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NFPA 1404 Fire Department Self-Contained Breathing Apparatus Program 1989 Edition

National Fire Protection Association, 1 Batterymarch Park, PO Box 9101, Quincy, MA 02269-9101

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Policy Adopted by NFPA Board of Directors on December 3, 1982

The Board of Directors reaffirms that the National Fire Protection Association recognizes that the toxicity of the products of combustion is an important factor in the loss of life from fire. NFPA has dealt with that subject in its technical committee documents for many years.

There is a concern that the growing use of synthetic materials may produce more or additional toxic products of combustion in a fire environment. The Board has, therefore, asked all NFPA technical committees to review the documents for which they are responsible to be sure that the documents respond to this current concern. To assist the committees in meeting this request, the Board has appointed an advisory committee to provide specific guidance to the technical committees on questions relating to assessing the hazards of the products of combustion.

Statement on NFPA Procedures

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NFPA 1404

Standard for a

Fire Department Self-Contained Breathing Apparatus Program

1989 Edition

This edition of NFPA 1404, *Standard for a Fire Department Self-Contained Breathing Apparatus Program*, was prepared by the Technical Committee on Fire Service Training and acted on by the National Fire Protection Association, Inc. at its Annual Meeting held May 15-18, 1989 in Washington, DC. It was issued by the Standards Council on July 14, 1989, with an effective date of August 7, 1989.

The 1989 edition of this document has been approved by the American National Standards Institute.

Origin and Development of NFPA 1404

This is a new standard, developed in response to a perceived need. The Committee on Fire Service Training saw that there were no standards on a fire department program for self-contained breathing apparatus, and that the lack of guidance on subject areas like training, maintenance, and SCBA program evaluation could cause serious problems for the fire service. It is the hope of the Technical Committee that the void has been filled in a practical and reasonable manner.

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This list represents the membership at the time the Committee was balloted on the text of this edition. Since that time, changes in the membership may have occurred.

NOTE: Membership on a Committee shall not in and of itself constitute an endorsement of the Association or any document developed by the Committee on which the member serves.

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NOTICE: An asterisk (*) following the number or letter designating a paragraph indicates explanatory material on that paragraph in Appendix A.

Information on referenced publications can be found in Chapter 9 and Appendix C.

Chapter 1 Introduction

1-1 Scope. This standard contains minimum requirements for a fire service respiratory protection program. These requirements are applicable to organizations providing fire suppression, fire training, rescue and respiratory protection equipment training, and other emergency services including public, military, and private fire departments and fire brigades.

1-2* Purpose. The purpose of this standard is to specify the minimum requirements of a respiratory protection program for a fire department. This includes safety procedures for those involved in fire suppression, rescue, training, and related activities in a toxic or contaminated environment.

1-2.1 Many of the performance objectives of this standard may be achieved in a variety of ways. The achievement of these objectives is intended to help prevent accidents, injuries, and exposure to harmful environments. They will also help to develop an awareness of the critical importance of a respiratory protection program to the health and welfare of personnel who are required to work in hazardous atmospheres.

1-2.2 Nothing herein is intended to restrict any authority having jurisdiction from exceeding these minimum requirements.

1-3 Definitions. Unless expressly stated elsewhere, the following terms shall, for the purposes of this standard, have the meanings indicated below.

ANSI. American National Standards Institute.

Approved. Acceptable to the "authority having jurisdiction."

NOTE: The National Fire Protection Association does not approve, inspect or certify any installations, procedures, equipment, or materials nor does it approve or evaluate testing laboratories. In determining the acceptability of installations or procedures, equipment or materials, the authority having jurisdiction may base acceptance on compliance with NFPA or other appropriate standards. In the absence of such standards, said authority may require evidence of proper installation, procedure or use. The authority having jurisdiction may also refer to the listings or labeling practices of an organization concerned with product evaluations which is in a position to determine compliance with appropriate standards for the current production of listed items.

Authority Having Jurisdiction. The "authority having jurisdiction" is the organization, office or individual responsible for "approving" equipment, an installation or a procedure.

NOTE: The phrase "authority having jurisdiction" is used in NFPA documents in a broad manner since jurisdictions and "approval" agencies vary as do their responsibilities. Where public safety is primary, the "authority having jurisdiction" may be a federal, state, local or other regional department or individual such as a fire chief, fire marshal, chief of a fire prevention bureau, labor department, health department, building official, electrical inspector, or others having statutory authority. For insurance purposes, an insurance inspection department, rating bureau, or other insurance company representative may be the "authority having jurisdiction." In many circumstances the property owner or his designated agent assumes the role of the "authority having jurisdiction"; at government installations, the commanding officer or departmental official may be the "authority having jurisdiction."

Closed-Circuit SCBA. A recirculation-type SCBA in which the exhaled gas is rebreathed by the wearer after the carbon dioxide has been removed from the exhalation and the oxygen content within the system has been restored from sources such as compressed breathing gas, chemical oxygen, and liquid oxygen.

Compressed Breathing Gas. A mixture of oxygen or air stored in a compressed state and supplied to the user in gaseous form. Compressed breathing gas shall meet at least the requirements of the specification for Type I, Grade D breathing air, and liquid air shall meet at least the requirements for Type II, Grade B breathing air as described in ANSI Z86.1, *Commodity Specification for Air.*

Facepiece. The component of a respirator that covers the wearer's nose, mouth, and eyes. It is designed to make a gastight or particle-tight fit with the face and includes the headbands, exhalation valves, and other necessary components required to connect it to a respirable gas source.

Fire Apparatus. A fire department emergency vehicle used for fire suppression, rescue, or other specialized functions.

Fire Department. An organization providing rescue, fire suppression, and related services. For the purposes of this standard, the term "fire department" shall include any public, private, or military organization engaging in this type of activity.

Hazardous Atmosphere. Any atmosphere that is oxygen deficient or that contains a toxic or disease-producing contaminant. A hazardous atmosphere may or may not be immediately dangerous to life and health.

Labeled. Equipment or materials to which has been attached a label, symbol or other identifying mark of an organization acceptable to the "authority having jurisdiction" and concerned with product evaluation, that maintains periodic inspection of production of labeled equip-

ment or materials and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.

Listed. Equipment or materials included in a list published by an organization acceptable to the "authority having jurisdiction" and concerned with product evaluation, that maintains periodic inspection of production of listed equipment or materials and whose listing states either that the equipment or material meets appropriate standards or has been tested and found suitable for use in a specified manner.

NOTE: The means for identifying listed equipment may vary for each organization concerned with product evaluation, some of which do not recognize equipment as listed unless it is also labeled. The "authority having jurisdiction" should utilize the system employed by the listing organization to identify a listed product.

Maintenance. Any work, program, or system of keeping the authority having jurisdiction's respiratory devices in a usable condition.

Member. A person involved in performing the duties and responsibilities of a fire department, under the auspices of the organization. For the purposes of this standard, a fire department member may be a full-time or part-time employee, a paid or unpaid volunteer, may occupy any position or rank within the fire department, and may or may not engage in emergency operations.

MSHA. Mine Safety and Health Administration.

NIOSH. National Institute for Occupational Safety and Health.

NIOSH/MSHA Approved. Tested and certified jointly by the National Institute for Occupational Safety and Health (NIOSH) of the U.S. Department of Health and Human Services and the Mine Safety and Health Administration (MSHA) of the U.S. Department of Labor, in accordance with the requirements of Title 30, *Code of Federal Regulations (CFR)*, Part 11, Subpart H. Approval by the Bureau of Mines of the U.S. Department of Interior shall not fall under the definition of approved. For the approval to remain in effect, the SCBA must be used and maintained in the approved condition.

Open-Circuit SCBA. An SCBA in which exhalation is vented to the atmosphere and not rebreathed. There are two types of open-circuit SCBA:

(a) *Demand Type (Negative Pressure).* An SCBA in which the pressure inside the facepiece, in relation to the immediate environment, is negative during any part of the inhalation or exhalation cycle when tested in accordance with 30 CFR, Part 11, Subpart H by NIOSH and using NIOSH test equipment.

