AGENDA

NFPA Technical Committee on Respiratory Protective Equipment (FAE-RPE)
NFPA 1850 (1852) Second Draft meeting

August 12 - 13, 2024
8:00 a.m. – 5:00 p.m. (CDT)

Sheraton Kansas City Hotel at Crown Center
2345 McGee Street
Kansas City, MO

To join the meeting, please contact ysmith@nfpa.org

1. **Call to order at 8:00 am.** Albert Yanagisawa.
2. **Introduction of Committee members and guests.** See committee roster attached.
3. **Chair report.** Albert Yanagisawa.
4. **Staff liaison report.** Barry Chase.
5. **Previous meeting minutes.** NFPA 1985 First Draft Meeting, December 12, 2023 (Microsoft Teams), January 9 (Microsoft Teams), February 5-7 (Lake Buena Vista, FL), March 1, 2024 (Microsoft Teams). See attached.
6. **NFPA 1970 Status Update.**
    a. **Report on 2024 NFPA Technical Meeting results.**
    b. **Report on tentative interim amendments.**
7. **NFPA 1850 (1852) Second Draft.**
    a. **Public comments for committee action.** See attached.
    b. **Public comments for committee review only.** See attached.
    c. **Task group reports.**
        i. *1850 (1852) task group.* Bryan Profit.
    d. **Second revisions.**
8. **Other business.**
9. **Future meetings.**
    a. NFPA 1985 Second Draft Meeting [January-March, 2025].
10. **Adjourn.**

AGENDA ITEM #2 ATTACHMENT

COMMITTEE ROSTER

Address List No Phone

07/23/2024
Barry D. Chase
FAE-RPE

Respiratory Protection Equipment

Fire and Emergency Services Protective Clothing and Equipment

Albert Yanagisawa **U** 04/04/2017
Chair **FAE-RPE**
Los Angeles County Fire Department
1320 N. Eastern Avenue
Los Angeles, CA 90063
Alternate: Michael Loput

David T. Bernzweig **L** 09/30/2004
Principal **FAE-RPE**
Ohio Association of Professional Fire Fighters (OAPFF)
444 Brookside Drive
Columbus, OH 43209
Alternate: Steven Stein

Jason Blackman **E** 04/14/2021
Principal **FAE-RPE**
Harris County Emergency Service District 13
11900 Cypress N Houston
Cypress, TX 77429

Michael J. Brookman **SE** 08/24/2021
Principal **FAE-RPE**
Averil Partners
34 Averill Place
Branford, CT 06405
Alternate: Hans O. Almqvist

Corey Butler **E** 12/07/2021
Principal **FAE-RPE**
US Department of the Interior
Office of Occupational Safety and Health
Denver Federal Center
Building 25
Denver, CO 80225

Robin B. Childs **E** 08/17/2017
Principal **FAE-RPE**
US Department of Defense
JPEO CBD/JPDM CBRNE ARS
50 Tech Parkway, Suite 301
Stafford, VA 22556

Mark Ciampaglio **RT** 08/10/2022
Principal **FAE-RPE**
US Army- Edgewood Chemical Biological Center (ECBC)
8820 Fleming Road
Building E5100 (RDCB-DET-P)
APG, MD 21010

David A. Cook **U** 04/02/2020
Principal **FAE-RPE**
First Responder Network Authority (FirstNet)
2813 Phillips Road
Castleton, NY 12033
Alternate: Gary McCarraher

David E. Cowgill **RT** 12/06/2019
Principal **FAE-RPE**
ATOR Labs
9210 Panama City Beach Parkway
Panama City, FL 32407

Chad Cross **E** 11/29/2023
Principal **FAE-RPE**
Washington State Patrol
Office of State Fire Marshal Training Academy
50810 SE Grouse Ridge Road
PO Box 1273
North Bend, WA 98045-9174

William Dickson **M** 03/05/2012
Principal **FAE-RPE**
Bauer Compressors, Inc.
1328 Azalea Garden Road
Norfolk, VA 23502
Alternate: George Hoppe, Jr.

Joseph W. Domitrovich **RT** 08/09/2012
Principal **FAE-RPE**
US Department of Agriculture
Forest Service
Technology & Development Cent
5785 Highway 10 West
Missoula, MT 59808
Alternate: Joe Sol

Address List No Phone

07/23/2024
Barry D. Chase
FAE-RPE

Respiratory Protection Equipment

Fire and Emergency Services Protective Clothing and Equipment

Michelle Donnelly **RT** 12/02/2020
Principal **FAE-RPE**
National Institute of Standards & Technology (NIST)
100 Bureau Drive, Stop 8661
Gaithersburg, MD 20899

Heidi Foust **E** 04/03/2019
Principal **FAE-RPE**
National Institute for Occupational Safety & Health (NIOSH)
272 Redds Mill Raod
Charleroi, PA 15022
National Personal Protection Technology Laboratory
Alternate: Michael Shahan

Robin R. Gainey **L** 3/1/2011
Principal **FAE-RPE**
Jacksonville Fire Rescue Department
2333 Marlee Road South
Jacksonville, FL 32259-9061
International Association of Fire Fighters
Alternate: John Lee

Ed Golla **RT** 4/16/1999
Principal **FAE-RPE**
TRI/Air Testing
1801 Central Commerce Court
Round Rock, TX 78664

Ronald Johnston **M** 08/08/2019
Principal **FAE-RPE**
Superior Products
3786 Ridge Road
Cleveland, OH 44144
Compressed Gas Association

Erik Kambarian **E** 04/17/2024
Principal **FAE-RPE**
IL Department Of Labor
OSHA
524 S 2nd Street
Springfield, IL 62701

Robert T. Kennedy **E** 12/07/2021
Principal **FAE-RPE**
Philadelphia Fire Department
9227 Marsden Street
Philadelphia, PA 19114

Beth C. Lancaster **M** 10/04/2002
Principal **FAE-RPE**
Avon Protection
12024 S. Hyacinth Point
Floral City, FL 34436
Alternate: Thomas A. Korb

Kevin D. Lentz **M** 04/05/2016
Principal **FAE-RPE**
Grace Industries, Inc.
9001 Treeline Drive
Woodway, TX 76712-8541
Alternate: John P. Campman

Jamie Little **M** 08/17/2018
Principal **FAE-RPE**
Rescue Intellitech
11613 Altimira Lane
Midlothian, VA 23112

Stephanie Lynch **M** 11/29/2023
Principal **FAE-RPE**
Occupational Health Dynamics (OHD)
2687 John Hawkins Parkway
Hoover, AL 35244

Michael McCarthy **U** 08/10/2022
Principal **FAE-RPE**
Boston Fire Department
8 Wales Street
Milford, MA 01757
Alternate: Douglas Menard

Tom Mooney **E** 08/10/2022
Principal **FAE-RPE**
Redmond Fire & Rescue
341 NW Dogwood Avenue
Redmond, OR 97756

Address List No Phone

07/23/2024
Barry D. Chase
FAE-RPE

Respiratory Protection Equipment

Fire and Emergency Services Protective Clothing and Equipment

Chad A. Morey **M** 04/17/2024
Principal **FAE-RPE**
Draeger, Inc.
7256 S. Sam Houston Pkwy W
#100
Houston, TX 77085
Alternate: Stuart Blenkiron

John H. Morris **M** 08/23/2023
Principal **FAE-RPE**
3M Company
3384 Mill Grove Terrace
Dacula, GA 30019
Alternate: Judge W. Morgan

Kory Mullin **U** 12/07/2018
Principal **FAE-RPE**
Clovis Fire Department
567 E Mallard Circle
Fresno, CA 93730
Alternate: Ryan Brubaker

Darrin Nelson **U** 04/03/2019
Principal **FAE-RPE**
Shawnee Fire Department
6501 Quivira Road
Shawnee, KS 66216
Alternate: John M. Rawie

Amanda H. Newsom **RT** 12/07/2022
Principal **FAE-RPE**
UL LLC
12 Laboratory Drive
PO Box 13995
Research Triangle Park, NC 27709-3995
Alternate: Christopher P. James

Matthew D. Pederson **M** 08/10/2022
Principal **FAE-RPE**
Interspiro, Inc.
10225 82nd Avenue
Pleasant Prairie, WI 53158-5801
Alternate: Patrick B. Droppleman

Kenneth A. Pravetz **U** 3/1/2011
Principal **FAE-RPE**
City of Virginia Beach Fire Department
Fire Chief
4305 Shrew Trail
Virginia Beach, VA 23456
Alternate: Fletcher James Fulgham

Bryan Profit **L** 12/08/2015
Principal **FAE-RPE**
Portland Fire & Rescue
1885 NW 138th Avenue
Portland, OR 97229-4313

Stephen R. Sanders **RT** 4/28/2000
Principal **FAE-RPE**
ASTM/Safety Equipment Institute (SEI)
100 Barr Harbor Drive
PO Box C700
West Conshohocken, PA 19428-2959

Maria Sandoval **RT** 04/02/2020
Principal **FAE-RPE**
Trace Analytics LLC
15768 Hamilton Pool Road
Austin, TX 78738
Alternate: Nichole Marie Smith

Jordan Doyle Smith **E** 08/23/2023
Principal **FAE-RPE**
Katy Fire Department
1417 Avenue D
Katy, TX 77493

Robert M. Sobocienski **U** 04/12/2022
Principal **FAE-RPE**
Fire Department of New York City (FDNY)
9 Metrotech Center
Brooklyn, NY 11201
Alternate: Kenneth Scanlon

Nick Sooter **U** 08/24/2021
Principal **FAE-RPE**
North Charleston Fire Department
153 Yorkshire Drive
Moncks Corner, SC 29461-8891

Address List No Phone

07/23/2024
Barry D. Chase
FAE-RPE

Respiratory Protection Equipment

Fire and Emergency Services Protective Clothing and Equipment

Kirk Speier **U** 04/14/2021
Principal **FAE-RPE**
Fairfax County Fire And Rescue
6800 A Industrial Road
Springfield, VA 22151
Alternate: Mark Huehn

Trevor L. Steedman **E** 4/5/2016
Principal **FAE-RPE**
Palm Beach Shores Fire Department
247 Edwards Lane
Palm Beach Shores, FL 33403

Marco Tekelenburg **M** 10/28/2014
Principal **FAE-RPE**
Mine Safety Appliance Company
1100 Cranberry Woods Drive
Cranberry Township, PA 16066-5208
Alternate: Adam Bilger

Mark Trudgeon **M** 10/28/2014
Principal **FAE-RPE**
Luxfer Gas Cylinders
3016 Kansas Avenue
Riverside, CA 92501

Jason L. Allen **RT** 1/10/2002
Voting Alternate **FAE-RPE**
Intertek Testing Services
3933 US Route 11
Cortland, NY 13045-9715

Hans O. Almqvist **SE** 10/29/2012
Alternate **FAE-RPE**
Createc LLC
80 Mill Plain Road
Bramford, CT 06405
Principal: Michael J. Brookman

Adam Bilger **M** 04/03/2019
Alternate **FAE-RPE**
Mine Safety Appliance Company (MSA)
1100 Cranberry Woods Drive
Cranberry Township, PA 16066
Principal: Marco Tekelenburg

Stuart Blenkiron **M** 08/23/2023
Alternate **FAE-RPE**
Draeger Safety
Ullswater Close
Blyth Riverside Business Park
Blyth, Northumberland, NE24 4RG United Kingdom
Principal: Chad A. Morey

Ryan Brubaker **U** 10/29/2012
Alternate **FAE-RPE**
Clovis Fire Department
1233 5th Street
Clovis, CA 93612
Principal: Kory Mullin

John P. Campman **M** 7/19/2002
Alternate **FAE-RPE**
Grace Industries, Inc.
PO Box 167
Transfer, PA 16154
Principal: Kevin D. Lentz

Patrick B. Droppleman **M** 08/10/2022
Alternate **FAE-RPE**
Ocenco, Inc./ Interspiro Inc.
10225 82nd Avenue
Pleasant Prairie, WI 53158
Principal: Matthew D. Pederson

Fletcher James Fulgham **U** 08/08/2019
Alternate **FAE-RPE**
Virginia Beach Fire Department
P.O. Box 5404
Portsmouth, VA 23703
Principal: Kenneth A. Pravetz

George Hoppe, Jr. **M** 03/05/2012
Alternate **FAE-RPE**
Bauer Compressors, Inc.
1328 Azalea Garden Road
Norfolk, VA 23502
Principal: William Dickson

Mark Huehn **U** 12/07/2022
Alternate **FAE-RPE**
Fairfax County Fire And Rescue
14715 Pickets Post Road
Centreville, VA 20121
Principal: Kirk Speier

Address List No Phone

07/23/2024
Barry D. Chase
FAE-RPE

Respiratory Protection Equipment

Fire and Emergency Services Protective Clothing and Equipment

Christopher P. James **RT** 03/20/2023
Alternate **FAE-RPE**
UL LLC
12 Laboratory Drive
PO Box 13995
Research Triangle Park, NC 27709-3995
Principal: Amanda H. Newsom

Thomas A. Korb **M** 12/07/2022
Alternate **FAE-RPE**
Avon Protection PLC
Monroe Corporate Center
17000 St. Clair Avenue
Building #1
Cleveland, OH 44110
Principal: Beth C. Lancaster

John Lee **L** 08/23/2023
Alternate **FAE-RPE**
Tualatin Valley Fire and Rescue
9991 SW Avery Street
Tualatin, OR 97062
International Association of Fire Fighters
Principal: Robin R. Gainey

Michael Loput **U** 04/17/2024
Alternate **FAE-RPE**
Los Angeles County Fire Department
3025 Wilderness Drive
Corona, CA 92882
Principal: Albert Yanagisawa

Gary McCarraher **U** 04/02/2020
Alternate **FAE-RPE**
FirstNet Authority
12201 Sunrise Valley Drive
M/S 243
Reston, VA 20192
Principal: David A. Cook

Douglas Menard **U** 08/17/2017
Alternate **FAE-RPE**
Boston Fire Department
197 Samoset Avenue
Hull, MA 02045
Principal: Michael McCarthy

Judge W. Morgan **M** 04/08/2015
Alternate **FAE-RPE**
3M Scott Safety
4320 Goldmine Road
Monroe, NC 28110
Principal: John H. Morris

John M. Rawie **U** 12/07/2021
Alternate **FAE-RPE**
Shawnee Fire Department
6501 Quivira Road
Shawnee, KS 66216
Principal: Darrin Nelson

Kenneth Scanlon **U** 08/24/2021
Alternate **FAE-RPE**
Fire Department of New York City (FDNY)
9 Metrotech Center
Brooklyn, NY 11201
Principal: Robert M. Sobocienski

Michael Shahan **E** 08/23/2023
Alternate **FAE-RPE**
National Institute for Occupational Safety & Health (NIOSH)
626 Cochrans Mill Road
Pittsburgh, PA 15236
National Personal Protection Technology Laboratory
Principal: Heidi Foust

Nichole Marie Smith **RT** 11/29/2023
Alternate **FAE-RPE**
Trace Analytics, LLC
15768 Hamilton Pool Road
Austin, TX 78738
Principal: Maria Sandoval

Joe Sol **RT** 04/17/2024
Alternate **FAE-RPE**
US Department of Agriculture
5785 Highway 10 West
Missoula, MT 59804
Principal: Joseph W. Domitrovich

Address List No Phone

07/23/2024
Barry D. Chase
FAE-RPE

Respiratory Protection Equipment

Fire and Emergency Services Protective Clothing and Equipment

Steven Stein	**L**	12/07/2018	**Barry D. Chase**		5/6/2024
Alternate		**FAE-RPE**	**Staff Liaison**		**FAE-RPE**
Columbus Division of Fire 767 City Park Avenue Columbus, OH 43206 **Columbus Firefighters Union** **Principal: David T. Bernzweig**			National Fire Protection Association 1 Batterymarch Park Quincy, MA 02169-7471		

AGENDA ITEM #5 ATTACHMENT

PREVIOUS MEETING MINUTES

MINUTES

NFPA Technical Committee on Respiratory Protective Equipment (FAE-RPE)
NFPA 1985 (1984 and 1989) First Draft meeting

December 12th, 2023: 11am -2pm eastern
January 9th, 2024: 11am-2pm eastern
via Microsoft Teams

In-person at
Lake Buena Vista, FL
February 5th-7th, 2024
8am start on first day
8am-12pm on February 7th.

Continuation meeting
March 1st, 2024: 11am-2pm eastern

1. **Call to order at 11am.** Chairman Albert Yanagisawa called the meeting to order at 11am on December 12th, 2023.
2. **Introduction of Committee members and guests.** Attendees introduced themselves and identified their affiliation.
3. **Chair report.** Albert Yanagisawa. Welcomed attendees and set the expectations for the meeting.
4. **Staff liaison report.** Chris Farrell provided the Staff report.
    a. NFPA staff reviewed policies from the Guide for the Conduct of Participants in the NFPA Standards Development Process, sections 3.3(e) (a technical committee member representing one interest category who has been retained to represent the interests of another category) and (f) (not accepting gifts or other benefits that could influence members' activities during standards development process).
    b. NFPA staff asked, in both instances, if anyone had anything they wanted to declare. No issues reported.

