SCBA manufacturer's and certification organization's instructions.

Where SCBA do not meet either 4.4.1, 4.4.2 or cannot be upgraded as per 4.4.3 the set should be scheduled for retirement. This is in keeping with Section 4.4.4 as outlined below.

4.4.4* Where currently-in-service SCBA do not meet the requirements of 4.4.1 and are covered by any of the following categories, such SCBA shall be retired as specified in 4.4.5:

- (1) Currently-in-service SCBA that met only the requirements of the 1971 edition of NFPA 19B, *Standard on Respiratory Protective Equipment for Firefighters*, when the SCBA was manufactured
- (2) Currently-in-service SCBA that met only the requirements of the 1981 edition of NFPA 1981, *Standard on Open-Circuit Self-Contained Breathing Apparatus for Fire Fighters*, when the SCBA was manufactured
- (3) Currently-in-service SCBA that met only the requirements of the 1987 edition of NFPA 1981, *Standard on Open-Circuit Self-Contained Breathing Apparatus for Fire Fighters*, when the SCBA was manufactured
- (4) Currently-in-service SCBA that met only the requirements of the 1992 edition of NFPA 1981, *Standard on Open-Circuit Self-Contained Breathing Apparatus for Fire Fighters*, when the SCBA was manufactured
- (5) Currently-in-service SCBA that were purchased prior to July 29, 1981 that did not meet the requirements of the 1971 edition of NFPA 19B, *Standard on Respiratory Protective Equipment for Firefighters*, when the SCBA was manufactured
- (6) Currently-in-service SCBA that were purchased after July 29, 1981 and prior to June 30, 1987 that did not meet the requirements of the 1981 edition of NFPA 1981, *Standard on Open-Circuit Self-Contained Breathing Apparatus for Fire Fighters*, when the SCBA was manufactured
- (7) Currently-in-service SCBA that were purchased after June 30, 1987 and prior to August 14, 1992 that did not meet the requirements of the 1987 edition of NFPA 1981, *Standard on Open-Circuit Self-Contained Breathing Apparatus for Fire Fighters*, when the SCBA was manufactured
- (8) Currently-in-service SCBA that were purchased after August 14, 1992 and prior to August 15, 1997 that did not meet the requirements of the 1992 edition of NFPA 1981, *Standard on Open-Circuit Self-Contained Breathing Apparatus for Fire Fighters*, when the SCBA was manufactured

In summary, if following the current 2013 edition of NFPA 1852 the only sets that should currently be in service shall be compliant with the 1997, 2002, 2007 or 2013 Editions of NFPA 1981.

If your sets fall within the above year range and were not certified as compliant with NFPA 1981 (ie; Industrial Sets) then the sets shall be upgraded to be compliant with the 2013 Edition of NFPA 1981 or retired.

Any sets prior to the 1997 Edition of NFPA 1981 and that cannot be upgraded to the 2013 Edition of 1981 shall be retired.

A NOTE ON THE 2013 EDITION OF NFPA 1852 AND RETIREMENT AGE

The previous edition of the NFPA 1852 standard was in 2007. The 2013 edition has changed the retirement age of the sets by five years. It was 1992; it is now 1997, as stated in the summary above. Fire and Emergency Services realizes that there are a number of sets in use in our Province manufactured between 1992 and 1997 editions that can still be tested and serviced following the manufacturer's instructions. A fire department may decide to keep these sets in service while planning for replacement. If for any reason your service provider can no longer perform the recommended maintenance, testing or repairs for these sets, they should be retired.

Cylinder Hydrostatic Testing and Replacement

Transport Canada (TC) requires that all high pressure SCBA air cylinders be hydrostatically tested by an approved cylinder requalifier (testing agency) as per the following:

Steel	Every five years	No end of service life
Aluminum	Every five years	No end of service life
Composite	Every three years	15 year service life

Some manufacturers have now obtained a Permit of Equivalent Safety through Transport Canada for their composite carbon fibre cylinders. One exemption of this permit is the 3 year hydrostatic test interval, thus allowing it to go to 5 years. A search of your carbon fibre cylinder SU number on the Transport Canada web site is available for this information, see <http://www.tc.gc.ca/eng/tdg/safety-menu.htm>

Cylinders may fail a hydrostatic test and inspection for a number of reasons including; out of acceptable limits, dents, gouges, cracks, pitting and rusting.

Note: Composite cylinders refer to fiberglass and Kevlar half-wraps and full wraps, carbon fibre, and all other cylinders that are constructed of two separate materials.

Composite cylinders must be taken out of service and destroyed after 15 years from the date of manufacture.

CAN/CSA-Z94.4-02 (R2008), the Canadian Standard on the Selection, Use and Care of Respirators requires that the air in the cylinder be changed every 12 months which is a change from the previous requirement of 90 days.

Fire departments must keep a written log of hydrostatic testing and filling of each cylinder. This includes the type of cylinder, when it was manufactured, when hydrostatic testing is due, when it was done and the date, location, and person who filled the cylinder. Air cylinders that have gone beyond their hydrostatic test date must not be filled by anyone.