(b) *Pressure Demand Type (Positive Pressure).* An SCBA in which the pressure inside the facepiece, in relation to the immediate environment, is positive during both inhalation and exhalation when tested in accordance with 30 CFR, Part 11 Subpart H by NIOSH and using NIOSH test equipment.

OSHA. Occupational Safety and Health Administration.

Oxygen Deficient Atmosphere. Oxygen concentrations less than 19.5 percent.

Point of No Return. The point at which the remaining operation time of breathing apparatus equals the time necessary to return safely to a nonhazardous atmosphere.

Respiratory Hazard. Any exposure to products of combustion, superheated atmospheres, toxic gases, vapors, or dust, potentially explosive or oxygen deficient atmospheres, or any condition that creates a hazard to the respiratory system.

Respiratory Protection Equipment (RPE). Those devices that are designed to protect the respiratory system against exposure to gases, vapors or particulate. Examples are filter respirators, chemical cartridge or canister respirators, air-line respirators, powered air-purifying respirators, and self-contained breathing apparatus.

Respiratory Protection Program. A systematic and comprehensive program of training, use, and maintenance of respiratory protection devices and related equipment.

SCBA. See self-contained breathing apparatus.

Self-Contained Breathing Apparatus (SCBA). A respirator worn by the user that supplies a respirable atmosphere, that is either carried in or generated by the apparatus, and is independent of the ambient environment.

Shall. Indicates a mandatory requirement.

Should. Indicates a recommendation or that which is advised but not required.

Standard Operating Procedures. Written instructions that document and define the manner in which activities shall be conducted.

1-4 Coordinated Administrative Policies.

1-4.1 The authority having jurisdiction shall adopt and maintain a respiratory protection program that meets the requirements of Section 5-3 of NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program*.

1-4.2 The authority having jurisdiction shall establish and enforce written standard operating procedures for the use of respiratory protection equipment.

1-4.2.1* Utilization policies shall include:

(a) When respiratory protection equipment will be used;

(b) When to exit due to reduced air supply;

(c) Procedures for insuring proper facepiece fit;

(d) The cleaning of respiratory protection equipment components.

1-4.3 The authority having jurisdiction shall provide respiratory protection equipment for each member at the scene of an incident who may be exposed to respiratory hazards.

1-4.4 The authority having jurisdiction shall conduct an

ongoing respiratory protection training program that meets the requirements of this standard.

1-4.5 The respiratory protection training program shall be conducted according to written standard operating procedures.

1-4.6 The authority having jurisdiction shall establish written training policies for a respiratory protection program.

1-4.6.1* Training policies shall include, but not be limited to:

(a) Identifying the various types of respiratory protection equipment;

(b) Responsibilities of personnel to obtain and maintain proper facepiece fit;

(c) Responsibilities of personnel for proper cleaning and maintenance;

(d)* Identifying the factors that will affect the duration of air supply;

(e)* Determining the point of no return for each fire fighter;

(f) Responsibility of personnel for using respiratory protection equipment in hazardous atmosphere.

1-4.7 The authority having jurisdiction shall establish written standard operating procedures for inspection, maintenance, repair, and testing of respiratory protection equipment in accordance with NFPA 1500, ANSI Z88.5-1981, and the manufacturer's recommendations.

1-4.7.1 All SCBA shall be inspected, maintained, and tested in accordance with the authority having jurisdiction's standard operating procedures.

Chapter 2 Provisions of SCBA

2-1 Inventory and Allocation of SCBA.

2-1.1* Sufficient SCBA shall be available at the scene to provide one unit for each member who may be exposed to respiratory hazards.

2-1.2* Sufficient reserve SCBA shall be provided to maintain the required number in service when maintenance or repairs are being conducted.

2-1.3 An adequate reserve air supply shall be provided by use of reserve cylinders or by an on-scene refill capability, or both.

2-1.4 When carried on apparatus, SCBA shall be secured in brackets or carrying cases and shall be stored in a manner that will protect the regulator openings and facepiece from contamination by road dirt, dust, or weather conditions.

2-1.5 All SCBA shall be stored in a ready-for-use condition, protected from damage or exposure to rough handling, excessive heat or cold, moisture, or other elements.

2-2 NIOSH/MSHA Certification.

2-2.1* SCBA of the open-circuit design shall be positive pressure and shall meet the requirements of NFPA 1981, *Standard on Open-Circuit Self-Contained Breathing Apparatus for Fire Fighters*. Closed-circuit type SCBA shall be NIOSH/MSHA approved with a minimum service duration of thirty (30) minutes and shall operate in the positive pressure mode only.

2-2.2 The authority having jurisdiction shall maintain a complete inventory record of all SCBA. Each SCBA and cylinder shall be individually identified by serial number or inventory number.

2-2.3* An individual record of each SCBA regulator and harness assembly shall be maintained. This record shall include inventory or serial numbers, date of purchase, date of manufacture, date placed in service, location, maintenance and repairs, replacement parts, upgrading, and test performance.

2-2.4* A record shall be maintained for each SCBA cylinder. This record shall include inventory or serial number, the date of purchase, date of manufacture, date placed in service, location, hydrostatic test pressure and dates, and inspection and repairs. Hydrostatic test dates shall be placed on each cylinder according to the manufacturer's instructions and applicable government agencies.

2-2.5 A record shall be maintained for each SCBA facepiece. This record shall include inventory or serial numbers, date of purchase, location, maintenance and repairs, replacement parts, upgrading, and test performance.

2-3 Acceptance Testing Program.

2-3.1 Respiratory protection equipment shall be selected according to the hazards a fire fighter may be exposed to and the operations expected to be performed.

2-3.2* Prior to being placed in service, all SCBA that are acquired shall be inspected and tested by factory certified personnel. Documentation of testing shall be provided to the fire department and included with the records specified in 2-2.3.

(a) All major components shall be inspected for compatibility, completeness of assembly, and signs of damage.

(b) All components shall be tested for proper function and performance. This shall include manipulation of all adjustable slides, buckles, control valves, levers, etc. Further, the facepiece, regulator mechanism, alarm, and cylinder valve shall be tested on manufacturer's test equipment for compliance with specifications.

2-4 Replacement Program.

2-4.1 The authority having jurisdiction shall establish a SCBA replacement or upgrade program in order that all open circuit SCBA are in compliance with the requirements of NFPA 1981, *Standard on Open-Circuit Self-Contained Breathing Apparatus for Fire Fighters*.

2-4.2 The authority having jurisdiction shall have removed from service all open-circuit SCBA not in compliance with 2-4.1 of this standard.

Chapter 3 Emergency Scene Use

3-1 Criteria for Use.

3-1.1 The authority having jurisdiction shall require respiratory protection to be used by all personnel who may be exposed to respiratory hazards in the performance of their duties.

3-1.2* Respiratory protection shall be used by all personnel who are exposed to respiratory hazards or who may be exposed to such hazards without warning. Personnel who are operating in areas that may be subject to the hazards with sufficient warning to don respiratory protection equipment, shall have respiratory protection equipment readily available for use.

3-1.3* Respiratory protection equipment shall be used by all personnel operating in confined spaces, below ground level, or where the possibility of a contaminated or oxygen deficient atmosphere exists until or unless it can be established by monitoring and continuous sampling that the atmosphere is not contaminated or oxygen deficient.

3-1.4 When used, respiratory protection equipment shall be properly worn according to the manufacturer's requirements.

3-1.5* Personnel shall be monitored for indications of fatigue or other factors that can result in unsafe conditions.

3-1.6 Members using SCBA shall operate in teams of two or more who are in communication with each other through visual, audible, physical, safety guide rope, electronic, or other means to coordinate their activities and are in close proximity to each other to provide assistance in case of an emergency.

3-1.7* When members are involved in operations that require the use of SCBA or other respiratory protective equipment, at least one member shall be assigned to remain outside the area where respiratory protection is required. This member shall be responsible for maintaining a constant awareness of the number and identity of personnel using SCBA, their location and function, and time of entry. Members with SCBA shall be available for rescue.