5. **Previous meeting minutes.** The previous meeting minutes from November 14th, 2023, were approved.
6. **Meeting schedule**
    a. December 12: NFPA 1985 (1984)
    b. January 9: NFPA 1985 (1989)
    c. February 5-7: NFPA 1985 (1984 and 1989)
7. **NFPA 1985 First Draft.**
    a. **Public inputs.** The Technical Committee reviewed the public inputs and developed first revisions as necessary. These will be available in the Second Draft Report at www.nfpa.org/1985.
    b. Task groups reported to the Technical Committee.
        i. 1984 task group
        ii. 1989 task group
        iii. Chapter seven task group. See attached.
    c. First revisions. Additional first revisions were made by the Technical Committee.
8. **Other business.** None
9. **Future meetings.**
    a. NFPA 1850 (1852), summer 2024
10. **Adjourned.** Chairman Albert Yanagisawa adjourned the meeting at 1:40pm eastern on March 1st, 2024.

Committee Roster

Technical Committee Members:

x	**Yanagisawa, Albert**	Chair	Los Angeles County Fire Department
x	**Bernzweig, David**	Principal	Columbus Firefighters Union
x	**Blackman, Jason**	Principal	Harris County Emergency Service District
	Brookman, Michael	Principal	Averil Partners
	Butler, Corey	Principal	US Department of the Interior
	Childs, Robin	Principal	US Department of Defense
x	**Ciampaglio, Mark**	Principal	US Army- Edgewood Chemical Biological
	Cook, David	Principal	First Responder Network Authority
x	**Cowgill, David**	Principal	ATOR Labs

	Cox, Brian	Principal	
	Crafford, Don	Principal	Thomasville Fire Department
x	**Dickson, William**	Principal	Bauer Compressors, Inc.
x	**Domitrovich, Joseph**	Principal	US Department of Agriculture
x	**Donnelly, Michelle**	Principal	National Institute of Standards &
x	**Foust, Heidi**	Principal	National Institute for Occupational Safety &
x	**Gainey, Robin**	Principal	International Association of Fire Fighters
x	**Golla, Ed**	Principal	TRI/Air Testing
	Johnston, Ronald	Principal	Compressed Gas Association
x	**Lancaster, Beth**	Principal	Avon Protection
x	**Lentz, Kevin**	Principal	Grace Industries, Inc.
x	**Little, Jamie**	Principal	Rescue Intellitech
	McCarthy, Michael	Principal	Boston Fire Department
	Mooney, Tom	Principal	Redmond Fire & Rescue
x	**Morris, John**	Principal	3M Company
x	**Mullin, Kory**	Principal	Clovis Fire Department
	Nelson, Darrin	Principal	Shawnee Fire Department
	Newsom, Amanda	Principal	UL Solutions
x	**Pederson, Matthew**	Principal	Interspiro, Inc.
x	**Pravetz, Kenneth**	Principal	City of Virginia Beach Fire Department
x	**Profit, Bryan**	Principal	Portland Fire & Rescue
	Rossos, Daniel	Principal	Oregon Department of Public Safety
x	**Sanders, Stephen**	Principal	ASTM/Safety Equipment Institute (SEI)
x	**Sandoval, Maria**	Principal	Trace Analytics LLC
	Sell, Robert	Principal	Draeger Safety UK Ltd.
x	**Smith, Jordan**	Principal	Katy Fire Department
x	**Sobocienski, Robert**	Principal	Fire Department City of New York
x	**Sooter, Nick**	Principal	North Charleston Fire Department
	Speier, Kirk	Principal	Fairfax County Fire & Rescue Department
x	**Steedman, Trevor**	Principal	Palm Beach Shores Fire Department
	Tekelenburg, Marco	Principal	Mine Safety Appliance Company
	Trudgeon, Mark	Principal	Luxfer Gas Cylinders

	Allen, Jason	Voting Alternate	Intertek Testing Services
x	**Kennedy, Robert**	Voting Alternate	Philadelphia Fire Department
	Almqvist, Hans	Alternate	Createc Consulting LLC
x	**Bilger, Adam**	Alternate	Mine Safety Appliance Company (MSA)
	Blenkiron, Stuart	Alternate	Draeger Safety UK Ltd.
	Brubaker, Ryan	Alternate	Clovis Fire Department
	Campman, John	Alternate	Grace Industries, Inc.
	Droppleman, Patrick	Alternate	Ocenco, Inc./ Interspiro Inc.
x	**Fulgham, Fletcher**	Alternate	Virginia Beach Fire Department
	Haston, David	Alternate	US Department of Agriculture
	Hoppe, George	Alternate	Bauer Compressors, Inc.
	Huehn, Mark	Alternate	Fairfax County Fire & Rescue Department
	James, Christopher	Alternate	UL Solutions
	Korb, Thomas	Alternate	Avon Protection PLC
	Lee, John	Alternate	International Association of Fire Fighters
	McCarraher, Gary	Alternate	FirstNet Authority
	Menard, Douglas	Alternate	Boston Fire Department
x	**Morgan, Judge**	Alternate	3M Scott Safety
	Rathbun, Sara	Alternate	Los Angeles County Fire Department
	Rawie, John	Alternate	Shawnee Fire Department
x	**Scanlon, Kenneth**	Alternate	Fire Department City of New York
x	**Shahan, Michael**	Alternate	National Institute for Occupational Safety &
	Stein, Steven	Alternate	Columbus Firefighters Union
x	**Farrell, Chris**	Staff Liaison	National Fire Protection Association

Guests:

Stephanie Lynch	OHD
Michael Loput	Los Angeles County FD
Nikki Smith	Trace Analytics LLC
Erick Bock	Mine Safety Appliances
Mark Fessenden	Johnson Controls
Steve Weinstein	himself
Chad Morey	Draeger

Adam Matz	Avon Protection Systems
Lucas Mayfield	Grassroots Wildland Firefighters
Chad Cross	Washington State Fire Marshal

DOC #	1985
TG #/NAME	Ch. 7
TG CHAIR	Bill Dickson
TG MEMBERS	*Steve Weinstein, Jamie Little, Maria Sandoval, George Hoppe, Jason Blackman

Chapter 7: Compressed Breathing Air Systems (NFPA 1989)

7.1 Application.

7.1.1

Where a high pressure breathing air system and/or components are to be utilized in a stationary or mobile application, the below details shall apply.

7.1.2

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7.2* Provisions Applying to All Air Systems.

7.2.1*

Compressor- and booster-supplied systems shall be capable of storage and operation in any ambient temperature between 32°F and 131°F (0°C and 55°C).

7.2.2

Cascade and bulk air systems shall be capable of storage and operation in any ambient temperature between 0°F and 131°F (–18°C and 55°C).

7.2.3

The air system shall be designed so that it can be stored and operated in environments with relative humidity up to and including 100 percent.

7.2.4

All materials used in the air system shall be corrosion-resistant or treated to resist corrosion unless the finished product will be in continuous contact with a noncorrosive lubricant.

7.2.5 Assembly and Installation Practices.

7.2.5.1

Installation of a high pressure breathing air compressor system shall be overseen by an authorized representative of the system manufacturer.

7.2.5.1.1

Proof of authorization shall include a letter written on the compressor manufacturer's letterhead and shall have been issued in the same year as the installation work.

7.2.5.2 Hot Surfaces.

7.2.5.2.1

Surfaces over 142°F (61°C) shall be covered with a thermal insulating material or shall be mechanically guarded to protect the operator.

7.2.5.2.2

If covering or guarding the surface affects the operation of the component, a label shall be provided that states "Caution: Hot Surfaces When Operating."

7.2.5.3

The air system shall be designed and constructed to withstand the stresses, vibrations, and other conditions found at the site where the system is installed.

7.2.5.4 Locking Devices.

7.2.5.4.1

All screws, pins, bolts, and other fasteners whose failure would create a hazardous condition for personnel or equipment shall be equipped with locking devices.

7.2.5.4.2

Safety wire, self-locking nuts, cotter pins, lock washers, and liquid-locking compounds shall be acceptable.

7.2.6 Breathing Air Systems.

7.2.6.1

Each part utilized in the fabrication of the air system and its components shall be designed and rated for use in compressed breathing air service at pressures, temperatures, and flow rates that will be encountered during actual air system operation.

7.2.6.2

Discharge air from a compressor shall pass through a purification system prior to distribution. The processed air shall meet the requirements of NFPA 1989 Chapter 5.6.

7.2.6.3

Prior to the initial air quality test and commissioning, the breathing air system shall be purged with pure air until moisture and other contaminants have been removed.

7.2.7 General Piping and Installation.

7.2.7.1

All pneumatic fittings, tubing, and hose shall be rated for the maximum allowable working pressure that could be encountered, with a test safety factor of not less than 4:1, including the purification system final separator and purification chambers.

7.2.7.2

All pneumatic fittings, tubing, and hose shall be corrosion-resistant or treated to resist corrosion.

7.2.7.3

No threaded close nipples shall be used.

7.2.7.4

Plugs shall be bar stock type with Allen head or hex heads.

7.2.7.5

All piping and tubing shall be blown clean with clean, dry air before being installed.

7.2.7.6

When making up threaded piping joints, the sealant shall be applied to the thread in a manner that will prohibit entry of the sealant into the piping system.

7.2.7.7

Pipes or tubes installed but not connected shall have the ends closed with threaded caps or plugs to prevent the entry of foreign material.

7.2.7.8

Air connections on equipment or panels shall be provided with a threaded dust cap on a safety chain or shall be a quick-disconnect–type fitting.

7.2.7.9

All exposed piping compressed air lines shall be clamped to a rigid body or chassis component at a minimum of every 24 in. (610 mm) and within 6 in. (150 mm) on each side of a coupling or elbow.

7.2.7.9.1

Piping shall run in an orderly manner in accordance with the air system manufacturer's installation requirements.

7.2.7.9.2

The piping installation shall provide room for maintenance and repairs with access panels provided where applicable.

7.2.7.10

Any rigid piping or flexible lines that run through a structural building wall shall be protected with removable mechanical protection to prevent wear and damage.

7.2.8 Flexible Hose.

7.2.8.1

Flexible hose shall be installed in such a manner as to prevent cuts, abrasions, exposure to damage, excessive temperatures, excessive bending and damage.

7.2.8.2

The hose shall be installed in a manner that permits removal of the hose without removal of major system components.

7.2.9 Operator's Panel and Controls.

7.2.9.1

The air operator's panel containing gauges, instruments, and valves shall face the operator's position and shall be illuminated with either system-affixed lighting or facility lighting sufficient for operations.

7.2.9.2

Any instrument that is to be used as a basis for manual control shall be visible and controlled from the operator's position.

7.2.9.3

Accessory gauges or controls that are not critical to the mission of the air system shall be permitted to be mounted remotely from the operator's panel or at another location where they can be monitored.

7.2.9.4

Pressure gauges or other devices shall not be mounted directly on lines where excessive vibration is likely to occur.

7.2.9.5

With the exception of direct-connected process instruments (e.g., pressure gauges), instruments shall not use instrument piping or electrical conduit for support.

7.2.9.6

Any gauge shall be capable of reading at least 110 percent but not greater than 200 percent of maximum working air pressure.

7.2.10 Maintainability.

7.2.10.1

The design of the air system shall provide for maintainability by including, but not necessarily being limited to, the following maintainability objectives and technical and operational constraints:

1) The design shall be such that faults can be isolated to allow access to removable assemblies or components.
2) Electrical panels, junction boxes, circuit breakers, and fuses shall be readily accessible.
3) The physical arrangement of components shall be such that they can be inspected, serviced, calibrated, and, if necessary, adjusted without being removed and with minimum disturbance to other parts.
4) The design shall be such that inspection, service, and replacement can be accomplished using a minimum of special tools and support equipment.
5) Test points shall be provided to facilitate malfunction isolation and the connection of calibration instrumentation.
6) If equipment requires oil or other liquid drainage, it shall be provided with a safe and clean remote drainage system that is equipped with a control valve, threaded plug or cap, and a label to note usage.

7.2.10.1.1

The breathing air system compressor shall be operated not less than 30 minutes each week, resulting in at least two (2) condensate drain cycles.

7.2.10.1.2

The purification components of the breathing air system shall be replaced in accordance with the purification component manufacturers instructions.

7.2.10.1.3

Compressed breathing air stored in steel cylinders of the breathing air system shall be replaced annually.

7.2.10.1.4

A positive pressure shall be maintained in depleted breathing air system cylinders until they are filled, to prevent the possibility of external contamination and condensation entering the cylinder.

7.2.10.2

If special tools are required to service or maintain the air system, those tools shall be supplied by the system manufacturer.

7.2.11 Labels and Plates.

7.2.11.1

All major components and accessories shall be identified with a label.

7.2.11.2

Caution and warning signs shall be affixed where necessary.

7.2.11.3

Instruction plate(s) shall be installed, as applicable, to advise the operator on the proper adjustment or setting of controls for safe operation.

7.2.11.4

Controls, gauges, valves, and other equipment shall be marked with a label indicating their function.

7.2.11.5

All controls and valves shall have a label to indicate movement direction.

7.2.11.6

The major component manufacturers and installers of the air system shall provide electrical diagrams and air piping drawings that document the system and its operation.

7.2.11.6.1

All symbols used shall be described in key charts on the drawings.

7.2.11.6.2

All diagrams and drawings shall be delivered with the breathing air compressor.

7.2.11.6.3

The following information shall be shown:

(1) The general arrangement of the air system, including air storage, air compressor (if provided), air panel, SCBA fill station (if provided), and air inlets and outlets

(2) The electrical wiring arrangement and controls, denoting power equipment, low-voltage equipment, and line-voltage equipment

(3) The air operator's control panel surface showing all controls, gauges, valves, outlets, and other specified equipment, including the labeling on the panel and controls

(4) The air piping arrangement with airflow direction indicated and showing all valves, gauges, controls, air cylinders, and furnished equipment

7.2.12 Documentation and Records.

7.2.12.1

Two complete sets of documentation that cover the operation and maintenance of the system shall be provided at time of system start-up and training.

7.2.12.2

The documentation shall be permitted to be in printed format, electronic format, audiovisual format, or a combination thereof.

7.2.12.3

Nomenclature for switches, controls, and indicators shall be consistent with that used on the diagrams required in 7.2.11.6 and on equipment nameplates.

7.2.12.4

The manuals shall include, but not necessarily be limited to, the following:

(1) An illustrated parts lists

(2) A schedule of maintenance and adjustment checks

(3) A lubrication schedule

(4) Troubleshooting information to enable a technician to locate trouble and to make repairs or adjustments to the equipment

(5) Step-by-step procedures for starting, operating, and stopping the equipment

7.2.12.5

The organization shall require that all air quality test results include the name of the testing lab's accrediting body and the lab's current designation by the body.

7.2.12.5.1

The organization maintain records of air quality test results of compressed breathing air sources and air quality test results of the compressed breathing air produced or purchased.

7.2.12.6

The organization shall maintain records of at least installation, maintenance, purification component changes, operation, trouble reports and corrective actions taken.

7.2.12.7

The organization shall maintain the aforementioned records for a period of not less than five (5) years.

7.2.13 Training and Instruction.

7.2.13.1*

If a breathing air system without a compressor/purification system is provided, the final installer of the air system shall supply a qualified person to provide operational training to the purchaser's designated personnel that includes the following:

(1) A complete system component familiarization/walkaround

(2) A complete review of the system and its safety features

(3) A review of all operation, service, and maintenance documentation

(4) Hands-on familiarization of the safe operation of the fill station and air management panel, including actual SCBA filling, air reel operations, and other pertinent operations of the system

7.2.13.2*

If a breathing air system that includes a compressor/purification system is provided, a person authorized by the breathing air compressor manufacturer in the operation of the specified air compressor system shall provide training to the purchaser's designated personnel.

7.2.13.2.1

The training shall include the items listed in 7.2.13.1.

7.2.13.2.2

The training shall also include the following:

(1) A review of the compressor/purification system operations and maintenance, including the operations and maintenance documentation and the name, address, and phone number of the local distributor

(2) Procedures to change purification cartridges

(3) Hands-on familiarization of the safe operation of the compressor and purification system

7.2.13.3

The purchaser shall designate an individual(s) to be the resource person(s) for all the breathing air system training and equipment indoctrination.

7.2.13.4

The purchaser shall designate where the high pressure breathing air system is to be installed, and subsequent system training shall take place.

7.3* Breathing Air Compressor.

7.3.1

The purchaser shall determine the working pressure and capacity required from the compressor and state those requirements in the purchase specifications.

7.3.2 Compressor Intake.

7.3.2.1

The compressor air intake shall be located within the building or mobile fire apparatus structure, or piped outside, to ensure it will not be contaminated by outside sources and include exhaust from vehicular traffic, fire apparatus and inclement weather.

7.3.2.1.1

The intake shall be installed in accordance with the compressor manufacturer’s recommendations.

7.3.2.2

If an extended air intake pipe is used, it shall be installed in accordance with the compressor manufacturer's specifications.

7.3.3 Cooling.

7.3.3.1

The final installer shall assemble and install all high pressure breathing air components in accordance with the component manufacturers' instructions and shall test the final assembled system in accordance with this standard and the operating parameters of the component manufacturers.

