

## NFPA 1986 Regulatory Update

On November 11, 2016, the National Fire Protection Association (NFPA) published a new standard regulating “Respiratory Protection Equipment for Tactical and Technical Operations.” This regulation update discusses the new standard for emergency services personnel in non-firefighting activity working in Immediately Dangerous to Life or Health (IDLH) atmospheres and addresses the design, use, testing, and certification of self-contained breathing apparatus (SCBA) used for operations outside of structural firefighting. The National Fire Protection Association (NFPA) is an international nonprofit organization devoted to eliminating death, injury, property and economic loss due to fire, electrical and related hazards.

This summary of the NFPA 1986 standard for “Respiratory Protection Equipment for Tactical and Technical Operations,” was prepared by 3M Personal Safety Division (PSD) with emphasis on the respiratory protection aspects of the standard. It does not represent an official, legal or necessarily complete interpretation of the standard. If specific questions rise, the standard itself should be reviewed and relied on rather than this summary. A copy of this standard can be obtained at <https://www.nfpa.org/codes-and-standards/all-codes-and-standards/list-of-codes-and-standards/detail?code=1986>

### 1.0 Origin and Development of NFPA 1986

In September 2012, the Standards Council responded to a request related to the use of respiratory protection equipment for emergency operations that did not involve structural firefighting. A need was identified to create a standard for tactical and technical operations and non-fire related emergency operations since those operations are very different from those of industrial or fire service. Some of those needs and differences included, but were not limited to were:

- Users may have an overriding need for low visibility; therefore, anything that would draw attention to them such as, bright lights or Personal Alert Safety System (PASS) alarms are actively not required.
- Users may have a need for longer operational time before the End-of-Service-Time Indicator (EOSTI) alarm is activated, alerting the user of low air.
- Users are likely not be exposed to the same high heat environments found in firefighting applications.
- Users may need Chemical, Biological, Radiological, Nuclear (CBRN) certification for their SCBA, but not all the additional rigorous standards included in NFPA 1981: Standard on Open-Circuit Self-Contained Breathing Apparatus (SCBA) for Emergency Services.

After its review, the Standards Council determined that there is a well-established technical need and a demonstrated demand for a standard addressing design, use, testing, and certification of SCBA not covered by the requirements of NFPA 1981.

### 2.0 Scope of the Standard

The NFPA 1986 Standard on Respiratory Protection Equipment for Tactical and Technical Operations, was prepared by the Technical Committee on Tactical and Technical Operations Respiratory Protection Equipment (FAE-TTO) and released by the Correlating Committee on Fire and Emergency Services Protective Clothing and Equipment (FAA-AAC) and issued by the Standards Council on November 11, 2016, with an effective date of December 1, 2016.

The 1986 standard specifies the minimum requirements for the design, performance, testing, and certification of (1) new compressed breathing air open-circuit self-contained breathing apparatus (SCBA) and compressed breathing air combination open-circuit self-contained breathing apparatus and supplied air respirators (SCBA/SARs); and (2) replacement parts, components, and accessories for those respirators.

The standard does have the following exclusions:

- NFPA 1986 does NOT specify requirements for respiratory protection equipment that is used for firefighting operations e.g. these are covered under NFPA 1981.
- NFPA 1986 does NOT specify requirements for other types of SCBA, other than those specified above.
- NFPA 1986 does NOT specify requirements for SCBA for underwater operations.
- NFPA 1986 does NOT establish criteria for protection from ionizing radiation.
- NFPA 1986 does NOT specify requirements for any accessories that could be attached to the certified product that are not certified by the National Institute for Occupational Safety and Health (NIOSH).
- The NFPA 1986 standard applies to the design, manufacturing, testing, and certification of new open-circuit SCBA and combination SCBA/SARs and is NOT applicable to accessories that can be attached to an open-circuit SCBA and combination SCBA/ SARs but are NOT certified by NIOSH for use with that specific SCBA or combination SCBA/SARs. The standard does however have the following reservations:
  - NFPA 1986 Does NOT apply to closed-circuit SCBA
  - NFPA 1986 Does NOT apply to the use of SCBA and combination SCBA/SARs

### 3.0 Purpose of the Standard

The purpose of the NFPA 1986 standard is to establish minimum levels of SCBA performance for respiratory protection of emergency services personnel in non-firefighting operations in atmospheres that are categorized as immediately dangerous to life or health (IDLH). For example, CBRN protection may be needed in tactical or technical operations such as on-site hazardous material incident management, explosive ordnance disposal, illicit drug enforcement and confined space tactical and rescue operations.