Chapter 4 SCBA Training

4-1 Recruit Training Program.

4-1.1* All training related to the use, maintenance, and care of respiratory protection equipment shall be provided by instructors meeting the objectives of Level I of NFPA 1041, *Standard for Fire Service Instructor Professional Qualifications*.

4-1.2* Records shall be maintained of all respiratory protection training including training of personnel involved in maintenance of such equipment.

4-1.3* Minimum performance standards shall be established by the authority having jurisdiction for donning respiratory protection equipment.

4-2 Annual Personnel Certification.

4-2.1 Prior to initial training, personnel shall be examined and certified by a physician as being medically and physically fit in accordance with Chapter 2 of NFPA 1001, *Standard for Fire Fighter Professional Qualifications*.

4-2.1.1* If the physician certifying personnel for respiratory protection equipment use is other than the fire department physician, the examination report shall be subject to the approval of the fire department physician.

4-2.2 All personnel who may be required to use respiratory protection equipment shall be medically certified by a physician on an annual basis in accordance with 5-3.6 of NFPA 1500, *Fire Department Occupational Safety and Health Program*.

4-2.3* The facepiece seal capability of each member qualified to use SCBA shall be verified by qualitative fit testing on an annual basis and any time that new types of SCBA are issued. Each new member shall be tested before being permitted to use SCBA in a hazardous atmosphere. Only members with a properly fitting facepiece shall be permitted by the fire department to function in a hazardous atmosphere with self-contained breathing apparatus.

4-2.4 Beards or facial hair that interfere with the facepiece seal shall be prohibited for personnel required to use respiratory protection equipment. If eyeglasses are worn, the person shall use frames that do not pass through the seal area of the facepiece.

4-2.5* Personnel required to wear respiratory protection equipment in conjunction with specialized protective equipment, for example, proximity suits or totally encapsulated suits, shall be evaluated for physical and emotional stresses associated with these specialized applications.

4-2.6 The authority having jurisdiction shall be responsible for establishing a program that provides personnel training in the proper and safe use and limitations of respiratory protection equipment and related equipment, on the policies and procedures related to the authority having jurisdictions's respiratory protection program, and in those areas outlined by this standard.

The program shall also provide a means of evaluating fire fighter performance in the use of respiratory protection equipment, and their knowledge of the respiratory equipment used. Respiratory protection training shall be conducted as an ongoing training program.

4-2.7 All members who are permitted to use SCBA shall at least annually successfully demonstrate their ability to meet the performance standards set by the authority having jurisdiction.

4-2.8 All fire fighters shall meet the training and performance requirements of this standard prior to actual emergency operations during which they may be expected to wear respiratory protection equipment.

4-3 SCBA Safety.

4-3.1 The authority having jurisdiction shall provide members with the most current information available concerning the safe operation of their respiratory protection equipment.

4-3.2 Standard operating procedures shall be written concerning the safe operation of respiratory protection equipment during training and while in use on the emergency scene.

4-3.3 The SCBA training program shall provide personnel training in the safe operation of SCBA, use and limitations of SCBA equipment, and the individual limitations of personnel who may be required to use SCBA.

4-3.4 Personnel shall successfully demonstrate their knowledge of safety procedures and practices through an evaluation process that is established by the authority having jurisdiction.

4-4 Ability to Act Properly in Emergencies.

4-4.1* The authority having jurisdiction shall provide a means for evaluating their personnel in the use and operation of SCBA under simulated emergency incidents.

4-4.2 Periodic evaluations shall be held to determine the proficiency level of personnel while using SCBA under simulated emergency incident conditions. These simulated emergency incident conditions shall be as realistic as possible while maintaining a safe level of protection for the wearer.

4-4.3 Fire fighters shall successfully demonstrate their ability to operate under simulated emergency incident conditions.

4-5 Requirements for the Progression of Training. Recruit training shall include the identification of SCBA components, terminology, and equipment specifications:

(a) Operation of SCBA and related equipment;

(b) Inspection and maintenance of equipment;

(c) Donning methods employed by the authority having jurisdiction;

(d) With SCBA donned, perform related emergency scene activities, advance hose lines, climb ladders, crawl through windows and confined spaces, perform rescues, etc.;

(e) Understand organizational policies and procedures concerning safety, emergency operations, use, inspection, and maintenance;

(f) Perform activities under simulated emergency conditions;

(g) Successfully meet all performance standards of the authority having jurisdiction.

4-6 Evaluation of SCBA Training. All personnel who may be required to wear SCBA shall be periodically evaluated on knowledge of SCBA equipment operation, safety, organizational policies and procedures, and facepiece seal. This evaluation shall occur no less than annually.

4-7* Required Training. This section sets forth, in a sequential format, a logical progression towards achieving training goals, first by requiring minimum policies to be established by the authority having jurisdiction; next by requiring a theoretical understanding of SCBA; and concluding with the development of practical skills.

4-8 Recognizing Hazards that May Be Encountered. The authority having jurisdiction's training program shall evaluate the ability of personnel to:

(a) Identify hazardous environments that may require the use of respiratory protection;

(b) Identify the primary gases produced by combustion;

(c) Identify the primary characteristics of gases that may be present or generated by processes other than combustion;

(d)* Identify any toxic gases that may be unique to their jurisdiction resulting from manufacturing or industrial processes.

4-9 Understanding the Components of SCBA. The authority having jurisdiction's training program shall evaluate the ability of personnel to:

(a) Identify the components of facepieces, regulators, harnesses, and cylinders used by the authority having jurisdiction;

(b) Demonstrate the operation of the SCBA used by the authority having jurisdiction;

(c) Describe the operation of the SCBA used by the authority having jurisdiction;

(d)* Describe the potential incompatibility of different makes and models of SCBA.

4-10 Understanding the Safety Features and Limitations of SCBA. The authority having jurisdiction's training program shall evaluate the ability of personnel to:

(a)* Describe the operational principles of warning devices required on SCBA;

(b) Identify the limitations of the SCBA used by the authority having jurisdiction;

(c)* Describe the limitations of the SCBA's ability to protect the body from absorption of toxins through the skin.

(d) Describe the procedures to be utilized if unintentionally submerged in water while wearing SCBA.

(e) Demonstrate alternative means of communications when wearing SCBA.

4-11 Donning and Doffing SCBA. The authority having jurisdiction's training program shall evaluate the ability of personnel to:

(a) Demonstrate the proper techniques for donning and doffing all types of SCBA used by the authority having jurisdiction while wearing the full protective clothing used by the authority having jurisdiction;

(b) Demonstrate that a proper face to facepiece seal has been achieved.

4-12 Practical Application in SCBA Training.

4-12.1 The authority having jurisdiction's training program shall evaluate the ability of personnel to:

(a) Demonstrate knowledge of the components of respiratory protection;

(b)* Demonstrate in conditions of obscured visibility the use of all types of SCBA utilized by the authority having jurisdiction;

(c) Demonstrate the emergency operations that may be required when a SCBA fails;

(d)* Demonstrate emergency techniques using SCBA to assist other fire fighters, conserve air, and show restrictions in use of bypass valves;

(e) Demonstrate the use of SCBA in limited or confined spaces.

4-12.2* Training shall be conducted under simulated stressful circumstances to promote immediate response to emergency operations.

4-12.3 Annual SCBA training shall be given to each person required to use breathing apparatus. This shall include re-evaluation of the individual for acceptable facepiece seal.

4-13 Training in the Maintenance and Testing of SCBA. The authority having jurisdiction's training program shall evaluate the ability of personnel to:

(a) Demonstrate the proper procedure for conducting routine and post-incident inspections of SCBA;

(b) Demonstrate a thorough examination and test of the SCBA;

(c)* Demonstrate the proper procedure for reporting defective SCBA.

4-14* Training in the Storage of SCBA and Reserve SCBA Cylinders. The authority having jurisdiction's training program shall evaluate the ability of personnel to demonstrate the proper storage of SCBA. This shall include, but not be limited to:

(a) SCBA mounted on apparatus;

(b) SCBA in carrying cases;

(c)* Individually issued facepieces;

(d)* Reserve air cylinders.