7.3.3.2*

The Purchaser shall provide a safe, well ventilated, dry space or room for the high pressure breathing air compressor system.

7.3.3.2.1

Provisions shall be made by the Purchaser to ensure there is adequate cooling to keep the air compressor within the compressor manufacturer's operating temperature range while the system is operating in an ambient temperature range between 32°F and 131°F (0°C and 55°C).

7.3.3.2.1

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7.3.3.2.2

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7.3.3.3

The temperature of the compressed air shall not exceed 20°F (11°C) above ambient when measured at the discharge of the compressor aftercooler.

7.3.3.4

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7.3.3.5

The system installer shall provide a warning label(s) cautioning: “Do not obstruct cooling airflow path.”

7.3.4

A relief valve shall be provided after each stage of compression.

7.3.5

If interstage condensate traps are provided by the compressor manufacturer, they shall be plumbed with the final separator to an automatic condensate drain system, which shall be plumbed to a reservoir to collect the discharged liquids.

7.3.5.1

To eliminate the possibility of discharging oily condensate on the ground, the system shall include an automatic system shut-off should the reservoir reach maximum capacity.

7.3.6 Compressor Drive System, Controls, and Air Quality Monitoring.

7.3.6.1

All compressors shall have automatic audible and visual alarms and controls at the main operator's panel that shut down the compressor and prevent automatic restart when any of the following conditions occur:

(1) Oil level or oil pressure is low

(2) Discharge air temperature is higher than recommended by the manufacturer

(3) Moisture in the compressed air at the purification system outlet exceeds the allowances established in NFPA 1989

(4) Carbon monoxide level within the processed air exceeds the allowances established in NFPA 1989

(5) The CO level exceeds 5.0 ppm

7.3.6.2*

All compressors shall be equipped with the following:

(1) An air pressure switch that controls the maximum operating pressure

(2) Interstage pressure gauges after each compression stage

(3) Final stage pressure gauge or digital readout

(4) Oil pressure gauge or digital readout on pressure lubricated compressors or an oil level indicator or device on non-pressure lubricated compressors

(5) Electric, non-resettable hourmeter(s)

7.3.6.3*

Compressors with electric motors shall be equipped with the following:

(1) Magnetic motor starter, or variable frequency drive, with motor overload protection

(2) Protective control to prevent automatic restart after power loss has been restored

7.3.6.4

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7.3.7

The compressor and driver assembly shall be mounted in accordance with the compressor manufacturer’s requirements.

7.3.7.1

The compressor frame shall have provision for safe handling or lifting.

7.3.7.2

Frames for compressors with V-belt drives shall include a means to adjust the V-belt tension.

7.3.8

The air compressor shall have a label affixed in a conspicuous location showing the name and address of the manufacturer, the serial number and model number, the date of manufacture, and the rated capacity.

7.4 Purification System.

If the compressed air system is to supply breathing air, a purification system that meets the requirements of 7.4.1 through 7.4.8 shall be installed.

7.4.1*

If the processed air is to be used as breathing air, the purification system shall produce breathing air that meets the latest requirements of NFPA 1989.

7.4.2

If the processed air is to be used for underwater diving, the purification system shall produce breathing air that meets the requirements of Grade E breathing air as specified by CGA G-7.1, *Commodity Specification for Air*.

7.4.3

The purification system shall be capable of producing the required air quality at full capacity of the compressor for a minimum of 50 hours with inlet air of 80°F (27°C) before cartridge saturation.

7.4.3.1

The purification system shall be equipped with purifier cartridges and filter elements.

7.4.3.2*

The design of the purification system shall permit replacement of the purifier cartridges without disconnecting piping or other components.

7.4.3.2.1

The system shall not be installed in a manner that would permit the compressed air stream to bypass one or more of the purifying components.

7.4.3.3

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7.4.4

A relief valve shall be provided in the purification system, set no higher than 10 percent above the maximum allowable working pressure.

7.4.5

A mechanical separator shall be provided and shall be piped to the automatic drain system.

7.4.5.1

A check valve shall be installed between the mechanical separator and the remainder of the purification system.

7.4.5.2*

The mechanical separator and the purifier housings shall be designed for a 4:1 safety factor at their maximum allowable working pressure.

7.4.5.3

The mechanical separator and the purifier housings shall be corrosion-resistant or treated to resist corrosion.

7.4.6

A pressure gauge shall be installed ahead of the purifier to monitor depressurization before service, maintenance, or repairs of the compressor or purifier.

7.4.7

A pressure regulator valve (back pressure regulator or minimum pressure valve) with a minimum setting of 2000 psi (138 Bar) shall be installed in the purification system downstream of the mechanical separator and purifier housings.

7.4.7.1

A piping connection shall be provided downstream of the pressure regulator valve to provide an air sample for the air quality testing.

7.4.7.2

A line valve shall be installed on the purifier outlet to allow the purifier to be isolated from the downstream air system during inspection, maintenance, and repairs.

7.4.8

A warning label shall be installed at the purifier chambers as follows:

WARNING: Prior to changing purifier cartridges, or performing service or maintenance on the purifier system, release all air pressure in the air compressor system, not including high pressure breathing air stored within high pressure breathing air storage cylinders.

7.5* Air Storage Systems.

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7.5.1.1

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7.5.1.2*

The cylinders shall have the data required by ASME or DOT, UN/ISO permanently stamped or labeled (composite cylinders cannot be stamped) according to the regulating agency they are certified under.

7.5.1.2.1

This data shall include, but not be limited to, the working pressure, date of manufacture, and date of the most recent test.

7.5.1.2.2

Cylinders that are not new shall be verified by the supplier that they are acceptable for breathing air use.

7.5.1.3

Safety relief devices on air cylinders shall be of the ASME type on ASME cylinders and of the DOT, UN/ISO type on DOT, UN/ISO cylinders or equal for the rated pressure.

7.5.2

Valves installed on air cylinders shall meet the requirements of the Compressed Gas Association regarding pressure and usage with compressed air.

7.5.3

If the installation utilizes cylinders that require periodic testing, a label shall be placed on or near the operator's panel that provides the following:

(1) The original cylinder test date stamped or labeled on the cylinders

(2) The recommended testing interval

(3) Five additional open spaces, appropriately labeled, for the user to enter actual retesting dates

7.5.4

The manufacturer's test date (month and year) on each air cylinder shall be current within 12 months of the system installation date.

7.5.5

Air cylinders shall be marked with a label that reads "High Pressure ____ psi Breathing Air" or "High Pressure _____ Bar Breathing Air."

7.5.6 Air Cylinder Mounting.

7.5.6.1*

Air cylinders shall be installed in an arrangement that will hold the cylinders in place and meeting local codes and or DOT requirements.

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7.5.6.1.2

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7.5.6.2

The air cylinder mounting shall facilitate removal of air cylinders for inspection, testing, or service as required.

7.5.6.2.1

Air cylinders shall be installed so that all air cylinders, control valves, and associated piping are readily accessible.

7.5.6.2.2

Air cylinders shall be mounted in such a fashion to permit visual inspection of external surfaces and emergency access to shutoff of cylinder valves or opening of moisture drain traps on ASME cylinders.

7.5.6.2.3

The air cylinder location shall be away from any heat-producing devices such as water heaters or heat exposure from HVAC systems

7.5.7 Air Cylinder Valve Control and Monitoring.

7.5.7.1

A slow-operating valve(s) shall be provided to control airflow into and out of the storage system (if applicable).

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7.5.7.2.1

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7.5.7.2.2

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7.5.7.3

Gauges shall be provided to allow for monitoring pressures from the air storage system or individual air cylinders.

7.5.7.3.1

For systems that are capable only of bulk filling, a minimum of a single gauge shall be provided.

7.5.7.3.2

For systems capable of cascade filling, gauges shall be provided for each individually controlled cylinder or set of cylinders.

7.6* Air Booster Systems.

7.6.1

Line valves shall be provided at the air control panel or on the air booster to control the booster inlet air supply line and the booster discharge airflow.

7.6.2

A pressure gauge shall be provided on the supply line and the discharge line from the booster.

7.6.3

A safety valve or high-pressure switch shall be installed on the discharge side of the air booster.

7.6.4

The pressure setting on the safety valve or high-pressure switch shall not exceed 110% of the maximum allowable working pressure of the booster, the booster's distribution piping, or the air system components.

7.7 Air Supply Regulation.

Air supply regulation shall include the following provisions on an operator's air control panel:

(1) One air pressure gauge marked with a label that reads “Supply Pressure” between the air supply line valve and the pressure self-relieving regulator

(2) One slow-operating air supply valve on the intake supply line

(3) One self-relieving adjustable pressure regulator equipped with a device to prevent unintentional adjustment

(4) One air pressure gauge downstream of the pressure regulator

(5) One pressure relief valve preset at not over 10 percent above the pressure regulator output setting

(6) A warning label installed next to the pressure regulator to indicate working pressure setting and that a relief valve will release at 10 percent higher than the working pressure

7.8 Air Control Panel.

7.8.1

The air control panel and system piping arrangement for a compressor-supplied breathing air system shall allow the operator to perform the following functions:

(1) Fill the storage system directly from the compressor/purification system

(2) Fill SCBA cylinders directly from the compressor/purification system

(3) Fill SCBA cylinders directly from the storage system (and air booster, if equipped)

(4) Utilize the cascade method (if system is capable) or bulk fill method of filling SCBA cylinders

(5) Bypass filling of the storage system to top off SCBA directly from the compressor/purification system

(6) Regulate the maximum SCBA fill pressure

(7) Meter airflow to control the SCBA fill rate with a slow-operating valve or other flow control device

7.8.2

When a cascade system is installed without a compressor, an air control panel and the system piping arrangement shall allow the operator to perform the following functions:

(1) Fill the storage system directly from a remote air compressor

(2) Fill SCBA cylinders directly from a remote air compressor

(3) Fill SCBA cylinders directly from the storage system

(4) Fill SCBA cylinders directly from a booster pump that is supplied by the storage system, if provided

(5) Utilize the cascade method, the bulk fill method, or both for filling SCBA cylinders, as appropriate to the design of the system

(6) Regulate the maximum SCBA fill pressure

(7) Meter airflow to control the SCBA fill rate with a slow-operating valve or other flow control device

(8) Take an air sample to check air quality (at the panel or at the end of an air reel hose, if applicable)

7.9 SCBA or SCUBA Air Cylinder Fill Station.

7.9.1

SCBA and/or SCUBA air cylinders shall be filled within a containment type fill station that meets the requirements of NFPA 1901, 2016 Edition, Sections 7.9.1.1 through 7.9.1.6.3.

7.9.1.1

The fill station shall fully enclose the cylinder during filling to contain the fragments if a cylinder ruptures.

7.9.1.1.1

The fill station design shall be proof tested in accordance with section 7.9.6.

7.9.1.2

The fill station shall fully enclose the refill lines to the cylinders.

7.9.1.3

The fill station shall direct the concussive air blast away from the operator and bystanders.

7.9.1.4

A fill station within any enclosed crew area shall have provisions to vent the concussive air blast to the exterior of the fire apparatus.

7.9.1.5

A means shall be provided to prevent SCBA or SCUBA cylinders from being refilled unless the fill station is in the "cylinder fill operation position."

7.9.1.6

A warning sign shall indicate the hazards inherent in the operation of filling SCBA or SCUBA cylinders.

7.9.2

Pressure gauges, pressure-regulating devices, and controls shall be provided to allow the operator to control the SCBA cylinder fill pressure and fill rate on each SCBA fill hose.

7.9.3

A valve(s) on a fill line(s) shall be a slow-operating valve.

7.9.4

A method of bleeding/venting each air cylinder fill hose shall be provided.

7.9.5*

The SCBA or SCUBA fill enclosure shall be installed in accordance with requirements of the fill enclosure manufacturer.

7.9.6 Testing and Certification.

7.9.6.1

The manufacturer of the enclosed air refill station shall type test a standard production model to validate the design.

7.9.6.1.1

If the enclosed air fill station is for SCBA cylinders, the test shall include rupturing a 5500 psi composite SCBA cylinder that is designed to hold at least 111 SCF (3143 l) of air at 5500 psi (379 Bar).

7.9.6.1.1.1

The failure shall be triggered when the pressure in the cylinder is not less than 6050 psi (417 Bar) or 110% of the fill station design pressure.

7.9.6.1.2

If the enclosed air fill station is for SCUBA cylinders, the test shall include pressurizing a SCUBA cylinder that is capable of holding 100 ft^3 (2831 L) of air at 3300 psi (207 Bar) to failure.

7.9.6.1.2.1

The failure shall occur when the pressure in the cylinder is not less than 3630 psi (207 Bar).

7.9.6.1.3

If the enclosed air fill station is designed for both SCBA and SCUBA cylinders, the refill station shall be tested in accordance with 7.9.6.1.1.

7.9.6.1.4

If the system provides for simultaneously refilling of multiple cylinders, the other chambers shall contain air cylinders identical in capacity and pressure to the cylinder in the chamber being tested.

7.9.6.1.5

The test pressure shall be measured at the SCBA or SCUBA fill enclosure.

7.9.6.1.6

The SCBA or SCUBA fill station shall be tested in a configuration that meets the fill station manufacturer's standard installation requirements.

7.9.6.2

The testing shall prove the following:

(1) The air refill station is capable of containing all fragments of a failed cylinder.

(2) The cylinders in adjacent chambers do not rupture.

(3) The venting provisions direct the air-concussive release away from the operator.

7.9.6.3

All tests shall be witnessed and the test results certified by an independent third-party certification organization.

7.9.6.3.1

Third-party certifying agencies shall be certified to conduct said testing in accordance with a recognized certifying agency such as ISO, ANSI, UL and ASQ.

7.10* Air Hose Reels.

7.10.1

Any permanently mounted air hose reel shall be certified by the reel manufacturer for use at the maximum expected working pressure with a safety factor of at least 4:1.

7.10.2

The air hose reel swivel joint, connecting feed hose, check valve, and air supply equipment shall be rated for the maximum working pressure with a safety factor of at least 4:1.

7.10.3

The air hose reel shall be designed to hold at least 100 percent of the intended hose length.

7.10.4 Size of Fluid Path.

7.10.4.1

The air hose reel shall have a full flow–style swivel joint and a hose connection designed and sized to match the hose intended to be used.

7.10.4.2

The air hose reel shall have a fluid path sized for its intended flow and working pressure.

7.10.5

The reel shall be marked with a label to indicate its intended use and the following:

(1) Utility air or breathing air

(2) Operating pressure

(3) Total hose length

(4) Hose size (ID)

7.10.6 Air Supply to Air Reel.

7.10.6.1

The following equipment shall be provided on the intake air supply line to the reel where the air supply gauge pressure is up to 150 psi (10 Bar):

(1) One air pressure gauge

(2) Meter airflow to control the air supply rate with a slow-operating valve or other flow control device

(3) One check valve

7.10.6.2

The following equipment shall be provided on the intake air supply line to the reel where the air supply gauge pressure is between 151 psi (10 Bar) and 300 psi (21 Bar):

(1) One air pressure gauge upstream of the air pressure regulating device

(2) One slow-operating air supply valve or other flow control device

(3) One adjustable pressure regulator equipped with a device to prevent inadvertent or accidental adjustment

(4) One downstream pressure gauge that reads from 0 psi to 500 psi (0 Bar to 34 Bar)

7.10.6.3

The following equipment shall be provided on the intake air supply line to the reel where the air supply gauge pressure is over 300 psi (21 Bar):

(1) One air pressure gauge upstream of the air pressure regulating device

(2) One slow-operating air supply valve or other flow control device

(3) One adjustable pressure regulator equipped with a device to prevent inadvertent or accidental adjustment

(4) One downstream pressure gauge

(5) One preset pressure relief valve set at not over 10 percent above maximum working pressure

7.10.7

The inlet to an air hose reel with an operating gauge pressure of over 300 psi (21 Bar) shall have a flow-limiting device, such as a velocity-type valve, or a manually adjustable orifice-type valve.

7.10.7.1

The device shall be adjusted to restrict excessive flow and shall be located or covered to prevent readjustment.

7.10.7.2

The metering device shall not be used for normal shutoff valve purposes.

7.10.8

The final assembler of the air hose reel, piping, and valve system shall test the system at the maximum operating pressure of the system for 10 minutes with no pressure loss.

7.10.8.1

This test shall include the hose, if supplied, on the reel.

7.10.8.2

A permanent label shall be installed adjacent to the air reel controls to indicate the operating pressure range and the type of air provided, low pressure utility air (gauge pressure under 300 psi [21 Bar]), low pressure breathing air (gauge pressure under 125 psi [9 Bar]), or high-pressure breathing air (gauge pressure over 300 psi [21 Bar]).

7.10.9 Air Reel Installation.

7.10.9.1

Reels shall be installed in a conspicuous location, accessible for maintenance and servicing, hose access, and reel removal.

7.10.9.2

Rollers and guides shall be installed, where necessary, to prevent damage to the hose at the reel spool or compartment openings and to allow deployment and rewinding of the hose.

7.10.9.3

Reels shall be installed in such a manner so as not to expose the operator to the rewind components.