The standard is not to be interpreted or used as a detailed manufacturing or purchase specification but shall be permitted to be referenced in purchase specifications as minimum requirements. For example, the controlled laboratory tests that are used to determine compliance with the performance requirements of NFPA 1986 are not to be deemed as establishing performance levels for all respiratory protective situations and IDLH atmospheres to which personnel can be exposed.

### 4.0 Application

NFPA 1986 applies to all open-circuit SCBA and combination SCBA/SARs used by emergency services organizations for respiratory protection of its personnel during but not limited to:

- **Rescue (Technical)**
- Hazardous materials response (Technical)
- Law enforcement operations (Tactical)
  - Narcotics search, sweep & seizure
  - Clandestine lab investigation, evidence collection and remediation
  - Correctional facilities emergency services
  - Bomb squad Explosive Ordnance Disposal (EOD)
- Confined space entry, e.g. underground facilities (Technical)
- Terrorist incident response (Both)
- Similar operations where oxygen deficiency, particulates, toxic products, products of combustion, or other IDLH atmospheres exist or could exist at the incident scene.



### 5.0 Certification

Certification to the NFPA 1986 Standard requires the following pre-requisites:

- Prior to certification of SCBA to the requirements of this standard, SCBA shall be NIOSH certified in accordance with 42 CFR 84.
- SCBA that are certified as compliant with NFPA 1986 will also be certified by NIOSH as compliant with the Statement of Standard for NIOSH CBRN SCBA Testing.

## 6.0 NFPA 1986 Design Requirements

### 6.1 General Requirements

- Prior to certification of SCBA to the requirements of this standard, the SCBA shall be NIOSH certified in accordance with 42 CFR 84.
- The SCBA shall have NIOSH pressure-demand certification.
- SCBA that are NIOSH pressure-demand certified but capable of supplying air to the user in a negative pressure demand-type mode shall NOT be certified to this standard.
- SCBA that are certified as compliant with NFPA 1986 shall also be certified by NIOSH as compliant with the Statement of Standard for NIOSH CBRN SCBA Testing. Enabling the SCBA to operate in the full range of applications highlighted in above in section 4
- Section 6.1.5 of NFPA 1986 states that in addition to the cylinder-mounted breathing air pressure gauge, all SCBA shall have another breathing air pressure gauge that shall be capable of being viewed by the wearer when the SCBA is worn.
- A heads-up display (HUD) shall not be the sole device used to meet the requirements of 6.1.5.
- All SCBA shall be equipped with a facepiece that covers, at a minimum, the wearer’s eyes, nose, and mouth
- All SCBA shall have a voice communications capability that shall consist of a nonelectronic transmission system.
- All electric circuits integral to an SCBA or to any SCBA accessories shall be certified to the requirements for Class I, Groups C and D; Class II, Groups E, F, and G, Division 1 hazardous locations specified in ANSI/UL 913, Standard for Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1 Hazardous (Classified) Locations.
- All hardware, brackets, and snaps or other fasteners of SCBA or any NIOSH-certified accessories shall be free of rough spots, burrs, and sharp edges.
- All SCBA models that are labelled as being compliant with this standard shall undergo recertification on an annual basis.

Table 1 below highlights the major differences between the new NFPA1986 Tactical and Technical SCBA standard and the existing NFPA 1981 Open-Circuit Self-Contained Breathing Apparatus (SCBA) for Emergency Services Standard.

	NFPA 1981 (Fire Fighting)	NFPA 1986 (Tactical / Technical)
CBRN testing and certification required	Yes	Yes
Flame and Engulfment Test Duration (seconds)	10	5
Flame Resistance (seconds)*	N/A	5
Number of EOSTI	2	1
EOSTI Activation Value (%)	35	25
Head Up Display (HUD) Requirement	Compulsory	Optional
Deactivatable HUD	No	Optional

\* No components of the SCBA and no accessories shall have an after flame of more than 5 seconds

### 6.2 End-of-Service-Time Indicator (EOSTI) Design Requirements.

Supporting longer duration tactical law enforcement and other technical operations such as CBRN decontamination & clean-up operations, confined space entries, e.g. underground facilities, and HAZMAT applications, NFPA1986 specifies that any SCBA unit shall be equipped with a minimum of one EOSTI. The EOSTI is a warning device on an SCBA that warns the user that the end of the breathing air supply is approaching. NFPA1986 specifies the following requirements for the optional HUD:

- The EOSTI alarm shall activate at 25 percent +4/-0 percent of full cylinder pressure. Differing from NFPA1981 “Fire Fighting” Standard which has a 35% activation.
- The EOSTI(s) shall be permitted to have more than one signaling device, and each signaling device shall be permitted to stimulate more than one human sense e.g. multi-modal communication.
- The EOSTI(s) signaling devices shall provide notification to the SCBA user of the activation of the EOSTI by stimulating one or more human senses. E.g. “Covert or Tactical Signaling”
- Each EOSTI shall consist of at least the following:
  - A sensing mechanism
  - A signaling device e.g. Head Up Display (HUD)

### 6.3 Optional HUD Design Requirements

To support tactical and / or “Hands Free” technical operations approach, the NFPA 1986 standard permits the integration of an optional Head-Up Display (HUD) unit into the SCBA unit. Differing from the NFPA 1981 “Fire Fighting” standard, the NFPA 1986 SCBA HUD can be deactivated when required to support either stealth (deactivated) or increased situational awareness (activated) in covert or other sensitive tactical environments.

The HUD can delivery mission critical information such as breathing air cylinder content and other visual displays of alert signals and information. NFPA 1986 specifies the following requirements for the optional HUD:

- All HUD visual displays shall be visible to the SCBA wearer with the SCBA and facepiece properly donned and regardless of the wearer’s head movement.
- The HUD shall be permitted to be capable of being user controlled following activation
- The HUD shall display a visual informational signal for breathing air cylinder content at 100 percent, 75 percent, 50 percent, and 25 percent of the cylinder’s total rated service content.
- If the HUD is used as the EOSTI, the EOSTI indication shall not be capable of being disabled.
- The HUD shall not use color as the only means of differentiating between alert signal displays and informational displays.
- Each visual alert signal shall be identifiable, by the SCBA wearer, from any other visual alert signals or other informational displays provided on the HUD or on the SCBA.
- If the SCBA is equipped with a HUD, the HUD shall be activated with no additional procedures other than those required to activate the SCBA breathing system.

## 6.4 Optional Rapid Intervention Crew/Company Universal Air Connection (RIC UAC) Design Requirements

To enable technical- and / or tactical-service personnel to search for and rescue downed emergency personnel, an NFPA 1986 certified SCBA shall be permitted to be equipped with a RIC UAC male fitting to allow replenishment of breathing air to the SCBA cylinder from a RIT bag.

The RIC-UAC design enables extended duration operations to be conducted, as remote on-scene replenishment of supplied air is possible. NFPA 1986 specifies the following requirements for the RIC-UAC:

- The SCBA shall be permitted to be equipped with a RIC-UAC male fitting to allow replenishment of breathing air to the SCBA breathing air cylinder
- If the SCBA is equipped with a RIC-UAC, a separate self-resetting relief valve shall be installed on the SCBA to protect the SCBA against over-pressurization
- RIC-UAC male and female fittings shall be equipped with a dust cap or sealing plug to prevent dust, dirt, and debris from entering the fitting and to serve as a leakproof seal
- The RIC-UAC filling hose assembly shall be, at a minimum, a high-pressure, 310 bar (4500 psi) assembly designed to replenish breathing air to an SCBA breathing air cylinder.



## Optional Emergency Breathing Safety System (EBSS) Design Requirements

NFPA 1986 specifies the following requirements for the EBSS:

- Each EBSS shall operate off the pressure after the first stage pressure reducer of the SCBA.
- The EBSS shall have an operating pressure of at least 5.5 bar (80 psi).
- The EBSS shall have a male and female connection with a check valve feature to prevent inward contaminants. This latter design feature is important for working in hostile environments e.g. CBRN.
- The EBSS shall require only one action for connection of the donor's fitting to the receiving SCBA's fitting.
- The EBSS shall require two distinctive actions to disconnect the fitting between the donor SCBA and the receiving SCBA. An important safety design feature to prevent the accidental release of high-pressure air from the SCBA cylinder.
- The connection of two EBSS shall be independent of the facepieces.
- The EBSS pressure hose assembly shall be a minimum of 20 in. long.

## Summary

The NFPA 1986 “Respiratory Protection Equipment for Tactical and Technical Operations” standard was created for tactical and technical operations and non-fire related emergency operations since those operations are very different from those of industrial workers or firefighters. This regulation update discusses the standard for emergency services personnel in non-firefighting activity working in Immediately Dangerous to Life or Health (IDLH) atmospheres and addresses the design, use, testing, and certification of self-contained breathing apparatus (SCBA) used for operations outside of structural firefighting. The standard was specifically designed for federal, state and local agencies, amongst others for end users such as emergency services personnel engaged in tactical operations, disaster response, confined space rescue, crime scene investigation, clandestine drug lab clean-up, and other response and or recovery situations.

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