Chapter 5 SCBA Inservice Inspection

5-1 Daily/Weekly Service Checks.

5-1.1 Inspection, maintenance, and repair records shall be kept as required by Section 2-2 of this standard.

5-1.2* When fire apparatus is in daily use, routine inspections shall be conducted of all respiratory protection equipment and reserve cylinders on the apparatus at least daily. If fire apparatus is not in daily use, routine inspections shall be conducted at least weekly. All inspections shall be in accordance with the requirements of the manufacturer of the specific respiratory protection equipment.

5-1.3* Monthly inspection of respiratory protection equipment shall be conducted and shall include a check of the entire unit for deteriorated components, airtightness of cylinders and valves, gauge comparison, reducing valve, and bypass valve operation, regulator, exhalation valve and low air alarm. The SCBA shall be cleaned and returned to service.

5-1.4* Inspection of respiratory protection equipment shall be conducted by the user before and after each use.

Chapter 6 SCBA Maintenance

6-1 User Maintenance.

6-1.1* All maintenance and repairs on SCBA shall be conducted in accordance with manufacturer's instructions by qualified personnel.

6-1.2* Annual inspection and servicing of SCBA shall be conducted by qualified personnel and at any time that an operational problem is reported.

6-1.3 Annual inspection and servicing shall include at least the following components and the manufacturer's recommendations:

(a) Disassembling of SCBA into major components;

(b) Flow testing the regulator;

(c) Disassembling and cleaning of regulator;

(d) Replacement of worn parts, or those suggested by by manufacturer, in regulator assemblies;

(e) Disassembling of low-air alarm, cleaning, and replacement of necessary components;

(f) Cleaning and replacement of needed components of the facepiece and harness assembly, and replacement of components as needed or scheduled;

(g) Reassembling of entire SCBA and testing for proper operation of all components;

(h) Proper recording of all maintenance performed on forms provided, and return of SCBA to service.

6-2 Preventative Maintenance Program.

6-2.1 A preventative maintenance program shall be established by the authority having jurisdiction for all SCBA provided in the organization.

6-2.2 The established SCBA preventative maintenance program shall be conducted in order to prevent SCBA malfunction and/or failures of equipment during use.

6-2.3 The SCBA maintenance program shall be conducted by qualified fire department members or by another organization using personnel. Qualified personnel shall be trained and certified by the manufacturer.

6-2.4 Organizations without an internal SCBA maintenance program may contract with an outside organization to provide SCBA preventative maintenance services.

6-3 Cylinder Testing and Maintenance.

6-3.1 SCBA cylinders shall be hydrostatically tested within the periods specified by the manufacturer and the applicable governmental agencies.

6-3.2* Internal inspections of SCBA cylinders shall be performed in conjunction with the required hydrostatic test.

6-3.3 External inspections of air cylinders shall be conducted in accordance with the manufacturer's recommendations for the specific type(s) of cylinders utilized by the authority having jurisdiction.

6-3.4 Air cylinders damaged beyond the acceptable limits as specified by the manufacturer shall be removed from service.

Chapter 7 Breathing Air Program

7-1 Air Quality Control.

7-1.1* Air for SCBA taken from the regular production of a compressor and storage system shall meet the testing and quality requirements of the Compressed Gas Association G7.1 *Commodity Specification for Air*, with a minimum air quality of Grade D and a maximum dew point of -65 °F (-54 °C).

7-1.2* Air quality shall be tested at least every three (3) months by a qualified laboratory. Test samples shall be obtained from the regular production of the compressor and storage system. Immediate notification from the testing entity of air not meeting the specifications of the authority having jurisdiction shall be required.

7-1.3 Records shall be maintained for each air quality test. If required air quality is not being achieved, the use of the system shall be discontinued until repairs are made and verified by testing.

7-1.4* Any air cylinders that were filled with air that is suspected of not meeting air quality standards shall be emptied and purged.

7-2 Recharging Air Cylinders.

7-2.1 The air cylinders of all SCBA shall be maintained at not less than 90 percent of the rated pressure stamped on the cylinder. Cylinders having less than 90 percent of their rated pressure shall be segregated from full cylinders until they are refilled.

7-2.2 SCBA cylinders shall be refilled only with approved breathing quality air, as specified in Section 7-1 of this standard.

7-2.3 Written policies shall be established to ensure that air is obtained only from a source that meets the requirements of Section 7-1 of this standard. Refilling shall be conducted by qualified personnel using proper equipment and procedures.

7-2.4 Air cylinders shall be filled only by personnel who have been trained on the proper procedures and equipment.

7-2.5 The proper operating procedures and safety precautions shall be posted in a conspicuous location at the fill station.

7-2.6* Personnel assigned to operate fill station equipment shall visually inspect all cylinders before filling. Cylinders that do not meet the manufacturer's requirements due to defects or damage, or that have not met hydrostatic test requirements, shall be left unfilled and removed from service.

7-2.7* All air cylinders shall be refilled according to the manufacturer's instructions.

7-2.8 When a breathing air compressor system, mobile or fixed, is used, it shall be located in an area where the air is free from contamination.

7-2.9* The authority having jurisdiction shall have the ability to support emergency scene operations of extended duration by providing a reserve supply of air for SCBA.

7-2.10 Mobile breathing air compressor systems shall be equipped with monitoring equipment to detect carbon monoxide contamination and an automatic shut-down device that activates when the contraction of carbon monoxide exceeds the limits of Grade D air, 20 ppm.

7-2.11 All breathing air compressors shall have the air quality tested as required by 7-1.2 of this standard.

7-2.12 Equipment used to produce compressed air for SCBA shall be inspected and maintained according to the manufacturer's instructions.

7-2.13* All filters and other components of air purification systems shall be inspected and changed according to the manufacturer's instructions.

7-2.14 A record shall be maintained for each air compressor, fill station, cascade cylinder, purification system, and related equipment used to produce and store air for SCBA. The record shall indicate the date of purchase, location, inspection, maintenance, and testing of the device.

Chapter 8 Program Evaluation

8-1 Annual Review.

8-1.1 The authority having jurisdiction shall annually review the organization's respiratory protection program for the purpose of determining the need to upgrade or change various aspects of the program.

8-1.2 An annual review of the respiratory protection program policies and procedures shall be conducted to ensure they are being followed, and to make necessary adjustments for the effective operation of the program.

8-1.3 Problem areas involving personnel, equipment, inspection, maintenance, and repair schedules or resources shall be addressed on a timely basis.

8-1.4 Any failures encountered in the respiratory protection program dealing with personnel, training, or equipment shall be analyzed and appropriate corrective action taken to preclude the reoccurrence of additional failure of a similar or related nature.

Chapter 9 Referenced Publications

9-1 The following documents or portions thereof are referenced within this standard and shall be considered part of the requirements of this document. The edition indicated for each reference is the current edition as of the date of the NFPA issuance of this document.

9-1.1 NFPA Publications. National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

NFPA 1001-1987, *Standard for Fire Fighter Professional Qualifications*

NFPA 1041-1987, *Standard for Fire Service Instructor Professional Qualifications*

NFPA 1500-1987, *Standard on Fire Department Occupational Safety and Health Program*

NFPA 1981-1987, *Standard on Open-Circuit Self-Contained Breathing Apparatus for Fire Fighters.*

9-1.2 Other Publications.

9-1.2.1 ANSI Publication. American National Standards Institute, 1430 Broadway, New York, NY 10018.

ANSI Z88.5-1981, *Respiratory Protection for the Fire Service.*

9-1.2.2 CGA Publication. Compressed Gas Association, 1235 Jefferson Davis Highway, Arlington, VA 22202.

CGA G7.1, *Commodity Specification for Air.*

9-1.2.3 US Government Publication. US Government Printing Office, Superintendent of Documents, Washington, DC 20402.

Title 30 CFR Part II.

Appendix A

This Appendix is not a part of the requirements of this NFPA document, but is included for information purposes only.