7.10.9.4

Manually operated reels shall have an operable hand crank with its central midpoint or centerline located not over 72 in. (1830 mm) above the ground or platform that is designed to serve as the operator's standing position.

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7.10.9.5.2

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7.10.10* Low Pressure Breathing Air Reel.

7.10.10.1

The regulation of the output pressure from the breathing air reel shall be at the reel or at an air control panel.

7.10.10.2

No shutoff valves or flow control valves shall be installed downstream of the pressure regulator except at the end of the hose.

7.10.10.3

The low pressure breathing air supply shall be equipped with a low air pressure audible warning device on the air supply.

7.11 Air Hose.

7.11.1*

All low pressure (gauge pressure not over 300 psi [21 Bar]) air hose and couplings supplied shall comply with their intended application and shall have a pressure rating equal to or greater than the highest pressure expected to be encountered as input to the hose with a test safety factor of at least 3:1.

7.11.2

All high-pressure (gauge pressure over 300 psi [21 Bar]) air hose and couplings supplied shall comply with their intended application and shall have a pressure rating equal to or greater than the highest pressure expected to be encountered as input to the hose with a test safety factor of at least 4:1.

7.11.3

Where the hose is attached to an air reel, it shall be done in a manner that allows for its removal.

7.11.4 Discharge Ends.

7.11.4.1*

The discharge end of any breathing air hose shall have a threaded connection.

7.11.4.1.1

If no other fittings are installed at the end of the hose, a temporary protective cap shall be installed to prevent internal contamination of the hose during shipping.

7.11.4.1.2

If the discharge end of hose will terminate with a threaded connection when in use, it shall be equipped with a slow-operating valve.

7.11.4.1.3

If the threaded end of the hose terminates in a quick-connection fitting, a slow operating valve and protective cap shall not be required.

7.11.4.1.4

Connections to hose shall comply with 7.2.7.

7.11.4.2

The discharge end of utility air hose shall have either a threaded connection and slow-operating valve or a quick-connection fitting.

7.11.5 Color Coding.

7.11.5.1

The ends of the hose shall be color coded or marked with a label to designate the operating pressure of the hose.

7.11.5.2

If color coding is used, it shall be as follows:

(1) Blue for utility air hose up to a gauge pressure of 300 psi (21 Bar)

(2) White for breathing air hose up to a gauge pressure of 300 psi (21 Bar)

(3) Yellow for breathing air hose from a gauge pressure of 301 psi to 3000 psi (21 Bar to 27 Bar)

(4) Red for breathing air hose over a gauge pressure of 3000 psi (207 Bar)

7.11.6*

Low pressure breathing air hose shall be a minimum **3⁄8** in. (10 mm) ID with a maximum hose length of not more than 300 ft (90 m).

7.11.7

Utility air hose shall be of a flexible type, with a scuff abrasion–resistant outer covering.

7.11.8

The hose shall be oil resistant and shall be compatible with oil, alkalis, kerosene, paraffin, grease, and salt solutions.

7.11.9

The hose connections for utility air hose shall not be the same as for low pressure breathing air hose or high-pressure air hose.

7.12

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7.13 Remote Breathing Air Systems.

Remote breathing air systems for remote locations shall comply with 7.13.1 through 7.13.7.

7.13.1

A breathing air system shall be designed to supply breathing air for a minimum of two persons at the specified location.

7.13.1.1

The purchaser shall specify the exact number of persons the system shall be designed to support.

7.13.2

The system shall include an air storage system properly sized for the number of persons indicated by the purchaser and shall meet the requirements of Section 7.5.

7.13.3 Piping System.

7.13.3.1

The piping system shall be arranged with an air regulator that shall limit the air pressure in the piping to the desired operating pressure.

7.13.3.2

A pressure relief valve set to relieve the pressure at 10 percent above the desired operating pressure shall be installed on the downstream side of the regulator.

7.13.4

All valves, pressure regulators, and gauges shall be protected from accidental damage.

7.13.5

The piping or hose system between the air cylinders and point of use shall be installed to prevent damage due to abrasion, bending, or pinching.

7.13.6

A holder or box shall be provided for the storage of the breathing air equipment when it is not in use.

7.13.7

A low air warning system shall be provided that monitors the air volume and provides an audible warning when the air volume is at or below 20 percent.

7.14* Breathing Air System Testing and Delivery.

7.14.1

The complete air system shall be tested by the final system installer after its installation on the fire apparatus is complete, using the testing procedure prescribed by the system manufacturer.

7.14.2

The following items shall be tested or verified on all air systems:

(1) Pressure test the system to its maximum operational pressure and check all connections made as a part of the installation for leaks with a leak detection device, which shall include bubble fluid or electronic means.

(2) Verify that any leaks detected during the testing in 7.14.2(1) are repaired.

(3) Visually verify the relief valve set points and working pressure of the air cylinder.

(4) Verify the accuracy of all pressure gauges.

(5) Fully test the operational capabilities of the fill station as established by the manufacturer of the fill station.

(6) Seal all fill adapter connections to eliminate the introduction of contaminants prior to shipment.

7.14.3

If the system's air supply includes a compressor/purification system, the following additional items shall be tested or verified:

(1) Confirm that the fluid levels are at the manufacturer's recommended levels, including the lubricant and coolant if the system is liquid cooled.

(2) Verify the expiration date of the purification filters and cartridges and that they have been installed as required by the manufacturer of the system.

(3) Operate the air compressor for a minimum of 2 hours or the period required to completely fill the onboard air cylinders, whichever is longer.

(4) Confirm that all compressor interstage pressures are within guidelines as established by the compressor manufacturer.

(5) Confirm the operation of the compressor shutdown switch at the pressure requested by the purchaser.

(6) Confirm the set point of the final pressure safety relief valve and pressure maintaining valve.

(7) Confirm the factory set limits of all electrical shutdown devices, including low oil pressure, automatic condensate drain system, high air temperature, excessive processed air moisture, high carbon monoxide, and motor amperage draw.

(8) Confirm that the breathing air system is installed in accordance with the breathing air compressor manufacturer's requirements and drawings and confirm that the cooling airflow is adequate.

7.14.4 Breathing Air Quality.

7.14.4.1*

Prior to final acceptance by the Purchaser, the system installer shall draw an air sample from the breathing air system and submit the sample to be tested in accordance with NFPA 1989, Chapter 5.5.

7.14.4.2

The breathing air shall meet the air quality standards defined in NFPA 1989, Chapter 5.6.

7.14.5

The results of all tests, including the air quality analysis, shall be documented and shall be delivered with the fire apparatus.

7.14.6

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7.16.1 General – FARS

7.16.1.1

Where a fire fighter breathing air replenishment system is installed within a high-rise building or other complex structure, the requirements of this chapter shall apply.

7.16.1.2 Firefighter Air Replenishment System (FARS).

7.16.1.2.1

Firefighter air replenishment systems shall be designed to operate with or without the immediate need of a fire department air support vehicle. A FARS shall consist of the following elements:

(1) A method for utilizing Mask Services Units/Air Support Vehicles to provide breathing air into another breathing air standpipe system

(2) Piping that connects all of the components together into an assembly that meets the needs of air replenishment for emergency crews

(3) A method of connecting firefighter self-contained breathing apparatus worn by emergency crews into a refilling system staged within a structure

(4) Spacing and location of charging panels to reduce travel time to refill locations

(5) Criteria for onsite air supply storage

(6) Criteria for air monitoring and quality control systems

(7) Criteria for breathing air compressors

(8) Commissioning process to ensure quality control

(9) Test and measurements for ongoing air quality control

7.16.1.3 Purpose.

7.16.1.3.1

To strategically place a breathing air replenishment system in high-rise buildings or other complex structures; to allow firefighters to replenish empty breathing air cylinders within close proximity of the incident; to reduce the amount of travel distance, time and equipment needed for logistical support; and thus to maximize firefighter safety and effectiveness.

7.16.1.4 Provisions.

7.16.1.4.1

This system shall be considered a "life safety system" designed to provide a safe and reliable source of breathing air replenishment.

7.16.1.4.1.1

Pressurized components of the FARS shall be listed, approved and certified by a nationally recognized testing and research facility.

7.16.1.4.1.2

FARS shall meet the requirements of Chapter 5 Air Quality Requirements, Chapter 6 Test Methods, and Chapter 7 Compressed Breathing Air Systems.

7.16.1.4.1.3

FARS shall meet the requirements of the following standards:

(1) NFPA 70, *National Electrical Code, 2023 Edition*
(2) NFPA 72, *National Fire Alarm and Signal Code*, *2022 Edition*, Chapters 14 and 26
(3) NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program, 2021 Edition*
(4) NFPA 1981, *Standard 0n Open-Circuit Self-Contained Breathing Apparatus (SCBA) for Emergency Services, 2019 Edition*
(5) NFPA 1901, *Standard for Automotive Fire Apparatus, 2016 Edition*, Chapter 24, Air Systems.

7.16.1.4.2

Design criteria for all pressure containing components shall be satisfied with a minimum working pressure of 5500 PSIG (379 Bar) at 70°F (21°C) with a safety factor of 4:1.

7.16.1.4.3

Compressor and booster supplied systems shall be capable of storage and operation in any ambient temperature between 32°F and 131°F (0°C and 55°C).

7.16.1.4.4

Cascade and bulk air systems shall be capable of storage and operation in any ambient temperature between 0°F and 131°F (-18°C and 55°C).

7.16.1.4.5

The air system shall be designed so that it can be operated in environments with relative humidity up to and including 100 percent.

7.16.1.4.6

All materials used in the air system shall be corrosion-resistant or treated to resist corrosion unless the finished product will be in continuous contact with a noncorrosive lubricant.

24.16.2 Assembly and Installation Practices.

7.16.2.1

All electrical, low voltage and supervisory signal components, equipment, and installation procedures shall conform to NFPA 70, *National Electrical Code, 2023 Edition.*

7.16.2.2

All electrical, low voltage and supervisory signal components, equipment, and installation procedures shall conform to NFPA 72 *National Fire Alarm and Signal Code, 2022 Edition,* Chapters 14 and 26.

7.16.2.3

All screws, pins, bolts, and other fasteners whose failure would create a hazardous condition for personnel or equipment shall be equipped with locking devices.

7.16.2.4

Safety wire, self-locking nuts, cotter pins, lock washers, and liquid-locking compounds shall be acceptable.

7.16.2.5

Each part utilized in the fabrication of the FARS and its components shall be designed for use in compressed breathing air service at pressures, temperatures, and flow rates that will be encountered during actual air system operation.

7.16.2.6

Discharge air from a compressor shall pass through a purification system prior to distribution.

7.16.2.7

Prior to the initial air quality test and commissioning, the FARS shall be purged with pure air until moisture and other contaminants have been removed.

24.16.3 Maintainability.

7.16.3.1

The design of the FARS shall provide for maintainability by including, but not necessarily being limited to, the following maintainability objectives and technical and operational constraints:

7.16.3.2

The design shall be such that faults can be isolated to allow access to removable assemblies or components.

7.16.3.3

Breathing air components, mechanical joints, electrical panels and junction boxes shall be readily accessible.

7.16.3.4

The physical arrangement of components shall be such that they can be inspected, serviced, calibrated, and, if necessary, adjusted without being removed and with minimum disturbance to other components.

7.16.3.5

The design shall be such that inspection, service, and replacement can be accomplished using a minimum of special tools and support equipment.

7.16.3.6

Test points shall be provided to facilitate malfunction isolation and the connection of calibration and test instrumentation.

7.16.3.7

If special tools are required to service or maintain the breathing air system, those tools shall be supplied by the installing contractor or manufacturer.

24.16.4 Performance Requirements

7.16.4.1

The FARS shall be designed to fill, at the most remote air cylinder fill station, a minimum of two (2) empty 45 SCF (1274 L) compressed breathing air cylinders to a maximum pressure of 5,500 PSIG (279 Bar) simultaneously in three (3) minutes or less.

24.16.5 Materials of Construction.

7.16.5.1

All pressurized materials used in the construction shall be suitable for high pressure breathing air at minimum operations of 5,500 PSIG (279 Bar) at 70°F (21°C) with a safety factor of 4:1.

7.16.5.2

All pressurized components shall meet the requirements of ANSI 331 and ASME Section IIIV Codes. The internal surface of all components shall be kept free of contamination, especially hydrocarbons, so the air contained within the system meets Chapter 5, Air Quality Requirements.

24.16.6 Isolation.

7.16.6.1

The FARS shall be arranged in such a way that when an Air Support Vehicle (ASV) is supplying air to the system, the supply from the ASV may be isolated from on-site air storage vessels and directed to a main riser by the use of readily accessible selector valves, in order to allow breathing air to be supplied directly from the air support vehicle to remote fill stations.

24.16.7 Components.

7.16.7.1 Exterior Operator Control Panel.

7.16.7.1.1

Systems designed for use with a Mask Services Unit (MSU) or Air Support Vehicle (ASV) shall be designed to allow the air support vehicle to interconnect with the system from an accessible exterior panel location, allowing a constant supply of air from the vehicle to the installed FARS system.

7.16.7.1.2

The exterior operator control panel shall be attached to the building or on a remote monument.

7.16.7.1.3

The panel shall be secured inside a weather-resistant enclosure that is visible and accessible on approach to the building.

7.16.7.1.3.1

The enclosure shall be maintained with unobstructed view and access.

7.16.7.1.4

The panel location shall be approved by the AHJ.

7.16.7.1.5

The panel shall meet the requirements of NFPA 1901 *Standard for Automotive Fire Apparatus, 2016 Edition.* Chapter 24, Air Systems, Section 7.8.

7.16.7.2 Interior Air Cylinder Fill Station.

7.16.7.2.1

Air cylinder fill stations shall be interconnected directly to the main air supply.

7.16.7.2.2

Air cylinder fill stations shall be located in a fire-resistive enclosure directly accessible to the fire department access paths.

7.16.7.2.2.1

Air cylinder fill stations shall be located such that means of egress are not obstructed.

7.16.7.2.3

Intermediate air cylinder fill station(s) shall be installed in a location specified by the AHJ.

7.16.7.2.4

Each air cylinder fill station shall have the capability of being isolated from the remainder of the system by means of isolation valves.

7.16.7.2.5

The interior air cylinder fill stations shall be capable of replenishing a minimum of four (4) empty 45 SCF (1274 L), 5,500 PSIG (379 Bar) breathing air cylinders within six (6) minutes or less.

7.16.7.2.5.1

The air cylinder fill station shall provide for the refilling of breathing air cylinders in accordance with NFPA 1901, *Standard for Automotive Fire Apparatus, 2009* Edition, Chapter 24, Air Systems Section 7.9.

7.16.7.2.6

The design of the air cylinder fill station shall, in an emergency, provide for the direct refilling of breathing air cylinders by means of a discharge outlet with a minimum of one (1) cylinder filling hose that shall have an RIC/UAC female quick-connect coupling.

7.16.7.2.6.1

The female coupling shall be designed to connect to an RIC/UAC male quick-connect coupling and be compatible with the fire department's SCBA.

7.16.7.6.6.2

The assembled coupling shall meet the construction, performance and dimensional requirements of NFPA 1981, *Standard on Open-Circuit Self-Contained Breathing Apparatus (SCBA) for Emergency Services, 2019 Edition*, Chapter 6, Section 6.4.

7.16.7.6.6.3

The use of the discharge outlet shall be in accordance with NFPA 1981, *Standard on Open-Circuit Self-Contained Breathing Apparatus (SCBA) for Emergency Services, 2019 Edition,* Section 3.3.34.

7.16.7.3 Interior Air Cylinder Fill Panel.

7.16.7.3.1

Air cylinder fill panels shall be interconnected directly to the main air supply.

7.16.7.3.2

Air cylinder fill panels shall be located in a fire-resistive enclosure directly accessible to the fire department access paths.

7.16.7.3.2.1

Air fill panels shall be located such that means of egress are not obstructed.

7.16.7.3.3

Intermediate air fill panels shall be installed in a location specified by the AHJ.

7.16.7.3.4

Each air cylinder fill panel shall have the capability of being isolated from the remainder of the system by means of isolation valves.

7.16.7.3.5

The interior air cylinder fill panel shall be capable of replenishing a minimum of two (2) empty 45 SCF (1274 l) at 5,500 PSIG (379 Bar) SCBA cylinders simultaneously within two (2) minutes or less.

7.16.7.3.6

Each air cylinder fill panel shall be installed in a metal cabinet constructed of minimum 18-gauge carbon steel or equivalent.

7.16.7.3.7

With the exception of the shutoff valve, pressure gauges, fill hoses, and ancillary components, all components shall be contained behind a minimum 18-gauge interior panel.

7.16.7.3.8

Hinges for the cabinet door shall be located inside of the cabinet.

7.16.7.3.9

A minimum of 20% of the door surface area shall be constructed of tempered glass, whose thickness shall not be greater than 1/8-inch (3.175 mm).

7.16.7.3.10

The design of the cabinet shall provide a means for storing the hose to prevent kinking.

7.16.7.3.10.1

When the hose is coiled, the brackets shall be installed so that the hose bend radius is maintained at 4 inches or greater.