Air compressor and Fill Station

The most important part of a firefighter's respiratory system protection is the quality of the air contained in their SCBA cylinder. And like the old computer adage of "garbage in, garbage out" having cylinders full of quality air is paramount.

For those operating with air compressors, ensure that the required periodic maintenance and purification filter change out is completed. Compressor breathing air is required to be tested/analyzed on a six (6) month basis as per CAN/CSA-Z180, the Canadian Standard on Compressed Breathing Air and Systems. Check with an authorized requalifier on the hydrostatic test intervals for your cascade cylinders.

Air fill stations, for either stationary or mobile SCBA, provide the cylinder refill operator with a greater measure of safety over simply laying a cylinder on the floor or bench during the refilling process. The degree of safety varies between types of fill stations. Class 2, Class 3 and Class 4 are informal classifications. The words "Containment" and "Class 2" refer to the same type. Class 3 refers to a deflecting style of tall fill station that provides a steel blast shield between the operator and the cylinders being refilled. It does not contain the air blast of a ruptured cylinder, nor the cylinder fragments. A Class 4 fill station is sometimes called a "PopCan". It is considered a small fragmentation deflecting unit that does not contain the air blast of a ruptured cylinder, nor the cylinder fragments. Class 4 units offer the operator the least amount of protection of the three types of fill stations. The two types most commonly found in our Province are Class 2 and 4.

CSA Z180 1-13, Compressed Breathing Air and Systems, contains the requirements for fill stations. A Class 2 fill station would meet these requirements. A Class 4 would not. FES-NL and Service NL recommends a Class 2 refill station, however a class 4 fill station would be considered as acceptable subject to meeting specific conditions.



Example of a class 2 refill station.

A Class 4 refill station would be acceptable to FES-NL and Service NL under specific conditions.

- If it is obtained through a manufacturer and installed as per their instructions.
- Written safe work procedures must be developed and implemented. Ensuring appropriate personal protective equipment (eye and hearing protection)
- The fill station at no time can be positioned to operate in an area where there are persons above the system (i.e. second floor of fire hall).
- For added operator safety, the operator should never lean over nor reach over the cylinder during the filling process.
- Units should only be installed vertically.
- Cylinder refilling carries inherent dangers. Proper refill training is required.



Example of a class 4 refill station.

Firefighter Training in the Use and Operation

Firefighter training in the use and operation of SCBA is critical to an effective SCBA program. Firefighters must understand all the operational features of their particular set. New firefighters will require more training to develop confidence in the use of SCBA. Even experienced firefighters should refresh their skills on an annual basis. The fire department should have a SOP/GOP on SCBA training requirements for all firefighters.

Under the 2009 OH&S regulations “Where required, an employer shall establish, implement and maintain, and revise where necessary, a written respiratory protection program in accordance with CAN/CSA-Z94.4-02, the Standard on the Selection, Use and Care of Respirators”.

Section 7.1.4 of CAN/CSA-Z94.4-02 states that under no circumstance shall a person use a tight fitting respirator until a satisfactory qualitative or quantitative fit test has been achieved.

FES-NL fully supports that fire departments implement fit testing into their respiratory protection program.

Chapter 6, of the *Essentials of Fire Fighting*, 6th Edition is an excellent source of information on respiratory protection, donning, doffing, and using SCBA. Chapter 8 will take you into building search with Chapter 15 covering fire control.

Under the NFPA 1001 Firefighter I program as delivered by FESNL there are a number of Job Performance Requirements (JPR’s) that can be referenced for skill development in the use of SCBA. The following JPR’s relate to SCBA use: #'s 7, 9, 10, 16, 18, 19, 20, 24, 25, 27, 28, 29, 37 and 44. These are available by calling FESNL or visiting our web site at <http://www.gov.nl.ca/fes/>

There are many other sources of information on SCBA training and each fire department is encouraged to develop a resource file of information.

The Fire Chief or the officer in charge is responsible to ensure that all firefighters using SCBA are qualified to perform the task. All training including SCBA training should be recorded, whether it be by chart, written log or computerized data base.

Summary:

- Evaluate existing SCBA units to ensure compliance with NFPA standards.
- Develop a one to three year plan to replace or upgrade non-compliant sets and seek council funding to meet the requirements of the plan.

- Ensure that existing SCBA units are maintained as per the manufacturer's recommendations.
- Maintain a written log of air cylinder testing and refilling.
- Ensure that air cylinders are hydrostatically tested as per TC requirements and that all composite cylinders are taken out of service at the end of service life, (15 years).
- Ensure that the fire department has a written SOP/GOP on the use, operation, care and maintenance of the SCBA
- Ensure that the firefighters are adequately trained in the use and operation of the SCBA.
- Maintain a written log of all training.

For further information please contact Fire and Emergency Services-NL at:

Telephone:	Deer Lake	635-4153	Fax:	635-4163
Telephone:	St. John's	729-1608	Fax:	729-2524
Telephone:	Grand Falls-Windsor	292-4414	Fax:	292-4415
Telephone:	Clareville	466-4109	Fax:	466-1306
Telephone:	Happy Valley Goose Bay	896-7957	Fax:	896-7956