A-1-2 Organizations who train with or use respiratory protection equipment must recognize their responsibility for the safety and welfare of personnel. A part of this responsibility is the development and implementation of a comprehensive respiratory protection program. This standard will also assist an organization with the development of a respiratory protection program that meets the requirements of OSHA Standards 29 CFR 1910.134 and 29 CFR 1910.156 and NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program.*

A-1-4.2.1 Section 5-3.1 of NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program*, provides specific information on when SCBA is to be used.

A-1-4.6.1 The role of any training program is to generate acceptance of operational evolutions for coordination and skill. It must be recognized that equally important is the formulation of mental acceptance of proper procedures and the dispelling of false notions concerning the use and application of respiratory protection equipment. The state of the art in today's fire fighting environment requires a commitment by each authority having jurisdiction to insure maximum acceptance in the use of respiratory protection equipment.

A-1-4.6.1(d) Personnel should be instructed in the variables affecting duration of available air supply. Such factors as physical conditioning, physical exertion, emotional stability, etc., all bear on the duration of air supply.

A-1-4.6.1(e) Individuals should be thoroughly familiar with the "point of no return" theory so as not to enter hazardous areas beyond safe margins. The time that is required for entry, work, and exit from a hostile environment must be considered for each fire fighter, since it varies among individuals. The factors that help determine this point are: entry point, physical condition, size of the individual, work being performed, environment where the work is being performed, amount of air available when entering environment, other stresses (people trapped, difficult access, outside temperatures), type of protective clothing used, and training.

Even though these factors can change dramatically at the emergency scene, it is important that each fire fighter be provided an opportunity to help determine his/her individual point of no return.

To help determine their points of no return, fire fighters need to be subjected to a variety of activities where they are allowed to consume all the air from their cylinders. When determining point of no return it is important that the process be cumulative, beginning with the basic skills and progressing to levels of more difficult, stressful tasks utilizing SCBA.

The activity of determining an individual's point of no return is important for fire fighters. Although the following activities can be used for air consumption measurement, they can only approximate the point of no return. The following will help determine the consumption demands of air for an individual: maze work, obstacle course that includes fire fighting task, smoke building work, and combined activities.

It is important to determine two (2) points of air consumption relevant to the point of no return: the point from the start of the operation until the warning alarm operates and the time it takes to consume the remainder of the air available. These two (2) points can help determine the individual's point of no return.

A-2-1.1 The additional SCBA may be provided on each apparatus or by providing a vehicle with extra SCBA.

A-2-1.2 At least one additional reserve SCBA should be available at the scene of an incident for each ten (10) SCBA in use to provide for emergency replacement if a failure occurs.

A-2-2.1 The use of long duration SCBA should be restricted to operations in tunnels and underground structures, onboard ships, and other situations where the need for this capability is demonstrated.

Several manufacturers of SCBA currently market "buddy" or rescue breathing devices as a component of their SCBA. The use of such a device voids the NIOSH Certification of the SCBA and cannot be recommended at this time.

The National Institute for Occupational Safety and Health (NIOSH) has issued three bulletins concerning emergency escape breathing support systems and they are reprinted here for your information:

July 24, 1984

LETTER TO INTERESTED PERSONS

Subject: Approval of Self-contained Breathing Apparatus Equipped with Emergency Escape Breathing Support System

In accordance with the requirements of Title 30, *Code of Federal Regulations*, Part 11, (30 CFR 11), the Mine Safety and Health Administration (MSHA) and the National Institute for Occupational Safety and Health (NIOSH) presently test and approve open-circuit self-contained breathing apparatus. These apparatus are used regularly by the fire services for respiratory protection during firefighting and other associated rescue activities. Although the apparatus is designed principally for use by and protection of a single individual at one time, it has been recognized that the apparatus is being used to protect two persons simultaneously, either by sharing of the facepiece, or by adaptation of the apparatus to accept a second facepiece. The latter practice is permitted under the OSHA Fire Brigades Standard (29 CFR 1910.156).

MSHA and NIOSH have been asked by several interested persons to develop new performance requirements which would be applied to combination self-contained breathing apparatus and emergency escape breathing support systems (EEBSS). These requirements would be in addition to the present requirements of Part 11. These new requirements would be distributed to respirator manufacturers as prescribed in Section 11.63(c) of Part 11. This procedure, which has been used before by MSHA and NIOSH, would permit such manufacturers to apply for approval of combination self-contained breathing apparatus and EEBSS which meet the new performance requirements pursuant to MSHA and NIOSH authority within 30 CFR 11.63(c) in addition to the present applicable requirements of Part 11. MSHA and NIOSH would issue approvals which indicated that the device had also passed special test requirements in addition to the requirements of 30 CFR 11 Subpart H, following successful conclusion of testing and quality control review.

MSHA and NIOSH are requesting that you consider the potential approval of combination self-contained breathing apparatus and EEBSS and that you provide NIOSH with your comments on the practicability, safety, and need for such a device, recommendations you may have for performance criteria for such devices, and suggestions which MSHA and NIOSH might apply to limitations on and conditions for safe use of such devices.

Signed:

John B. Moran, Director
Division of Safety Research

November 6, 1984

NOTICE TO ALL RESPIRATOR MANUFACTURERS WITH MSHA/NIOSH-APPROVED RESPIRATORS

Until NIOSH establishes a formal position based upon our review of the information submitted pursuant to the NIOSH memorandum to Concerned Individuals dated July 24, 1984, titled, "Emergency Escape Breathing Support System" the following policy remains in effect:

The use of any component connected, interfaced, or assembled in combination with MSHA/NIOSH certified self-contained breathing apparatus (SCBA) for use as an emergency escape support breathing system or "Buddy Breather" to allow more than one individual access to the apparatus' life support system(s) either directly or indirectly, automatically voids the applicable certification during its use. Such invalidation continues in effect until the SCBA is returned to the certified status through required maintenance, test checkout, and reassembly as prescribed by the manufacturer's instruction manual and any other applicable user company policy/rules, legislative directives or enforceable regulations applicable to user health and safety.

Respirator manufacturers must not state in advertising or instructional literature that use of such components is approved by MSHA/NIOSH.

Signed:

John B. Moran, Director
Division of Safety Research

July 23, 1985

LETTER TO INTERESTED PERSONS

Subject: Self-contained Breathing Apparatus Equipped with Emergency Escape Breathing Support System

On July 24, 1984, the National Insitutue for Occupational Safety and Health sent a letter to interested persons, requesting that they consider the potential approval of combination self-contained breathing apparatus (SCBA) and emergency escape breathing support systems (EEBSS). Also, it was requested that they provide NIOSH with comments on the practicability, safety, and need for recommendations for performance criteria for, limitation on, and conditions for safe use of such devices.

NIOSH has received several written replies to and verbal comments on the subject. It appears, from our evaluation of those replies and comments, that there is, at present, insufficient information on which to base certification of safe and practicable combination SCBA and EEBSS. In addition, there is concern over the legal and moral considerations of use of such devices, which NIOSH is unable to address at this time.

NIOSH understands that Lawrence Livermore National Laboratory (LLNL) is proposing to study the design and use of combination SCBA and EEBSS. NIOSH proposed to work with LLNL and with fire service and other organizations in an effort to resolve the present concerns and needs.

At present, NIOSH will take no action on certification of combination SCBA and EEBSS.

Signed:

John B. Moran, Director
Division of Safety Research

A-2-2.3 A record or label should be maintained with each SCBA regulator and harness assembly noting the date of the most recent maintenance and testing and identifying the individual performing the functions. It is desirable to indicate the next due date for maintenance of the assembly. As an alternative, this information may be kept in a data file that is readily accessible according to the identification number or label.

Plano Fire Department
SCBA Periodic Maintenance and Testing Record

Inventory No. _____ Date of Inspection _____

	O.K.	Needs Servicing
Cylinder Check	☐	☐
Regulator Function	☐	☐
Diaphragm Function	☐	☐
Harness Assembly	☐	☐
Facepiece and Tube	☐	☐
P.A.S.S. Device	☐	☐

Next Inspection Due Date _____

Maintenance and Testing Completed by _____

Figure A-2-2.3.