7.16.7.3.11

The design of the air cylinder fill panel shall, in an emergency, provide for the direct refilling of breathing air cylinders by means of a discharge outlet with a minimum of two (2) cylinder filling hoses that shall have an RIC/UAC female quick connect coupling.

7.16.7.3.11.1

The female coupling shall be designed to connect to a RIC/UAC male quick connect coupling and be compatible with the fire department's SCBA apparatus.

7.16.7.3.11.2

The assembled coupling shall meet the construction, performance and dimensional requirements of NFPA 1981, *Standard on Open Circuit Self-Contained Apparatus (SCBA) for Emergency Services, 2019 Edition*, Chapter 6, Section 6.4.

7.16.7.3.11.3

The use of the discharge outlet shall be in accordance with NFPA 1981, *Standard on Open-Circuit Self-Contained Breathing Apparatus (SCBA) for Emergency Services, 2019 Edition,* Section 3.3.34.

7.16.7.3.12

The air cylinder fill panel shall meet the requirements of NFPA 1901, *Standard for Automotive Fire Apparatus, 2016 Edition*, Chapter 24, Air Systems.

7.16.7.4 Air Storage System.

7.16.7.4.1

FARS designed with on-site air storage to supply firefighters with air replenishment prior to the arrival of an air support unit shall be capable of refilling a minimum of fifty (50) empty breathing air cylinders of 45 SCF (1274 l) cubic feet at 5,500 PSIG (379 Bar), and shall be capable of replenishing all 50 cylinders at a minimum of two (2) empty 45 SCF (1274 l) at 5,500 PSIG (379 Bar) SCBA cylinders simultaneously within three (3) minutes or less without fire department supplementation.

7.16.7.4.2

FARS designed with on-site air storage shall meet the Chapter 5 Air Quality Requirements of NFPA 1901, *Standard for Automotive Fire Apparatus, 2016 Edition*, Chapter 24, Air Systems, Section 7.5.

7.16.7.4.3

FARS designed with on-site air storage shall meet the breathing air quality requirements of NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program, 2021 Edition.*

7.16.7.5 General Piping and Installation.

7.16.7.5.1

All pneumatic fittings, tubing, and hose shall be rated for the maximum allowable working pressure that could be encountered, with a test safety factor of not less than 4:1.

7.16.7.5.2

All pressurized materials used in the construction of the piping distribution system shall be compatible for use with high pressure breathing air equipment and self-contained breathing apparatus.

7.16.7.5.3

Tubing shall be constructed of stainless steel or other approved materials that are compatible with high pressure

breathing air.

7.16.7.5.3.1

When stainless steel tubing is used, it shall meet the requirements of ASTM A-269, Grade 316 or equivalent.

7.16.7.5.4

Fittings shall be constructed of stainless steel or other approved materials that are compatible with breathing air.

7.16.7.5.4.1

Stainless steel fittings shall meet the requirements of ASTM A-269, Grade 316 or equivalent.

7.16.7.5.5

All pneumatic fittings, tubing, and hose shall be corrosion-resistant.

7.16.7.5.6

All piping and tubing shall be blown clean with clean, dry air before being installed and shall be free of contamination.

7.16.7.5.7

Routing of tubing and bends shall be such as to protect the tubing from mechanical damage.

7.16.7.5.8

Clamps shall be attached to the structure at a minimum of every 48 inches (1220 mm), and within 4 inches (102 mm) of either side of a coupling or elbow.

7.16.7.5.9

Rigid piping shall run in an orderly manner with a minimum of bends and elbows.

7.16.7.5.10

The piping installation shall provide room for maintenance and repairs with access panels provided where applicable.

7.16.7.5.11

Prior to assembling threaded piping joints, sealant shall be applied to the thread in a manner that will prohibit entry of the sealant into the piping system.

7.16.7.5.12

Air connections on equipment or panels shall be provided with a threaded dust cap on a safety chain or shall be a quick-disconnect-type fitting.

7.16.7.5.13

All pneumatic fittings, tubing, and hose shall be located within a fire-resistive enclosure and be protected from physical damage.

7.16.7.5.14

Flexible hose shall be installed in such a manner as to prevent cuts, abrasions, exposure to damage, excessive temperatures and excessive bending.

7.16.7.5.15

The hose shall be installed in a manner that permits removal of the hose without removal of major breathing air components or building structure components.

7.16.7.5.16

All pressurized components shall meet the requirements of NFPA 1901, *Standard for Automotive Fire Apparatus, 2016 Edition,* Chapter 24, Air Systems.

7.16.7.5.17

All pressurized components shall meet the breathing air quality requirements of NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program, 2021 Edition.*

7.16.7.5.18

All pressurized components shall meet the breathing air quality requirements of Chapter 5, Air Quality Requirements, of this standard.

7.16.7.6 Air Monitoring and Quality Control.

7.16.7.6.1

FARS shall have automatic audible and visual alarms and controls at the Exterior Operator Control Panel and within the Fire Command Center to monitor the systems moisture, carbon monoxide and pressure.

7.16.7.6.1.1

FARS shall meet the requirements of NFPA 70, *National Electrical Code, 2023 Edition.*

7.16.7.6.1.2
FARS shall meet the requirements of NFPA 72 *National Fire Alarm and Signal Code, 2022 Edition*, Chapters 14 and 26.

7.16.7.6.2

The monitors shall be connected to the building's fire alarm system as a supervisory alarm.

7.16.7.6.2.1

The monitors shall meet the requirements of NFPA 70, *National Electrical Code, 2023 Edition.*

7.16.7.6.2.2

The monitors shall meet the requirements of NFPA 72 *National Fire Alarm and Signal Code, 2022 Edition*, Chapters 14 and 26.

7.16.7.6.3

The monitors shall transmit a supervisory signal when the levels of moisture exceed 24 ppm or carbon monoxide exceeds 5 ppm for breathing air in accordance with Chapter 5 Air Quality Requirements, or when the pressure of the breathing air system is less than 80% of the operating pressure.

24.16.8Breathing Air Compressor.

7.16.8.1

FARS designed with a breathing air compressor shall meet the requirements of NFPA 1901, *Standard for Automotive Fire Apparatus, 2016 Edition*, Chapter 24, Air Systems, Section 7.3.

24.16.9 Labels and Plates.

7.16.9.1

Each component and enclosure shall be identified with a label.

7.16.9.1.1

The marking of the enclosure shall be immediately visible and accessible to emergency response personnel.

7.16.9.1.1.1

Marking shall meet the requirements of NFPA 1901, *Standard for Automotive Fire Apparatus, 2016 Edition*, Chapter 24, Air Systems, Section 7.2.11.

24.16.10 Documentation.

7.16.10.1

Two complete sets of plans, specifications and calculations shall be submitted to the AHJ for review and approval.

7.16.10.1.1

Plans, specifications and calculations shall demonstrate compliance with the requirements of this chapter and shall be stamped by a Registered Design Professional.

7.16.10.2

Documents shall include system calculations, manufacturer mill reports and product data specification sheets for all components of the FARS installation.

7.16.10.3

Two complete sets of documentation that cover the operation and maintenance of the system shall be delivered with the FARS.

7.16.10.4

The documentation shall be permitted to be in printed format, electronic format, audiovisual format, or a combination thereof.

7.16.10.5

Nomenclature for components, controls, and indicators shall be consistent with that used on the diagrams required in 7.16.8 and on equipment nameplates.

7.16.10.6

The manuals shall include, but not necessarily be limited to, the following:

(1) An illustrated component list

(2) A schedule of maintenance and air quality checks

(3) Troubleshooting information to enable a technician to locate trouble and to make repairs or adjustments to the components

(4) Step-by-step procedures for operating the FARS

7.16.10.7

Documentation shall meet the requirements of NFPA 1901, *Standard for Automotive Fire Apparatus, 2016 Edition*, Chapter 24, Air Systems, Section 7.2.12.

24.16.11 Training and Instruction.

7.16.11.1

If a FARS without a compressor/purification system is provided, the system installer shall supply a qualified person to provide operational training to fire department personnel that includes the following:

(1) A complete system component familiarization/walkaround

(2) A complete review of the system and its safety features

(3) A review of all operation, service, and maintenance documentation

(4) Hands-on familiarization of the safe operation of the air control panel and air cylinder fill station/fill panel, including actual SCBA filling and other pertinent operations of the system

7.16.11.2

If a FARS that includes a compressor/purification system is provided, a person certified by the breathing air compressor manufacturer in the operation of the specified air compressor system shall provide training to fire department personnel that includes the following:

(1) A review of the compressor/purification system operations and maintenance, including the operations and maintenance documentation and the name, address, and phone number of the local distributor

(2) Procedures to change purification cartridges

(3) Hands-on familiarization of the safe operation of the compressor and purification system

7.16.11.3

The fire department shall designate one or two individuals to be the resource persons for all the fire fighter breathing air replenishment system training and equipment indoctrination.

7.16.11.4

The fire department shall designate where the training is to take place.

7.16.11.5

Training shall meet the requirements of NFPA 1901, *Standard for Automotive Fire Apparatus, 2016 Edition*, Chapter

24, Air Systems; and Section 7.2.13.

24.16.12 FARS Testing and Commissioning.

7.16.12.1

Following fabrication, assembly, and installation of the FARS, the Authority Having Jurisdiction shall witness the pneumatic testing of the complete system at a minimum test pressure of 6,050 PSIG (417 Bar) using oil-free dry air, nitrogen or argon.

7.16.12.1.1

A minimum twenty four (24) hour pneumatic test shall be performed.

7.16.12.1.1.1

During this test all fittings, joints and system components shall be inspected for leaks.

7.16.12.2

The Authority Having Jurisdiction shall witness the filling of two (2) empty 45 SCF (1274 l) at 5,500-PSIG (379 Bar) capacity SCBA cylinders in three (3) minutes or less using compressed air supplied by fire department mobile air equipment connected to the exterior fire department connection panel.

7.16.12.2.1

The SCBA cylinders shall be filled at the Air Fill Panel or Air Fill Station farthest from the exterior fire department connection panel.

7.16.12.3

The air storage system shall be tested to confirm its ability to meet section X.3.4.

7.16.12.3.1

This shall be accomplished by replenishing a minimum of fifty (50) empty 45 SCF (1274 l) at 5,500 PSIG (379 Bar) SCBA cylinders at the uppermost air cylinder fill panel or air cylinder fill station without fire department mobile air augmentation.

7.16.12.4

Before the system is placed into service, a minimum of two air samples shall be taken from separate air cylinder fill panels and/or air cylinder fill stations and submitted to an independent certified gas analysis laboratory to verify the system's cleanliness and that the air complies with the requirements for breathing air in accordance with Section 5.3.

7.16.12.4.1

The written report of the analysis shall be submitted to the Authority Having Jurisdiction documenting that the breathing air complies with this section.

7.16.12.5

A fire department representative shall be present at all testing.

12.16.12.6

Testing and commissioning shall meet the requirements of NFPA 1901, *Standard for Automotive Fire Apparatus, 2016 Edition*, Chapter 24, Air Systems, Section 7.14.

24.16.13 Security.

7.16.13.1

To prevent unauthorized access to or tampering with the FARS system, each enclosure shall be maintained locked by a means approved by the fire department.

7.16.13.1.1

The enclosure shall have a tamper switch connected to the building fire alarm system indicating a supervisory signal when the enclosure is opened.

7.16.13.1.2

The enclosure shall meet the requirements of NFPA 70, *National Electrical Code, 2023 Edition.*

7.16.13.1.3

The enclosure shall meet the requirements of NFPA 72, *National Fire Alarm and Signal Code, 2022 Edition*, Chapters 14 and 26.

24.16.14 Annual Maintenance - Tests and Measurements.

7.16.14.1

FARS installed in accordance with this standard shall be properly inspected, tested and maintained in accordance with this standard to provide at least the same level of performance and protection as initially designed.

7.16.14.1.1

The owner shall be responsible for maintaining the system and keeping the system in good working order.

7.16.14.2

All components of the FARS shall be inspected annually and certified by the installer and/or licensed mechanical engineer specializing in high pressure breathing air systems to be in proper working condition and free of defects.

7.16.14.3

Air samples shall be taken at least quarterly to ensure the stored air meets or exceeds breathing air quality standards in accordance with Section 5.3.

7.16.14.3.1

A copy of the report shall be submitted to the fire department.

Sample Annex Language

A.7.2
The type of fire department air system and its size is determined by the number of SCBA units that will be used simultaneously, the number of SCBAs available, and the length of the event requiring the use of SCBA.

The number of users wearing SCBAs simultaneously should be considered under both peak demand and continuous demand. Peak demand is the maximum number of simultaneous SCBA users needed under the worst emergency conditions for which the fire department feels preparation is necessary. Continuous demand is the minimum number of simultaneous SCBA users necessary to maintain operations for a long-term duration.

To allow a specified number of SCBA users to be deployed without interruption, as many as three times that number of SCBA units should be available on the scene. That allows for backup personnel to have their equipment in readiness to immediately relieve those personnel who have exhausted their air supply, as well as providing extra units in the event of failures or equipment problems.

The resupply rate of SCBA cylinders on the scene could be accomplished by an air compressor alone, air cascade alone, or a combination of both, and with or without a booster system. The users should determine the supply rate and duration, then determine what system will meet this requirement.
An analysis of the existing fire department SCBAs and breathing air system should be performed to determine what needs, if any, exist. This analysis should include the following:

(1) SCBA units: type, quantity, designed duration
(2) Extra SCBA cylinders: type, quantity, designed duration
(3) Air storage system capability
(4) Air compressor capability

The fire department high pressure breathing air compressor system should contain the ability to monitor the processed breathing air quality and may have the capability to notify the operator on the system-equipped Human Machine Interface (HMI) and/or alert the operator via email, SMS, or Cloud alerts if preset breathing air quality thresholds are exceeded.

Should the high pressure breathing air compressor system be installed in a location where ambient noxious gases hazardous to human health may be present, the department may wish to specify, at time of compressor ordering, electronic monitoring devices and/or sensors protecting against the intake of noxious gases. Examples include carbon monoxide, hydrogen sulfide, sulfur dioxide and carbon dioxide. The affixed monitoring device(s) shall shut off the high pressure breathing air compressor, should any one of the monitoring/sensing devices detect said gas above preset limits.

The fire department may wish to include in the system specifications, at time of purchase, a high temperature monitoring device(s) for the high pressure purification system. The device should include temperature thermistors installed either within the purification filter cartridge or between the purification filter chambers to protect against adverse temperature rise as a result of improper filter cartridge maintenance. The department may also wish to include an electronic purification moisture monitoring device to alert the operator and shut off the compressor, should the moisture limit rise above preset thresholds.

A.7.2.1
Special operating conditions such as high temperatures or cold weather might require special equipment modifications or design requirements by component manufacturers and body manufacturers. Fire departments need to be specific in stating their operating temperature range and special requirements. Because of the presence of moisture, special provisions should be made for moisture separator freeze protection in very cold weather operations.

A.7.2.11.6
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A.7.2.13.1
Expectations for warranty, installation, start-up and training should be carefully defined in the purchaser's specifications. If, due to specific circumstances, training is not able to be conducted in person, remote teaching/learning may be an alternative as long as the curriculum is approved by the system manufacturer.

A.7.2.13.2
Because of the extremely complicated nature of breathing air compressor systems, training is a critical component of the safe use of the system. Expectations for training should be carefully defined in the purchase specifications.

A.7.3
If filling is to be accomplished with a compressor and a filled air storage system in simultaneous operation, the amount of SCBA fills in the first 1 to 2 hours will increase considerably. The number of SCBA fills from the air storage system should be calculated and added to the air compressor fill rate. The total fills per hour would have to be an estimate, because the compressor could be refilling the air storage system during SCBA connection and disconnection.

A.7.3.2.1
Purposely Left Bank

A.7.3.3.2
Special airflow engineering, supplemental fans, additional doors, and vents might be required for the release of heated air from the air compressor during long periods of operation. These could include automatic operating doors in the door or walls of the compressor room, manually opened roof doors, large electric-driven exhaust fans, etc. These extra provisions installed by the final-stage installer could ensure there is adequate cooling to keep the air compressor within the compressor manufacturer's operating temperature range.

A.7.3.3.5
Purposely Left Blank.

A.7.3.6.2

Pressure reading devices can be pressure gauges or digital readout.

A.7.3.6.3
Purposely Left Blank.

A.7.4.1
The purchaser might require a quality of air other than that used for fire fighting. In those situations, it is important that the purchaser specify the standards that such air quality has to meet.

A.7.4.3.2
The purification system cartridges and filter elements should be located for ease of service. These units can be remotely mounted from the air compressor and the operator's panel.

A.7.4.5.2
The manufacturer should specify the replacement interval of the housings based on pressurization and depressurization load cycles.

A.7.5
In some U.S. states, the regulations of the Occupational Safety and Health Administration (OSHA) of the Department of Labor have been interpreted to require that ASME air storage cylinders shall be required.

A.7.5.1.2
The purchaser might want to request the cylinder manufacturer to supply an acceptance certificate for UN cylinders or a “Form U1A Manufacturer’s Data Report for Pressure Vessels” for ASME cylinders. A statement on the invoice, such as the following, is recommended for used cylinders and is adequate to verify that the cylinders are acceptable for breathing air use: “These used cylinders have been in breathing air service or have been cleaned to be acceptable for breathing air service.”

If the purchaser is supplying the cylinders, they should include this statement on their form or letterhead and sign and date it.

A.7.5.6.1
Purposely Left Blank.

A.7.6
Booster-type high pressure air compressors, used in conjunction with air cylinder storage arranged for air cascading, serve the purpose of extracting greater quantities of air from high pressure air storage systems. By adding a high pressure air booster/amplifier to the system, the yield can be increased by over 100 percent.

A.7.9.5
The SCBA/SCUBA containment fill station should be affixed to the ground in accordance with the manufacturer's recommendations.

A.7.10
The size of the air supply piping, air compressor output, air hose size, and size of auxiliary storage reservoirs are of critical importance for supplying utility air–powered tools, confined-space breathing air, and high pressure air supplies to remote locations. The purchaser needs to specify the following information about the air reels that are to be installed on the apparatus so that the manufacturer can design an appropriate system:

(1) Source of air supply to the air reel
(2) Operating pressure range desired
(3) Type of air desired (low or high pressure, utility or breathing air)
(4) Cubic feet (cubic meters) of air output or cubic feet (cubic meters) of air per minute required by air tools or equipment to be used and whether to be used alone or in combination
(5) Specific air tools, air bags, and other devices to be used from the air system

The use of chassis air brake systems for utility air tools is not recommended. Air brake system–supplied air outlets should be used only for nonemergency applications. Rescue air tools, air bags, or other emergency uses should not be supplied from air brake systems but from a high pressure cascade cylinder system or a high capacity utility air compressor especially designed for air tool usage. SCBA or SCUBA air cylinders are suitable for intermittent air supply with limited airflow requirements. Where used for this purpose, additional SCBA cylinders should be defined and segregated on the fire apparatus for such usage.

A.7.10.1
Purposely Left Blank

A.7.10.10
The intent of the low pressure breathing air reel is to supply breathing air through air hose at an operating gauge pressure of 125 psi (9 Bar) at the outlet point for connection to specific types of breathing apparatus. These arrangements provide for a longer operating duration in toxic or oxygen-deficient atmospheres.

A.7.11.1
The purchaser should evaluate conditions under which utility air hose, high pressure breathing air hose, or low pressure breathing air hose could be used and advise the contractor if special hose is required.

A.7.11.4.1
The discharge end of any breathing air hose could have various fittings, threads, or quick connections installed on the threaded end of the discharge hose. The purchaser needs to specify the particular hose termination,

thread size, valve control, quick-connect fitting, expected application of hose, and other pertinent information if the manufacturer is to provide appropriate connections.

A.7.11.6
Confined-space low pressure hose supplying multiple users or hose lengths greater than 300 feet (90 m) could require larger hose sizes.

A.7.12
Purposely Left Blank

A.7.12.1
Purposely Left Blank

A.7.12.2
Purposely Left Blank.

A.7.14
If the tests of some components of the high pressure breathing air compressor system are being certified by an independent third-party certification organization, the purchaser might want to specify that the test results and certification documentation be provided in the equipment documentation packet.

A.7.14.4.1
Prior to handover of the high pressure breathing air compressor system, the authority having jurisdiction might wish to require additional point-of-use air quality testing. This could include air sample ports affixed directly to the compressor system, SCBA fill stations and/or others as indicated by the system manufacturer. This standard requires that the air sample(s) be tested in accordance with NFPA 1989. The results of such testing should be included in the required delivery documentation and as required by 7.14.5.

A.7.16.1.1
This section describes the minimum requirements for the design, fabrication, engineering, installation, testing, and maintenance of a fire fighter breathing air replenishment system installed within a high-rise building or other complex structure for use under emergency conditions.

AGENDA ITEM #6a ATTACHMENT

PUBLIC COMMENTS FOR COMMITTEE ACTION

Public Comment No. 3-NFPA 1850-2024 [Section No. 13.4.2]

13.4.2

As part of the respiratory protection program, the organization shall develop SOPs for minimizing exposure to contaminated SCBA.

13.4.2.1 SCBA subject to exposure to products of combustion on the fireground warrants advanced cleaning and the organization SOP should include the following information for when and how SCBA is subjected to preliminary exposure reduction after being contaminated.

(1) A statement that SCBA subject to exposure to products of combustion on the fireground usually warrants advanced cleaning

(2) The specific technique(s) that can be applied for cleaning, including hand washing, machine washing, or other processes that the manufacturer indicates as safe for the SCBA

(3) The identification of any SCBA components that should be removed for separate cleaning

(4) Any specific detergents for cleaning the SCBA or specific SCBA components, or a list of acceptable parameters for a detergent such as pH, chemical constituents that are acceptable, and chemical constituents to be excluded

(5) * Warnings against the use of any specific substances

(6) * Characteristics of any tools or equipment

(7) * Specifications of any other cleaning parameters

(8) Specific procedures for carrying out advanced cleaning, including drying of SCBA

(9) * Specific precautions related to decontamination where SCBA are exposed to hazardous substances, including where SCBA exposure to certain hazardous substances requires specialized cleaning, replacement of components, or disposal

(10) A requirement for the organization or end user to inspect the SCBA following preliminary exposure reduction, advanced cleaning, or decontamination

13.4.2.2 The organization SOP should include the minimum following information for when and how SCBA is subjected to exposure of contamination.

(1) A list of considerations for when SCBA or SCBA components are to be subject to disinfection

(2) A warning that sharing of SCBA facepieces and other SCBA components require disinfection and advanced cleaning between individuals

(3) The identification of specific sanitizers or disinfectants that are suitable for SCBA, and if these disinfectants have been registered with the US Environmental Protection Agency for disinfection of specific infectious diseases

(4) Specific procedures for the application of the disinfectant, including the concentration, manner of application, dwell time, and any subsequent requirement for rinsing, drying, or advanced cleaning.

13.4.2.3 The organization shall define what criteria determine when an SCBA is contaminated beyond the ability to remedy by cleaning and disinfecting in accordance with Section 15.1 of this standard.

13.4.2.~~2~~ – 4

The SOPs shall detail methods for proper disposal of such contaminated SCBA in accordance with 13.8.2.

13.4.2.~~3~~ – 5

As a minimum, SCBA that are known to be contaminated or are suspected of being contaminated shall be tagged out-of-service and shall be segregated from other equipment, personnel, and civilians.

13.4.2.~~4~~ – 6

The organization shall develop procedures to minimize the public's risk of exposure to soiled or contaminated SCBA.

Statement of Problem and Substantiation for Public Comment

Moving "selection care and maintenance" information which was incorrectly placed in performance standard for SCBAs.

Related Item

• First Revision No. 4

Submitter Information Verification

Submitter Full Name: John Morris
Organization: 3M Company
Street Address:
City:
State:
Zip:
Submittal Date: Tue May 21 10:36:42 EDT 2024
Committee: FAE-RPE

Public Comment No. 56-NFPA 1850-2024 [Section No. C.1.2]

C.1.2

The SCBA cylinder requalification process includes a visual inspection, both internal and external; the ~~hydrostatic test~~ DOT approved requalification test ; marking or labeling; and maintenance of proper records of the requalification. Each retest facility has to perform all these functions during a cylinder requalification. Information about the hydrostatic retest is found in 49 CFR 173.34(e).

Statement of Problem and Substantiation for Public Comment

Hydrostatic testing is not the only DOT approved requalification method. In fact, Luxfer has also included other requalification methods such as modal acoustic emission (MAE) to their DOT Special Permit 142332.

Related Public Comments for This Document

Related Comment	Relationship
Public Comment No. 58-NFPA 1850-2024 [Section No. C.4]	

Related Item

- PI Number 30

Submitter Information Verification

Submitter Full Name: Will Morrison
Organization: Hexagon Digital Wave
Street Address:
City:
State:
Zip:
Submittal Date: Wed May 29 15:56:46 EDT 2024
Committee: FAE-RPE

Public Comment No. 58-NFPA 1850-2024 [Section No. C.4]

C.4 Requalification Process.

A brief description of the requalification process follows. The cylinder is first de-valved and all internal and external surfaces made visible to the retester. The cylinder is internally and externally visually inspected according to required DOT specifications. If it passes, the ~~hydrostatic~~ DOT approved requalification test is performed next.

To hydro-test the cylinder, it is placed inside of a water jacket or bath (containing water) that is specially sealed. The cylinder is filled with water. The cylinder is pressurized with more water. The cylinder expands a little and displaces water in the water jacket. The amount of water displaced in the water jacket is measured by a precision method. This amount of water displaced represents how much the cylinder expanded under pressure. When the water pressure returns to normal, the amount of expansion that still exists (the water not taken back into the water jacket) is called the *permanent expansion*. This information is recorded and compared to DOT requirements to determine if the two expansions of the cylinder comply with DOT regulations.

If the cylinder passes the internal and external inspection and retest, the retester marks the all-metal cylinder by stamping into the metal or labels the composite cylinder with a label sealed in resin. The information marked or labeled includes the RIN identification and the retest date. A record is then made of the requalification with the information required by the DOT.

The retester is required to stamp out cylinder DOT markings with Xs or with the word “Condemned” if the cylinder does not pass the requalification process. Cylinders that are fully wrapped with composite materials that do not pass requalification are labeled condemned. The cylinder should be rendered unable to hold pressure with the permission of the cylinder owner. It is recommended that all organizations permit the retest facility to render condemned cylinders unable to hold pressure by drilling through the cylinder or destroying valve threads. A record is made of condemned cylinders, according to DOT requirements.

Statement of Problem and Substantiation for Public Comment

Hydrostatic testing is not the only DOT approved requalification method. In fact, Luxfer has also included other requalification methods such as modal acoustic emission (MAE) to their DOT Special Permit 142332.

Related Public Comments for This Document

Related Comment	Relationship
Public Comment No. 56-NFPA 1850-2024 [Section No. C.1.2]	

Related Item

- PI Number 31

Submitter Information Verification

Submitter Full Name: Will Morrison
Organization: Hexagon Digital Wave
Street Address:
City:
State:
Zip:

Submittal Date:	Wed May 29 16:12:08 EDT 2024
Committee:	FAE-RPE

AGENDA ITEM #6b ATTACHMENT

PUBLIC COMMENTS FOR COMMITTEE REVIEW ONLY

Public Comment No. 1-NFPA 1850-2024 [Global Input]

Sections 1.1, 1.2

The correlating committee identified that different approaches in scoping for the consolidated document are used and that a joint effort to reexamine the provided narrative will improve the overall understanding that how each technical committee differently approaches selection, care and maintenance. The correlating committee directs the Technical Committees on Respiratory Protective Equipment, and Structural Firefighting Protective to consider changes to scope statements to better reflect the unique nature of requirements in NFPA 1852 as related to selection, care, and maintenance of SCBA as contrasted to those in NFPA 1851 and provide harmonization as deemed appropriate.

Additional Proposed Changes

File Name	Description	Approved
1850_CustA2025_FAE_AAC_FD_CorrelatingNotes.pdf	1850_CCNote_No.1	

Statement of Problem and Substantiation for Public Comment

See First Revision No. 32

Related Item

• First Revision No. 32

Submitter Information Verification

Submitter Full Name: Committee Member2
Organization: No
Street Address:
City:
State:
Zip:
Submittal Date: Tue Mar 19 11:12:33 EDT 2024
Committee: FAE-SPF

Public Comment No. 47-NFPA 1850-2024 [Global Input]

Remove all requirements for, and references to, “PPE Technician”, . Specifically, Remove 4.1.1.5, 4.1.2.3, 4.1.3.5, 4.2.2.1*, A.4.2.2.1, and all references to “PPE Technician” after 4.2.4

Remove "Verified Training Organization" and all language added throughout the document in conjunction with "PPE Technician" and, specifically, to the table in 4.3.4

Statement of Problem and Substantiation for Public Comment

Much work has been done to refine the PPE Technician requirements included in the First Draft based on feedback received from the committee and the simplest way to implement these changes is to remove all references to PPE Technician in the First Draft. Additional Public Comments will be submitted to update the definition for PPE Technician (and the related annex) and add a definition for PPE Manager (with a related annex); insert one requirement for an organization to assign a PPE Manager/PPE Technician to their program (with related annex material); and add an Annex focused on the PPE Manager/PPE Technician roles, responsibilities, and training curriculum.

Related Public Comments for This Document

Related Comment	Relationship
Public Comment No. 48-NFPA 1850-2024 [Section No. 3.3.122.1]	
Public Comment No. 51-NFPA 1850-2024 [Section No. 4.2.4]	
Public Comment No. 53-NFPA 1850-2024 [Global Input]	
Public Comment No. 77-NFPA 1850-2024 [Section No. 4.3.4]	

Related Item

• FR-32 • PI-141 • PI-149 • PI-150 • PI-48 • PI-234 • PI-256 • PI-258 • PI-259 • PI-260 • PI-36 • PI-155 • PI-261 • PI-26

Submitter Information Verification

Submitter Full Name: Marni Schmid
Organization: Fortunes Collide Marketing LLC
Affiliation: F.I.E.R.O.
Street Address:
City:
State:
Zip:
Submittal Date: Tue May 28 20:10:21 EDT 2024
Committee: FAE-SPF

Public Comment No. 53-NFPA 1850-2024 [Global Input]

ADD NEW ANNEX E PPE MANAGER and PPE TECHNICIAN

PPE Management Program

The AHJ needs to establish a PPE Program for Structural Firefighting gear. The program should have a PPE Manager and a minimum of one Technician(s) position (which could be the same individual).

PPE Manager

A PPE Manager is a managerial role within a fire department or organization responsible for overseeing the entire lifecycle of firefighter Personal Protective Equipment (PPE).

While following all the requirements of this standard, the functions of the PPE Manager include, but are not limited to:

- **Maintaining an understanding of current NFPA Standards (e.g. NFPA 1970) as well as other required standards and laws (e.g. OSHA) for the purchase of appropriate PPE.**
- **Reviewing the Department Operations to complete a Risk Assessment for the type of PPE required.**
- **Establishing Policy and Procedures for the proper use and care of PPE within the organization. The Policy and Procedures must be re-evaluated periodically. (A best practice is to review these at least annually.)**
- **Establishing a system to Monitor, Track and document PPE over its life**
- **Determining the useful life of the PPE**
- **Establishing criteria for assessing PPE selection.**
- **Actively participating in the selection of the department's PPE.**
- **Establishing processes for returning product that does not meet specifications.**
- **Following retirement and disposal criteria of PPE.**
- **Establishing procedures for the inspection, cleaning, and repair of PPE.**
- **Establishing a process for the fitting of gear for firefighters.**
- **Developing a Training program specific for the job functions of the PPE Technician(s).**
- **Developing and implementing a Training program for the entire department detailing the proper fit, function, limitations, and handling of PPE as well as the expected inspection and routine cleaning [MS1] of PPE. The Manager may train and assign the PPE Technician (or other indidividual) to deliver departmental training.**
- **Assisting with, including providing input to, the budgeting process and strategic planning related to PPE acquisition and maintenance.**
- **Establishing exposure procedures and controls for the handling of contaminated PPE sent for cleaning, inspection, and/or repair.**
- **Representing the organization (or assigning a designee) as the primary point of contact with**

the element manufacturer and/or verified ISP for matters pertaining to the PPE maintenance and repairs.

PPE Technician:

The PPE Technician(s) is an individual(s) who is assigned and has received specialized training for the care and maintenance of the department's PPE. The technician ensures that all PPE is in proper working condition, compliant with relevant standards such as NFPA.

The PPE Technician(s) role can be performed by the PPE Manager, another employee of the organization, verified organization, or verified ISP or a combination thereof, depending on the organization's structure or size.

While following all the requirements of this standard, the functions of the PPE Technician include, but are not limited to:

- **Examining and filing information that comes with PPE**
- **With the PPE Manager, establishing the schedule for cleaning inspecting, and repairing PPE**
- **Determining the need for repair or additional cleaning (example: bloodborne pathogen or specialized cleaning)**
- **Performing advanced inspections on all ensemble elements to determine serviceability**
- **Coordinating all repairs**
    - **If properly trained, performs basic element repair. (Advanced repair may be performed by a verified organization.)**
    - **If designated by the PPE Manager, consults the element manufacturer and/or verified ISP on advanced ensemble element repair**
    - **Evaluates moisture barrier repair requirement**
- **Documents the action taken on the PPE in the tracking system**
- **Evaluates the process in an on-going manner and reports concerns and improvements to the PPE Manager, including any safety and health concerns in the receiving process of contaminated PPE.**

Training and Curriculum

This outline is provided to illustrate everything that should be included in a training course for Firefighter PPE Technician

I. Introduction to Firefighter PPE

(1) Definition of PPE

(2) Importance of PPE in Firefighting

(3) Evolution of Firefighter PPE

II. NFPA and OSHA Regulations

(1) Overview of NFPA (National Fire Protection Association) Standards

(2) OSHA (Occupational Safety and Health Administration) Regulations Related to PPE

(3) Compliance Requirements for Firefighter PPE

III. Selection of Firefighter PPE

(1) **Understanding Different Types of PPE**

(2) **Factors Influencing PPE Selection (e.g., Hazards, Comfort, Fit)**

(3) **Evaluating PPE for Compliance with NFPA Standards**

IV. Care and Maintenance of Firefighter PPE

(1) **Importance of Proper Care and Maintenance**

(2) **Inspection Procedures for PPE**

(3) **Handling and Storage Guidelines**

(4) **Record-Keeping Requirements**

V. Cleaning of Firefighter PPE

(1) **Importance of Cleaning PPE**

(2) **Cleaning Methods for Different Types of PPE (e.g., Turnout Gear, Helmets, Boots)**

(3) **Recommended Cleaning Agents and Techniques**

(4) **Drying Procedures**

VI. Repairs of Firefighter PPE

(1) **Identifying Damage and Wear**

(2) **Repair vs. Replacement Considerations**

(3) **Basic Repair Techniques for PPE Components (e.g., Stitching, Patching)**

(4) **Guidelines for Outsourcing Repairs to Certified Professionals**

VII. Practical Training and Exercises

(1) **Hands-On Inspection and Maintenance Demonstrations**

(2) **Simulated Cleaning and Repair Exercises**

(3) **Role-Playing Scenarios to Reinforce Learning**

VIII. Conclusion

(1) **Recap of Key Points Covered**

(2) **Importance of Ongoing Training and Education**

(3) **Resources for Further Information and Support**

This outline is meant to provide a comprehensive framework for establishing a training program for Firefighter PPE Technicians and Managers. Each section may be expanded into detailed modules with relevant content, activities, and assessments.