A-2-2.4 A record or label should be maintained with each SCBA cylinder noting the most recent date of maintenance and testing. It may be desirable to maintain a separate record of the maintenance and testing of cylinder valves. Refer to the cylinder manufacturer for the recommended method of marking the hydrostatic test date on the cylinder.

A-2-3.2 The inspection and testing of new SCBA is normally performed at the factory. When used SCBA are acquired, it will be necessary for the fire department to ensure that they are inspected and tested prior to being placed in service.

A-3-1.2 This section requires respiratory protection equipment to be used by all personnel who are actually or potentially exposed to any respiratory hazards. This includes overhaul situations, unless it can be determined that the area has been adequately ventilated to eliminate respiratory hazards.

A-3-1.3 One of the contaminants that can be readily measured is carbon monoxide. Respiratory protection equipment should not be removed when tests reveal a concentration greater than 50 ppm carbon monoxide or when other toxic contaminants are known or suspected to be present.

A-3-1.5 The additional weight of the SCBA could reduce work performance, increasing fatigue factors and the susceptibility to injury. The SCBA also changes the center of gravity of the individual, making loss of balance a possibility. These factors are reduced through training and familiarization with SCBA and when members participate in regular physical fitness programs. The application of SCBA in evolutions involving complete encapsulation such as with chemical suits, proximity suits, and other hazardous materials protective clothing, warrant special consideration, as these suits are designed specifically to create an artificially protected environment exclusive of outside contaminants. Operating in an environment that is immediately dangerous to life and health presents a significant danger if SCBA malfunctions. Strict monitoring of personnel and establishing of safety margins for operation and backup systems for rescue should be presented and reinforced during training.

A-3-1.7 During the initial stages of emergency scene operations, the individual assigned to remain outside and to maintain an awareness of the personnel working inside with SCBA could also be responsible for functions such as operating pumps, preparing equipment, or commanding operations. The essential requirement, however, is to have at least one member outside to maintain accountability and to direct help, if needed. As operations progress, this responsibility should shift to individuals assigned to this specific function according to standard operating procedures. The members required to be available for rescue could also be assigned to other functions at the scene of the incident. These members must have SCBA and suitable rescue equipment and be available for reassignment to assist members in trouble. The requirement for additional personnel to be available for rescue could be satisfied by additional companies or members who are responding to the scene and will arrive within the safe operating time of initial entry teams.

A-4-1.1 This section does not prohibit the use of manufacturers' representatives to provide training related to their products.

A-4-1.2 A method of maintaining the information deemed appropriate by the authority having jurisdiction concerning respiratory protection training should be developed. This may vary from entries in the station log to specialized individual, company, or departmental records. See NFPA 1401, *Fire Protection Training Reports and Records*.

A-4-1.3 The minimum level of performance recommended by this standard shall be for a fire fighter wearing full protective clothing to be capable of donning and be fully operational within sixty (60) seconds. This timed performance shall begin with the fire fighter standing in full protective clothing and the respiratory protection equipment laying on the ground and shall stop when the fire fighter is properly attired in full protective clothing and properly wearing a fully operational respiratory protection equipment. The respiratory protection equipment cylinder valve shall be in the closed position before starting the performance. It is understood that fire fighters normally do not don SCBA by picking it up off the ground, however this procedure is used in this standard to set a consistent performance standard. It is recommended that additional performance standards be established by each authority having jurisdiction based upon the manner in which they store or carry their SCBA. For example, if SCBA are carried on apparatus in cases, a performance standard should be established for the removal and donning of the SCBA.

A-4-2.1.1 The attending physician should consult ANSI Z88.6 for guidance. Personnel should also be evaluated for claustrophobic tendencies prior to acceptance into a respiratory protection equipment training program. Personnel displaying claustrophobic tendencies should be evaluated to determine ability to work under conditions requiring respiratory protection equipment. Personnel deemed unable to work in conditions requiring respiratory protection equipment should be prohibited from participating in such activities.

A-4-2.3 In those instances where personnel cannot meet the facepiece seal requirement with equipment currently used by the authority having jurisdiction, individually fitted facepieces should be provided.

Because of the importance of a proper facepiece fit, it is desirable to conduct facepiece fit testing for applicants prior to accepting them as members of the organization.

A-4-2.5 Significant increases in blood pressure and respiratory rates, unusual signs of fatigue, and claustrophobic tendencies are factors that might disqualify personnel from performing these activities.

A-4-4.1 Although all aspects of the physical and emotional stresses an emergency scene creates cannot be fully duplicated during training exercises, many of these aspects can be simulated.

The more of them that are duplicated, the more beneficial the training will be. Further, the student's performance can be evaluated more accurately. These simulations should take into consideration varying situations during which the student may be required to wear a SCBA, such as when using a fully encapsulating suit.

A-4-7 The first level of instruction would normally take place in a classroom setting allowing the students to fully understand the SCBA by actual "hands on" training. This permits the instructor to use various testing and evaluation methods to determine the student's level of comprehension. Manipulative skills are best learned and retained by using the actual SCBA as soon as possible after the classroom instruction.

The second level SCBA training should allow the student to operate the equipment in performing various fireground tasks, so the student becomes familiar with the unit and becomes confident with its use. This training should take place in a setting that can be safely controlled by the instructor and relative to the tasks being performed. The use of an SCBA training maze is one alternative application for this level of training and builds confidence in the student.

The third level of training should allow the student to operate with the SCBA under simulated emergency conditions. Up to this point, the student should have demonstrated his/her ability to identify, operate, and use the SCBA in performing various manipulative fireground tasks. When the student has successfully demonstrated the ability to perform fireground tasks, he/she is ready to perform these same tasks under simulated emergency conditions. The student should be allowed to demonstrate his/her ability to perform under emergency conditions, by simulating various emergency conditions during this level of training. Such training may include conducting tasks while wearing hazardous material suits, and other job related tasks required by the authority having jurisdiction. The facility or area for conducting this type of training should allow the instructor to maintain student safety, and provide for the proper evaluation of the student's performance.

A-4-8(d) Management representatives from various companies in the response district as well as information from prefire planning visits will be helpful in identifying features unique to the jurisdiction.

A-4-9(d) It should be pointed out that the components of different manufacturers' SCBA are not interchangeable and, in addition, different models of SCBA from the same manufacturer may not be compatible with each other.

A-4-10(a) A Personal Alert Safety System (PASS) device is required by Section 5-4 of NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program*. Although the PASS device is not a component of the SCBA, it should be considered as an integral safety companion device and therefore included in any training session involving SCBA.

A-4-10(c) A sealed facepiece does not prevent infiltration of toxins through exposed skin.

A-4-12(b) Smoke produced from "live fire" is prohibited in SCBA training sessions. The authority having jurisdiction may decide to substitute something for smoke that would have the same effect in demonstrating the value of SCBA. Several accidents have occurred when smoke bombs or other smoke generating devices that produce a toxic atmosphere have been used for training exercises. When training exercises are intended to simulate emergency conditions, smoke generating devices that do not create a hazard are required.

A-4-12(d) The intent of this objective, required by NFPA 1001, *Fire Fighter Professional Qualifications*, is to insure that personnel are familiar with procedures for assisting other fire fighters as well as their own personal protection in emergency situations. This Committee is opposed to any procedure that breaks the facepiece seal on any individual having operable SCBA.

A-4-12.2 The intent is to simulate stressful conditions without endangering the physical well being of the individual.

A-4-13(c) This should include procedures for placing defective SCBA out of service, removal from apparatus and documentation of defective equipment. Repairs should be accomplished only by trained personnel equipped with specified tools and test instruments needed to adjust and repair SCBA. These repair persons should be factory certified by the manufacturer of the equipment utilized where such training is made available.

A-4-14 Personnel should describe the procedure for returning unused and exhausted SCBA to its proper place immediately upon removal from service. SCBA should not be placed in locations such as on the ground or in areas of debris that will cause damage to the unit.

A-4-14(c) Extreme caution must be employed, especially in high pressure systems, to avoid eye injury from trapped particles of debris that may be loosened during the activation of SCBA.

A-4-14(d) Personnel should be instructed in the inherent dangers associated with the improper storage, handling, and transportation of reserve air cylinders. This instruction should emphasize the use of properly designed storage for reserve cylinders, both at the station and on the apparatus. Protection of stem valves from being damaged or broken is of great importance. Cylinders should never be transported in an unrestrained condition.

A-5-1.2 Routine inspections for open-circuit SCBA should include at least the following operational checks:

(a) Check cylinder pressure gauge reading. Should meet/exceed authority having jurisdiction policy for change of cylinder (90 percent or greater of fully charged cylinder pressure).

(b) Turn on the cylinder valve and check for leaks; listen for low-air alarm operation.

(c) Inspect high-pressure line for leaks or damage.

(d) Check harness and facepiece for wear and check all straps for proper adjustment and/or damage.

(e) Don SCBA.

(f) Don the facepiece and check for facepiece-to-face seal (leakage).

(g) Check exhalation valve for proper operation.

(h) Place the SCBA in service and check for normal SCBA operation.

(i) Open bypass valve slightly to assure operation and then close.

(j) Shut cylinder valve, and breathe until low-air alarm initiates and operates correctly.

(k) Restore SCBA valves to normal positions.

(l) Doff SCBA.

(m) Restore harness straps and facepiece webbing to don positions.

(n) Clean and sanitize facepiece and other associated equipment, as needed.

(o) Place SCBA back in appropriate case or rack, ready for use.

Routine inspections for closed-circuit SCBA should include at least the following operational checks:

(a) Check cylinder pressure of oxygen.

(b) Check for damage to SCBA due to mechanical damage, heat, or abuse.

(c) Open cylinder and listen for leaks and ascertain that low-air alarm functions.

(d) Don the SCBA.

(e) Don the facepiece and check for facepiece-to-face seal (hoses are kept connected).

(f) Check operation of bypass valve.

(g) Shut off oxygen cylinder valve and breathe down the system, and listen for low-air alarm signal.

A-5-1.3 See ANSI Z88.5-1981 and *A Fire Service Guide to the Selection, Use, Care, and Maintenance of Self-Contained Breathing Apparatus* published by NFPA for further detail of the monthly check.

A-5-1.4 Before-use inspections for open-circuit SCBA should include the following checks:

(a) Cylinder pressure 90 percent or greater of full cylinder pressure.

(b) Low-air alarm sounds when cylinder valve is opened.

(c) Correct facepiece-to-face seal.

(d) Exhalation valve function.

(e) Bypass valve function.

(f) Normal operation of SCBA.

After-use inspections for open-circuit SCBA should include the following checks:

(a) Replacing air cylinder with a fully charged cylinder.

(b) Check for defective or damaged components.

(c) Thoroughly clean all SCBA components and sanitize the facepiece.

(d) Check SCBA for functional operation.

Closed-circit SCBA should be checked before and after use according to the manufacturer's recommendations.

A-6-1.1 Daily and/or weekly checks/inspections can be completed by any personnel who have completed the performance objectives of Chapter 4 of this standard.

Maintenance and repair on SCBA is more technical and should only be performed by persons who have been specially trained for this work.

A-6-1.2 Preventative maintenance at this first level is a function of recognizing potential maintenance problems such as air flow restrictions, loose or broken components, or strange noises emanating from regulators. Administratively, the authority having jurisdiction must reinforce an attitude that the recognition of maintenance problems will result in corrective action that will return a properly operating SCBA to the user in a reasonable amount of time. The second level of maintenance may be accomplished in

a variety of ways. This level involves the removal and replacement of defective or damaged parts of the facepiece, harness, and regulator. The second or intermediate level of maintenance requires completion of training provided by the SCBA manufacturer, simple tools, and a complement of spare parts. It is important to note at this time that the type and degree of maintenance that can or should be accomplished by an individual organization varies widely depending on the specific manufacturer. The manufacturer should be contacted directly to ascertain individual maintenance policies. Advanced level training allows personnel to completely disassemble, rebuild, assemble, and accurately test all portions of the SCBA. This level requires more training and test equipment, making it impractical for every authority having jurisdiction to provide this level of service by its own personnel. Where large numbers of SCBA are in use, it may be reasonable to provide this level of service. Most authorities having jurisdiction will make use of regional service centers provided by, or certified by, manufacturers for advanced level maintenance.

A-6-3.2 The purpose of the internal inspection is to determine any conditions that may contribute to the deterioration of the cylinder, or possibly cause malfunction of the SCBA and injury to personnel. The object of the internal inspection is to check for rust, corrosion, moisture, and damage that may have occurred since previous inspections, and traces or evidence of oil or hydrocarbon contamination.

A-7-1.1 Organizations should consider requiring an air quality higher than Grade D for SCBA since, over a period of time, even with quarterly testing, the effectiveness of the filtering system will deteriorate.

A-7-1.2 It is recommended that one of the quarterly tests be performed by a different laboratory in order to confirm the results of the primary lab.

A-7-1.4 Instructions for purging should be obtained from the cylinder manufacturer.

A-7-2.6

Table A-7-2.6(a)
Luxfer FRP Cylinders
Allowable Defect with Field Repair*

Cylinder Identification	Service Pressure (psi)	Test Pressure (psi)	Maximum Allowable Defect Dimensions in Length	Depth	Width	Use
DOT 7235-4500 L45W-45 5.4 OD × 19	4500	7500	1″	.015	.125	Breathing apparatus
DOT 7235-2216 L45S-22 6.8 OD × 20	2216	3700	1″	.010	.125	Breathing apparatus
DOT 7235-3000 L21W-30 5.4 OD × 11	3000	5000	1″	.010	.125	Breathing apparatus
DOT 7235-4000 L70W-40 7.10 OD × 20	4000	6670	1″	.020	.125	Breathing apparatus
DOT 8258-4000 S70W-40	4000	6670	1″	.020	.125	Scuba

*Fill defect with epoxy glue or resin and hydrotest.

Table A-7-2.6(b)
Structural Composites Industries
FRP Cylinders
Allowable Defect with Field Repair

Cylinder Identification	Service Pressure (psi)	Test Pressure (psi)	Maximum Allowable Defect Dimensions in Length	Depth	Width	Use
DOT-E-7277-2216 ALT-59 6.8 OD × 20.4	2216	3700	1″	.090[1] .060[2]	.125	Breathing apparatus

[1]Applies to cylindrical section only.
[2]Applies to dome sections.

A-7-2.7 During refilling operations, protection should be provided from fragmentation of SCBA cylinders.

A-7-2.9 When individual organizations may not be able to provide their own mobile air supply, such a supply may be provided by a mutual aid association, mobile cascade compressor vehicle, or a vehicle that carries a large number of spare cylinders.

Figure A-7-2.9
Spare cylinder trailer.

A-7-2.13 Filtration monitoring devices can be installed to warn of dirty or clogged filters.

Appendix B

This Appendix is not a part of the requirements of this NFPA document, but is included for information purposes only.

B-1 Limitations of Respirators.

B-1.1 Self-Contained Breathing Apparatus: provides respiratory protection under conditions of oxygen deficiency or in concentrations of toxic gases immediately dangerous to life or health. The period over which the device will provide protection is limited by the amount of air in the apparatus. This type of respirator offers no protection against skin irritation or against skin absorption of materials.

B-1.2 Air-Line Respirators: provides respiratory protection in atmospheres not immediately dangerous to life or health from which the wearer can escape unharmed without the aid of the respirator. It is necessary that sufficient oxygen be present at all times to support life.

Half-mask respirators of this type provide no protection to the eyes.