Statement of Problem and Substantiation for Public Comment

After considering committee input from the First Draft meeting, simplifying the requirements for a PPE Manager and PPE Technician, and drafting additional content for the annex, adding an Annex focused on the PPE Manager/PPE Technician roles, responsibilities, and training curriculum seems beneficial

to the fire service.

Providing essential descriptive information in a stand-alone annex makes it easier for anyone using the standard to focus on this information without bogging down Annex A.

Related Public Comments for This Document

Related Comment	Relationship
Public Comment No. 47-NFPA 1850-2024 [Global Input]	

Related Item

• FR-34

Submitter Information Verification

Submitter Full Name: Marni Schmid
Organization: Fortunes Collide Marketing LLC
Street Address:
City:
State:
Zip:

Submittal Date: Tue May 28 21:06:59 EDT 2024
Committee: FAE-SPF

Public Comment No. 7-NFPA 1850-2024 [Global Input]

Update the references to NFPA 1971 throughout the document as incorporated into NFPA 1970 as necessary based on the actual publication and edition date.

Statement of Problem and Substantiation for Public Comment

The actual publication and published edition date of NFPA 1970 references may need to be changed based on actual publication timing of the standard.

Related Item

• FR33

Submitter Information Verification

Submitter Full Name: Karen Lehtonen
Organization: LION Group, Inc.
Street Address:
City:
State:
Zip:
Submittal Date: Fri May 24 15:01:57 EDT 2024
Committee: FAE-SPF

Public Comment No. 50-NFPA 1850-2024 [New Section after 3.3.122.1]

Add new definition (and annex) for "PPE Manager"

3.3.xx* PPE Manager . A PPE Manager is a managerial role within a fire department or organization responsible for overseeing the entire lifecycle of firefighter Personal Protective Equipment (PPE).

A.3.3.xx

The PPE Program Manager is a person designated by the Organization to administer the NFPA 1851 Program adopted by the Organization. This Person shall have been trained in the selection and care of PPE as well as has been trained to perform Advanced Cleaning and Advanced Inspection, This person oversees the PPE Repairs and is trained to make decisions of replacement of PPE.

The PPE Manager is the person(s) responsible for the organization's overall PPE program, including but not limited to seeing that selection, procurement, distribution, training, care, maintenance, and retirement of PPE is compliant with applicable standards. In addition, the PPE Manager is responsible for educating the organization's members on the use and limitations of each PPE elements (this includes donning, doffing, and storage).

The PPE Manager typically works closely with the Fire Department Safety Officer (HSO), Deputy/Assistant Fire Chief and/or the Fire Chief. to ensure compliance with safety regulations and standards. They may also be involved in budgeting, risk assessment, and policy development related to PPE the program.

Depending on the size of the department, and available resources, the PPE Manager may also be the PPE Technician.

PPE protects every fire department’s most valuable asset, its members. Therefore, it is essential that proper attention be given to PPE and the PPE program by including a PPE Technician (or Managers) in an organization’s PPE program SOPs/SOGs.

Ensuring PPE is afforded proper attention for selection, care, and maintenance includes intentionally assigning a person (or persons) in the department to perform the functions included in this standard. Historically, many departments have assigned a civilian or someone on light duty to the care and maintenance of PPE. Because of the well-documented need to reduce exposure to contamination and because PPE has become so sophisticated, it is critical that an organization identifies, trains, and empowers an individual (or individuals) to be responsible for tracking, inspecting, and cleaning structural firefighting PPE.

The fire service has had training and qualification requirements for a health and safety officer, an incident safety officer, an EVT Manager, Firefighter I and II, driver operator, company officer, and others. The need for organizations to have a PPE Manager(s) has emerged because managing a PPE program is more comprehensive than before.

Certainly, contamination control has been a catalyst in bringing attention to PPE. However, many other aspects of PPE have become more critical to fire departments. Design, materials, and components are more sophisticated, and every department needs a PPE Manager(s) who is (are) knowledgeable in these areas. Of utmost importance is a

thorough understanding about record-keeping, selection, fit, cleaning, drying, inspection, repair, storage, retirement, and disposal. If the fire service expects the highest quality PPE which is independently third-party certified, then it must use and care for those products in a similar manner. Moreover, the cost of purchasing PPE and its subsequent care costs is now a much higher percentage of a department's budget than in previous years and must be managed appropriately.

The PPE Manager should be knowledgeable about the design, materials, and components of the PPE used by the department and must be trained on, and given the tools to track, inspect, clean, and repair (to the level allowed by this standard) PPE.

To this end, a PPE Manager is a skilled employee who is properly trained and equipped clean, maintain, and repair of the department's PPE worn for fire suppression.

The individual or individuals who are appointed by the organization must meet the qualifications outlined in this standard. It is important that the individual or individuals have the requisite knowledge and skills to function effectively in this position. The individual or individuals might or might not be directly involved the in the hands-on application of this standard. If they are not directly involved, they are responsible to ensure those involved have the requisite knowledge and skills to function effectively in their position.

The PPE Manager is the competent person who is capable of identifying existing and predictable hazards in the surroundings or working conditions that are unsanitary, hazardous, or dangerous to employees. The competent person has the authority to impose prompt corrective measures to eliminate these hazards.

The PPE Manager should be expected to maintain cleaning and inspection records for each individual piece of PPE, conduct Advanced Inspection, Complete Liner Inspection, and determine whether the PPE can be repaired (according to the requirements of this standard.

The PPE Manager should be part of the gear evaluation and selection team and should provide bring their experience handling the department's PPE to every selection discussion.

Statement of Problem and Substantiation for Public Comment

After considering committee input from the First Draft meeting, it is clear that the standard needs to allow for both a PPE Manager and PPE Technician. This Public Comment establishes the definition and annex material for the PPE Manager.

Related Public Comments for This Document

Related Comment	Relationship
Public Comment No. 48-NFPA 1850-2024 [Section No. 3.3.122.1]	

Related Item

- PI-234

Submitter Information Verification

Submitter Full Name: Marni Schmid
Organization: Fortunes Collide Marketing LLC
Affiliation: F.I.E.R.O.

Street Address:	
City:	
State:	
Zip:	
Submittal Date:	Tue May 28 20:48:50 EDT 2024
Committee:	FAE-SPF

Public Comment No. 48-NFPA 1850-2024 [Section No. 3.3.122.1]

3.3.122.1* PPE Technician.

The PPE Technician(s) is an individual(s) ~~trained and certified to professional qualifications and assigned and authorized by the organization to manage the PPE program as described in this standard, including training users on basics of PPE function, care, and maintenance~~ who is assigned and has received specialized training for the care and maintenance of the department's PPE and who ensures that all PPE is in proper working condition and compliant with relevant standards such as NFPA .

Statement of Problem and Substantiation for Public Comment

After considering committee input from the First Draft meeting, it is clear that the standard needs to allow for both a PPE Manager and PPE Technician. This Public Comment updates the definition and annex material for the PPE Technician.

Related Public Comments for This Document

Related Comment	Relationship
Public Comment No. 47-NFPA 1850-2024 [Global Input]	
Public Comment No. 49-NFPA 1850-2024 [Section No. A.3.3.122.1]	
Public Comment No. 50-NFPA 1850-2024 [New Section after 3.3.122.1]	

Related Item

• FR-41 • PI-111 • PI-234

Submitter Information Verification

Submitter Full Name: Marni Schmid
Organization: Fortunes Collide Marketing LLC
Affiliation: F.I.E.R.O.
Street Address:
City:
State:
Zip:
Submittal Date: Tue May 28 20:40:17 EDT 2024
Committee: FAE-SPF

Public Comment No. 62-NFPA 1850-2024 [Section No. 3.3.122.1]

3.3.122.1* PPE Technician.

The individual(s) trained and certified to professional qualifications and assigned and authorized by the organization to manage the PPE program ~~as~~ and other trained technician personnel as described in this standard, including training users on basics of PPE function, care, and maintenance.

Statement of Problem and Substantiation for Public Comment

Adding clarification that the PPE program does not have to be managed by one person, there can be a team of people that perform the duties.

Related Item

• PPE technician

Submitter Information Verification

Submitter Full Name: Tricia Hock
Organization: LION
Street Address:
City:
State:
Zip:
Submittal Date: Thu May 30 12:47:25 EDT 2024
Committee: FAE-SPF

Public Comment No. 51-NFPA 1850-2024 [Section No. 4.2.4]

4.2.4*

~~4.2.4.3~~ –

~~The PPE technician(s) shall be knowledgeable and responsible for the following areas of each PPE element: education, selection, sizing, cleaning, drying, inspection, repair, storage, retirement, and disposal.~~

The ~~program shall have one or more PPE technicians to manage the organization's PPE program.~~

~~4.2.4.1~~ –

~~The PPE technician(s) shall be knowledgeable about the performance characteristics and limitations of each PPE element.~~

~~4.2.4.2~~ –

~~The PPE technician(s) shall be responsible for educating and training all organizational members who use PPE on the performance characteristics and limitations of each element.~~

organization , as part of the PPE Program, shall ~~_~~ appoint a PPE Manager and ~~_~~ a minimum of one PPE Technician (s) as described in Annex E

Statement of Problem and Substantiation for Public Comment

After considering committee input from the First Draft meeting, it is clear that the standard needs to allow for both a PPE Manager and PPE Technician and that the requirements needed to be simplified so that they are not spread throughout the standard. This change (one base requirement in lieu of 100+ requirements throughout the document) will make it easier for departments to implement and will make the roles and responsibilities of each position much easier to work with. This requirement acknowledges the need for these roles given the importance and technical nature of firefighting PPE and serves the fire service through its clarity and efficiency.

Related Public Comments for This Document

Related Comment	Relationship
Public Comment No. 47-NFPA 1850-2024 [Global Input]	
Public Comment No. 52-NFPA 1850-2024 [Section No. A.4.2.2.1]	

Related Item

• FR-34

Submitter Information Verification

Submitter Full Name: Marni Schmid
Organization: Fortunes Collide Marketing LLC
Affiliation: F.I.E.R.O.
Street Address:
City:
State:
Zip:

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Committee:	FAE-SPF

Public Comment No. 77-NFPA 1850-2024 [Section No. 4.3.4]

4.3.4*

The organization's PPE technician(s) shall ensure one or any combination thereof of the following to perform advanced cleaning, sanitization or disinfection, advanced inspection, and repair services of ensembles and ensemble elements *(see Table 4.3.4)*:

(1) ~~Verified training organization~~

(2)

(3) Manufacturer verified in cleaning

(4) Verified organization

(5) Verified independent service provider (ISP)

(6) Verified cleaner

(7) Manufacturer-trained organization for the organization's ensembles and ensemble elements only

(8) Ensemble or ensemble element manufacturer

Table 4.3.4 Responsibilities for Garment Element Inspection, Cleaning, and Repair

			-	~~PPE Technician Overall Responsibilities~~	~~Verified Training Organization Knowledge & Skills Training Only~~	Manufacturer Verified in Cleaning	Verified ISP or Verified Organization	Verified Cleaner	M C
Routine inspections (Section 6.2)							X	~~X~~	
Preliminary exposure reduction (Section 7.2)							X	~~X~~	
Advanced inspection (Section 6.3)			X	X		X		X	
Complete liner inspection (Section 6.4)			X	X		X		X	
Advanced cleaning (Section 7.3)			X	X	X	X	~~X~~	~~X~~	
Sanitization or disinfection (Section 7.4)			X	X	X	X	~~X~~	~~X~~	
Specialized cleaning (Section 7.5)			X	X	X	X	~~X~~	~~X~~	
Repair management	~~X~~	-	-	-	-	-	-	-	
Basic repair (Sections 8.2 and 8.3)	-	-			X	X	-		

				PPE Technician Overall Responsibilities	Verified Training Organization Knowledge & Skills Training Only	Manufacturer Verified in Cleaning	Verified ISP or Verified Organization	Verified Cleaner	M C
Advanced repair (Sections 8.2 and 8.4)	-	-			X	X	-	-	
Training for cleaning			X	X	X			X	
Training for repairs	-	-			X	X	-	-	
Training for the management of repairs	X	-	-	-	-	-	-	-	
Training for inspection			X	X				X	
Training for record keeping (Section 4.4)	X	X	-	-	-	-	-	-	

4.3.4.1

The following entities shall meet the requirements of Chapter 11 and be verified by a third-party certification organization according to the requirements outlined in Table 11.1.1.1:

(1) Verified organizations

(2) Verified ISPs

(3) Manufacturers verified in cleaning

(4) Verified cleaners

4.3.4.2*

Where the organization is a verified organization, uses a verified ISP, or uses a verified cleaner, approval from the element manufacturer shall not be required.

4.3.4.3*

Verified training organizations and manufacturer-trained organizations shall meet the training requirements in this section and shall be permitted to perform the activities identified in Table 4.3.4 for verified training organizations and manufacturer-trained organizations.

4.3.4.3.1*

Training shall be provided by a verified training organization, an element manufacturer of the same element type, a verified ISP, a verified organization, a verified cleaner, or any combination thereof.

4.3.4.3.2*

The PPE technician shall be responsible for training consistent with the requirements and information provided in this standard and shall incorporate at least the following:

(1) Program *(see Section 4.3)*

(2) Education of the organization's members on the basics of PPE components, use, limitations, routine inspection, and preliminary exposure reduction

(3) Records *(see Section 4.4)*

(4) Protecting the public and personnel from exposure to contaminated PPE *(see Section 4.6)*

(5) Selection *(see Chapter 5)*

(6) Inspection *(see Chapter 6)*

(7) Cleaning *(see Chapter 7)*

(8) Repair *(see Chapter 8)*

(9) Storage *(see Chapter 9)*

(10) Retirement, disposition, and special incident procedures *(see Chapter 10)*

(11) Specific instructions, parameters, or procedures applicable to ensembles or ensemble elements with unique properties or performance as necessary

4.3.4.3.3*

The entity conducting the training shall provide documentation that the organization has received the required training.

4.3.4.3.4

Organizations shall obtain and complete within one year of the edition issuance date the training required in 4.3.4.3.2 each time a new edition of NFPA 1850 is issued or there is a change in PPE technician(s) overseeing or performing the required aspects of an organization's program.

4.3.4.3.5

Organizations shall consult with an ensemble or ensemble element manufacturer when additional training is necessary for special requirements specific to products, components, or materials that are unique to a manufacturer.

Statement of Problem and Substantiation for Public Comment

Much work has been done to refine the PPE Technician requirements included in the First Draft based on feedback received from the committee and the simplest way to implement these changes is to remove all references to PPE Technician in the First Draft. Additional Public Comments will be submitted to update the definition for PPE Technician (and the related annex) and add a definition for PPE Manager (with a related annex); insert one requirement for an organization to assign a PPE Manager/PPE Technician to their program (with related annex material); and add an Annex focused on the PPE Manager/PPE Technician roles, responsibilities, and training curriculum.

Related Public Comments for This Document

Related Comment	Relationship
Public Comment No. 47-NFPA 1850-2024 [Global Input]	

Related Item

• FR-21 • PI-161 • PI-342

Submitter Information Verification

Submitter Full Name:	Marni Schmid
Organization:	Fortunes Collide Marketing LLC
Affiliation:	F.I.E.R.O.
Street Address:	
City:	
State:	
Zip:	
Submittal Date:	Thu May 30 15:11:55 EDT 2024
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Public Comment No. 49-NFPA 1850-2024 [Section No. A.3.3.122.1]

A.3.3.122.1 PPE Technician.

PPE protects every fire department's most valuable asset, its members. Therefore, it is essential that proper attention be given to PPE and the PPE program by including a PPE Technician (or Technicians) in an organization's PPE program SOPs/SOGs.