B-1.3 Combination self-contained and air-line: provides respiratory protection under conditions of oxygen deficiency or concentrations of toxic gases, immediately dangerous to life or health. By means of a small air cylinder the wearer is able to escape the dangerous atmosphere in case the primary air supply is interrupted. If used for entry into atmospheres dangerous to life or health, the air-line must be connected on entry. This type of respirator offers no protection against skin irritation or against skin absorption of materials.

B-1.4 Chemical Cartridge Respirator: provides respiratory protection against light concentrations of certain acid gases, ammonia, and organic vapors by utilizing various chemical filters to purify the inhaled air. It is necessary that sufficient oxygen be present at all times to support life. Half-mask respirators of this type provide no protection to the eyes.

B-1.5 Mechanical Filter Respirators: provide respiratory protection against airborne particulate matter, including dusts, mists, metal fumes, and smoke. Mechanical filter respirators do not provide protection against gases, vapors, or oxygen deficiency. Half-mask respirators of this type provide no protection to the eyes.

B-1.6 Unusual Hazards: Unusual factors can add new dimensions to a hazardous situation and should be considered when using respirators. Some airborne contaminants are extremely irritating to the skin while others are capable of being absorbed through the skin and into the bloodstream with serious, possibly fatal results. A facepiece or hood respirator will not afford complete protection against such contaminants.

B-2 Respirator Selection Guide.

Type Respirator	Oxygen deficiency (oxygen concentrations less than 19.5%)	Gas & vapor contaminants immediately dangerous to life and health	Gas and vapor contaminants *NOT* immediately dangerous to life and health	Particulate contaminants immediately dangerous to life and health	Particulate contaminants *NOT* immediately dangerous to life and health	Combination gas and vapor and particulate contaminants immediately dangerous to life and health	Combination gas and vapor and particulate contaminants *NOT* immediately dangerous to life and health	Fire Fighting
Self-contained breathing apparatus	X	X		X		X		X
Air-line Respirator			X		X		X	
Combination self-contained & air-line respirator	X	X		X		X		
Chemical cartridge respirator			X					
Mechanical filter respirator — full face					X			
Mechanical filter respirator — half-mask					X			
Combination chemical cartridge & mechanical filter respirator							X	
Self-rescue respirator (Escape only)		X		X				
Air-line abrasive blasting respirator					X			

B-3 Guide for Selection of Respirators.

Hazard	Respirator
Oxygen Deficiency	A. Self-contained breathing apparatus. B. Combination air-line respirator with auxiliary self-contained air supply or an air-storage receiver with alarm.
Gas and Vapor Contaminants	
Immediately dangerous to life or health	A. Self-contained breathing apparatus. B. Self-rescue respirator (for escape only). C. Combination air-line respirator with auxiliary self-contained air supply or an air-storage receiver with alarm.
Not immediately dangerous to life or health	A. Air-line respirator. B. Air-purifying, half-mask or full face respirator with chemical cartridge.
Particulate Contaminants	
Immediately dangerous to life or health	A. Self-contained breathing apparatus. B. Self-rescue respirator (for escape only). C. Combination air-line respirator with auxiliary self-contained air supply or an air-storage receiver with alarm.
Not immediately dangerous to life or health	A. Air-purifying full face-piece respirator with appropriate filter. B. Air-purifying, half-mask respirator with filter pad or cartridge. C. Air-line respirator. D. Air-line abrasive-blasting respirator. E. Powered air-purifying respirator.
Combination Gas, Vapor, and Particulate Contaminants	
Immediately dangerous to life or health	A. Self-contained breathing apparatus. B. Self-rescue respirator (for escape only). C. Combination air-line respirator with auxiliary self-contained air supply or an air-storage receiver with alarm.
Not immediately dangerous to life or health	A. Air-line respirator. B. Air-purifying half-mask or full face respirator with chemical cartridge and appropriate filter.

Appendix C Referenced Publications

C-1 The following documents or portions thereof are referenced within this standard for informational purposes only and thus are not considered part of the requirements of this document. The edition indicated for each reference is the current edition as of the date of the NFPA issuance of this document.

C-1.1 NFPA Publication. National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

A Fire Service Guide to the Selection, Use, Care, and Maintenance of SCBA.

C-1.2 Other Publications.

C-1.2.1 US Government Publications. US Government Printing Office, Superintendent of Documents, Washington, DC 20402.

Title 29 CFR Part 1910.134

Title 29 CFR Part 1910.156

C-1.2.2 ANSI Publication. American National Standards Institute, 1430 Broadway, New York, NY 10018.

ANSI Z88.6-1984, *Physical Qualifications for Respirator Use*

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The NFPA Codes and Standards Development Process

Since 1896, one of the primary purposes of the NFPA has been to develop and update the standards covering all areas of fire safety.

Calls for Proposals
The code adoption process takes place twice each year and begins with a call for proposals from the public to amend existing codes and standards or to develop the content of new fire safety documents.

Report on Proposals
Upon receipt of public proposals, the technical committee members meet to review, consider, and act on the proposals. The public proposals – together with the committee action on each proposal and committee-generated proposals – are published in the NFPA's Report on Proposals (ROP). The ROP is then subject to public review and comment.

Report on Comments
These public comments are considered and acted upon by the appropriate technical committees. All public comments – together with the committee action on each comment – are published as the Committee's supplementary report in the NFPA's Report on Comments (ROC).

The committee's report and supplementary report are then presented for adoption and open debate at either of NFPA's semi-annual meetings held throughout the United States and Canada.

Association Action
The Association meeting may, subject to review and issuance by the NFPA Standards Council, (a) adopt a report as published, (b) adopt a report as amended, contingent upon subsequent approval by the committee, (c) return a report to committee for further study, and (d) return a portion of a report to committee.

Standards Council Action
The Standards Council will make a judgement on whether or not to issue an NFPA document based upon the entire record before the Council, including the vote taken at the Association meeting on the technical committee's report.

Voting Procedures
Voting at an NFPA Annual or Fall Meeting is restricted to members of record for 180 days prior to the opening of the first general session of the meeting, except that individuals who join the Association at an Annual or Fall Meeting are entitled to vote at the next Fall or Annual Meeting.

"Members" are defined by Article 3.2 of the Bylaws as individuals, firms, corporations, trade or professional associations, institutes, fire departments, fire brigades, and other public or private agencies desiring to advance the purposes of the Association. Each member shall have one vote in the affairs of the Association. Under Article 4.5 of the Bylaws, the vote of such a member shall be cast by that member individually or by an employee designated in writing by the member of record who has registered for the meeting. Such a designated person shall not be eligible to represent more than one voting privilege on each issue, nor cast more than one vote on each issue.

Any member who wishes to designate an employee to cast that member's vote at an Association meeting in place of that member must provide that employee with written authorization to represent the member at the meeting. The authorization must be on company letterhead signed by the member of record, with the membership number indicated, and the authorization must be recorded with the President of NFPA or his designee before the start of the opening general session of the Meeting. That employee, irrespective of his or her own personal membership status, shall be privileged to cast only one vote on each issue before the Association.

Sequence of Events Leading to Publication of an NFPA Committee Document

Call for proposals to amend existing document or for recommendations on new document.

▼

Committee meets to act on proposals, to develop its own proposals, and to prepare its report.

▼

Committee votes on proposals by letter ballot. If two-thirds approve, report goes forward. Lacking two-thirds approval, report returns to committee.

▼

Report is published for public review and comment. (Report on Proposals - ROP)

▼

Committee meets to act on each public comment received.

▼

Committee votes on comments by letter ballot. If two-thirds approve, supplementary report goes forward. Lacking two-thirds approval, supplementary report returns to committee.

▼

Supplementary report is published for public review. (Report on Comments - ROC).

▼

NFPA membership meets (Annual or Fall Meeting) and acts on committee report (ROP and ROC).

▼

Committee votes on any amendments to report approved at NFPA Annual or Fall Meeting.

▼

Complaints to Standards Council on Association action must be filed within 20 days of the NFPA Annual or Fall Meeting.

▼

Standards Council decides, based on all evidence, whether or not to issue standard or to take other action, including hearing any complaints.

▼

Appeals to Board of Directors on Standards Council action must be filed within 20 days of Council action.