Ensuring PPE is afforded proper attention for selection, care, and maintenance includes intentionally assigning a person (or persons) in the department to perform the functions included in this standard. Historically, many departments have assigned a civilian or someone on light duty to the care and maintenance of PPE. Because of the well-documented need to reduce exposure to contamination and because PPE has become so sophisticated, it is critical that an organization identifies, trains, and empowers an individual (or individuals) to be responsible for tracking, inspecting, and cleaning structural firefighting PPE.

The fire service has had training and qualification requirements for a health and safety officer, an incident safety officer, an EVT Technician, Firefighter I and II, driver operator, company officer, and others. The need for organizations to have a PPE Technician(s) has emerged because managing a PPE program is more comprehensive than before.

Certainly, contamination control has been a catalyst in bringing attention to PPE. However, many other aspects of PPE have become more critical to fire departments. Design, materials, and components are more sophisticated, and every department needs a PPE technician(s) who is (are) knowledgeable in these areas. Of utmost importance is a thorough understanding about record-keeping, selection, fit, cleaning, drying, inspection, repair, storage, retirement, and disposal. If the fire service expects the highest quality PPE which is independently third-party certified, then it must use and care for those products in a similar manner. Moreover, the cost of purchasing PPE and its subsequent care costs is now a much higher percentage of a department's budget than in previous years and must be managed appropriately.

The PPE Technician should be knowledgeable about the design, materials, and components of the PPE used by the department and must be trained on, and given the tools to track, inspect, clean, and repair (to the level allowed by this standard) PPE.

To this end, a PPE Technician is a skilled employee who is properly trained and equipped clean, maintain, and repair of the department's PPE worn for fire suppression.

The individual or individuals who are appointed by the organization must meet the qualifications outlined in this standard.

~~It~~

It is important that the individual or individuals have the requisite knowledge and skills to function effectively in this position.

~~The~~

The individual or individuals might or might not be directly involved the in the hands-on application of this standard. If they are not directly involved, they are responsible to ensure those involved have the requisite knowledge and skills to function effectively in their position.

The PPE Technician is the competent person who is capable of identifying existing and predictable hazards in the surroundings or working conditions that are unsanitary, hazardous, or dangerous to employees. The competent person has the authority to impose prompt corrective measures to eliminate these hazards.

The PPE Technician should be expected to maintain cleaning and inspection records for each individual piece of PPE, conduct Advanced Inspection, Complete Liner Inspection, and determine whether the PPE can be repaired (according to the requirements of this standard.

The PPE Technician should be part of the gear evaluation and selection team and should provide bring their experience handling the department's PPE to every selection discussion.

Statement of Problem and Substantiation for Public Comment

After considering committee input from the First Draft meeting, it is clear that the standard needs to allow for both a PPE Manager and PPE Technician. This Public Comment updates the definition and annex material for the PPE Technician

Related Public Comments for This Document

Related Comment	Relationship
Public Comment No. 48-NFPA 1850-2024 [Section No. 3.3.122.1]	

Related Item

- FR-41

Submitter Information Verification

Submitter Full Name: Marni Schmid
Organization: Fortunes Collide Marketing LLC
Affiliation: F.I.E.R.O.
Street Address:
City:
State:
Zip:
Submittal Date: Tue May 28 20:43:26 EDT 2024
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Public Comment No. 52-NFPA 1850-2024 [Section No. A.4.2.2.1]

A.4.2.~~2.1~~ 4

This job description should include, but not be limited to, educational criteria for the organization's members related to selection, use inspection, cleaning, drying, storage, retirement, and disposal for all elements of the ensemble.

Statement of Problem and Substantiation for Public Comment

PC 51 removes this section but the annex item should stay, it needs to be renumbered so that it is attached to 4.2.4

Related Public Comments for This Document

Related Comment	Relationship
Public Comment No. 51-NFPA 1850-2024 [Section No. 4.2.4]	

Related Item

- FR-34

Submitter Information Verification

Submitter Full Name: Marni Schmid
Organization: Fortunes Collide Marketing LLC
Affiliation: F.I.E.R.O.
Street Address:
City:
State:
Zip:
Submittal Date: Tue May 28 21:04:08 EDT 2024
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Public Comment No. 83-NFPA 1850-2024 [Section No. A.4.3.4.3.2]

~~A.4.3.4.3.2~~ —

Training should explain the activities that organizations are required to perform in order to comply with this standard, as well as provide information and options in regard to how organizations can accomplish them. This training does not negate the need for organizations to consult with manufacturers on specific instructions for performing inspections or basic repairs on proprietary products, individual ensemble elements, fabrics, or components with unique attributes or performance that require special consideration. For cleaning, it might be necessary to consult a manufacturer who has been verified in cleaning.

The following overview can be used as a basis for an NFPA 1850 (1851) structural and proximity firefighting PPE selection, care, and maintenance program.

The following is included in this overview:

(1) Why this is important

(2) NFPA 1850 consolidation

(3) General guidelines

(4) New this edition

(5) Program basics

(6) Implementing a program

(7) Record keeping

(8) Miscellaneous

(9) Selecting gear

(10) Assessing gear

(11) Receiving gear

(12) Inspecting gear

(13) Cleaning gear

(14) Storing and retiring gear

Why this is important. Structural and proximity firefighting PPE selection, care, and maintenance is important for the following reasons:

(1) Being a firefighter is inherently dangerous. Firefighting gear is designed and manufactured to protect the wearer during structural and proximity firefighting duties.

(2) During firefighting duties, gear becomes contaminated. This contamination can risk exposure to the wearer, other firefighters and emergency response personnel, family members of emergency response personnel, and the public.

(3) Clean gear is critical to supporting health and safety goals.

NFPA 1850 consolidation. The following is a summary of the material covered in the now consolidated NFPA 1850 standard. NFPA 1850 consists of what was NFPA 1851 and NFPA 1852. This overview focuses on what was NFPA 1851–specific material.

(1) Chapters 1 – 3 contain material common to both standards.

(2) Chapter 4 – 12 and Annexes A and E contain NFPA 1851–specific material.

(3) Chapters 13 – 16 and Annexes A– E contain NFPA 1852–specific material.

General guidelines. The following is a summary of the material covered in the NFPA 1851–specific chapters of NFPA 1850:

(1) Chapter 1 provides information about the scope and purpose of the document, and some basics about how to apply the standard.

(2) Chapter 2 lists other publications referenced in the document.

(3) Chapter 3 contains the glossary of terms used in the document.

(4) Chapter 4 provides the framework for designing and implementing a structural and proximity firefighting PPE selection, care, and maintenance program.

(5) Chapter 5 focuses on selecting PPE.

(6) Chapter 6 lays out the requirements for completing a routine inspection, an advanced inspection, and a complete liner inspection.

(7) Chapter 7 is all about cleaning and disinfection.

New this edition. The following topics are new to the 2025 edition of NFPA 1850:

(1) Definition, role, and responsibilities of a PPE technician

(2) More information on advanced cleaning

(3) Updated cleaning efficiency requirements

(4) Example risk assessment documents

Program basics. The following is the basic framework for designing and implementing a structural and proximity firefighting PPE selection, care, and maintenance program:

(1) PPE is designed and manufactured to meet high performance and protection standards and it needs to be treated and handled appropriately to help ensure it can protect the person wearing it.

(2) A successful program provides a strong foundation for informing everyone in the department how PPE should be handled and maintained.

(3) The requirements in Chapters 4 – 12 are minimum requirements for the selection, care, and maintenance of structural and proximity firefighting protective clothing and equipment that are compliant with NFPA 1970 (1971) only.

(4) A structural and proximity firefighting PPE selection, care, and maintenance program should contain documentation for clear expectations and procedures for all of the following to ensure equipment functions as designed and harm from improper selection, care, and maintenance is minimized:

(5) Records of all PPE

(6) Protection from contaminated PPE

(7) Selection of PPE

(8) Inspection of PPE

(9) Cleaning of PPE

(10) Repair of PPE

(11) Storage of PPE

(12) Retirement, disposition, and special incident procedures for all PPE

(13) Specific operations included in NFPA 1850 that should be incorporated into a structural and proximity firefighting PPE selection, care, and maintenance program include the following:

(14) Routine inspections

(15) Preliminary exposure reduction (PER)

(16) Advanced inspection

(17) Complete liner inspection

(18) Advanced cleaning

(19) Sanitization or disinfection

(20) Specialized cleaning

(21) Basic repair

(22) Advanced repair

(23) Training for inspection

(24) Training for cleaning

(25) Training for repairs

Implementing a program. A department can implement a structural and proximity firefighting PPE selection, care, and maintenance program through one, or a combination of, the following providers defined in Chapter 3 (There is also a reference table in Chapter 4 .):

(1) Manufacturer verified in cleaning

(2) Verified ISP or verified organization

(3) Verified cleaner

(4) Manufacturer-trained organization

(5) User

(6) Ensemble manufacturer or ensemble element manufacturer (protective clothing and equipment manufacturer)

Each provider with "verified" in its title must pass third-party verification and have a certificate. That certificate lists the specifics for which that service provider is verified. Check Intertek and UL for websites to find verified ISPs to service gear.

Record keeping. Record keeping includes, at a minimum, the following:

(1) The person to whom a PPE element has been issued

(2) PPE elements that are not issued to a specific person

(3) The date of issue and condition of the PPE when issued

(4) The manufacturer and model name or design of the PPE

(5) The PPE manufacturer's identification number, lot number, or serial number

(6) The month and year of manufacture for the PPE

(7) All dates of and findings related to advanced inspection(s)

(8) All dates of and findings related to advanced cleaning, disinfection or sanitization, or specialized cleaning

(9) All dates of repair(s), who performed the repair, and a brief description of the repair for all PPE

(10) The date of retirement for the PPE

(11) The date and method of disposal for the PPE

Records can be collected and stored either as hard copies or electronically, or both. Records

should be maintained until a PPE element is retired and disposed of. If resources permit, records should be kept for at least 12 months past retirement.

Miscellaneous. All manufacturer's instructions should be kept. If a manufacturer's instructions differ from the requirements in the standard (except as related to verification), the manufacturer's instructions should supersede all other instructions.

Chapter 4 is important because it provides clear direction for defining a structural and proximity firefighting PPE selection, care, and maintenance program, as well as additional information for the rest of Chapters 5 through 12 .

Selecting gear. Where a department is set to select gear, all of the following should be considered:

(1) A risk assessment should be performed (tis standard includes multiple examples).

(2) The types of incidents the department responds to.

(3) The gear that can provide the most appropriate protection.

A risk assessment should include, but not be limited to, all of the following:

(1) Type of duties performed

(2) Incident types with related response activities identified

(3) What the organization has experienced in the past

(4) Incident operations

(5) Local geographic and climate considerations

(6) The specific physical area of operation

(7) The likelihood of, or response to, a CBRN terrorism incident

(8) The risks associated with not having access to two sets of gear

After the risk assessment is complete, take time to evaluate the strengths and weakness of all PPE elements under consideration, such as thermal insulation, thermal comfort, interface areas, and so on.

Assessing gear. The following guidelines should be used where evaluating gear in the filed:

(1) Make sure that all gear to be tested fits the were as designed by the manufacturer.

(2) Have a systematic (i.e., quantifiable) way to evaluate the performance of each PPE element tested, as follows:

    (3) Use a combination of quantitative and qualitative mechanism for gathering feedback

    (4) Use the same firefighters to evaluating different PPE elements, if possible

(5) If a department can't run a field evaluation alone, team up with other local departments to run a joint field evaluation

Prior to any gear purchase, all purchase specifications should be detailed and include at least the following:

(1) Be certified to NFPA 1970

(2) Require substantiation of certification as part of the specification

(3) Define proper fit in the specification

(4) Comparison of each bid submittal against the specification

(5) Include procedures for returning gear that isn't satisfactory or doesn't meet the specification

Receiving gear. Upon delivery, all gear should be inspected to confirm the following:

(1) Does the gear meet the specification?

(2) Was any gear damaged in shipment?

(3) Are all sizes and quantities ordered accounted for?

(4) Is all information such as use and maintenance instructions, warranty, and technical data included?

Any gear that is unsatisfactory or does not meet the specification should be returned per established procedures.

Inspecting gear. All PPE elements should be inspected for the following both prior to donning and after an incident:

(1) Rips, tears, or holes

(2) Charring, burns, melting, or discoloration

(3) Chemical damage

(4) Missing or damaged reflective trim

(5) Correct assembly of shell, liner, and DRD

(6) Missing hardware

Any damaged or incomplete gear should be removed from service. Back-up gear should be utilized until damaged or incomplete gear is repaired by the original equipment manufacturer (OEM), a verified independent service provider (ISP), or verified department personnel to NFPA 1850 requirements or is replaced.

Cleaning gear. All gear should be cleaned as determined by Figure A.4.3.4.3.2(a) for exposure and Figure A.4.3.4.3.2(b) for contamination.

Figure A.4.3.4.3.2(a) Basic Exposure Decision Tree.

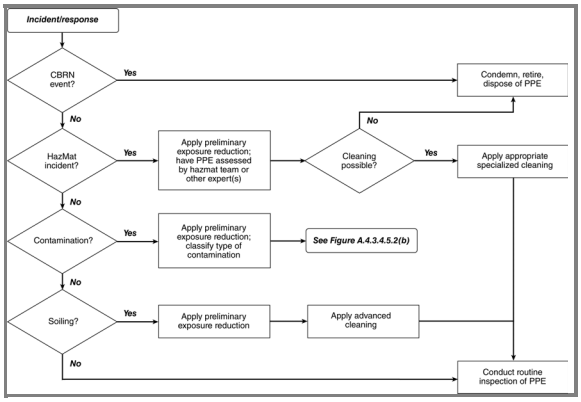
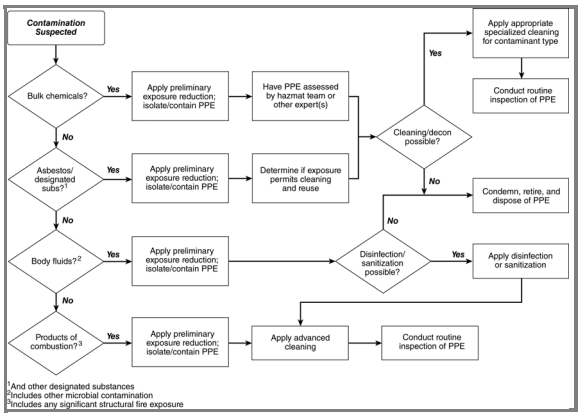


Figure A.4.3.4.3.2(b) Contamination Decision Tree.



~~*Cleaning gear.* Where gear needs to be cleaned, there are three levels of cleaning as follows:~~

(1) ~~Routine wash~~

(2) ~~Advanced (machine washing)~~

(3) ~~Specialzed (pretreat/soaking)~~

~~A routine wash can reduce preliminary exposure contaminants. However, advanced cleaning is most often necessary. The following precautions should be taken where advanced cleaning is needed:~~

(1) ~~Never use bleach~~

(2) ~~Water temperature should not exceed 40°C (105°F).~~

(3) ~~Extraction g-forces should not exceed 100.~~

(4) ~~Cleaning agent Ph should be between 6.0 and 10.5.~~

(5) ~~Liners should be washed separately, inside out.~~

(6) ~~Advanced cleaning should only be done twice per 12-month period.~~

~~Where advanced cleaning is needed, all of the following procedures should be implemented:~~

(1) ~~Separate outer shells from liners~~

(2) ~~Invert liners so quilt is facing the outside~~

(3) ~~Secure all closures (e.g., velcro, hook and dees, zippers)~~

(4) ~~DRD does not have to be removed if closures are secure~~

(5) ~~Machine wash outer shells with outer shells~~

(6) ~~Machie wash inner liners with inner liners~~

(7) ~~Hoods can be washed with liners~~

(8) ~~Air dry all elements~~

~~*Storing and retiring gear.* Where storing gear, care should be taken to protect all PPE elements from UV lighting. Gear should be transported in a plastic or gear bag. Gear should not be stored in air-tight bags.~~

~~PPE elements should be retired per the following considerations:~~

(1) ~~Structural fire firefighting and proximity ensemble elements should be retired and removed from service no more than 10 years from the date of manufacture.~~

(2) ~~Structural fire firefighting and proximity firefighting ensembles should be retired when they~~

~~are worn or damaged to the extent that they can no longer be repaired.~~

(3) ~~Recommendations for retirement can be made by an ISP; however, final determination should be made by a member of the organization who has been trained in the inspection and repair of ensembles.~~

(4) ~~Retired structural fire firefighting and proximity elements that have been retired should be destroyed in such a manner that prevents their use in firefighting or other emergencies.~~

(5) ~~Retired elements that are retired but still serviceable can be used for training provided the training does not involve live firefighting.~~

Statement of Problem and Substantiation for Public Comment

This annex item may need to be updated to mirror the Second Draft of the standard or deleted in its entirety. While this is useful and informative, a curriculum outline is included in the PPE Technician-related Public Comments and PPE Manager/Technician proposed annex.

Related Item

• FR-28

Submitter Information Verification

Submitter Full Name: Marni Schmid
Organization: Fortunes Collide Marketing LLC
Street Address:
City:
State:
Zip:

Submittal Date: Thu May 30 16:19:30 EDT 2024
Committee: FAE-SPF