3M JobHealth
HIGHLIGHTS

Technical Information for Occupational Health and Safety Professionals

OSHA 29 CFR 1910.134: A summary and discussion

On January 8, 1998, the Occupational Safety and Health Administration (OSHA) issued a final rule for respiratory protection. The standard was published in the *Federal Register, 63 Fed. Reg. 1151* and will be codified as 29 CFR 1910.134. The standard applies to general industry, construction, shipyard, longshoring and marine terminal workplaces. The previous 29 CFR 1910.134 will be recodified as 29 CFR 1910.139 and apply only to respiratory protection against *M. tuberculosis* (TB) in lieu of 1910.134. The new 1910.134 applies to biohazards except for TB.

This summary of the respiratory protection standard was prepared by 3M OH&ESD and focuses primarily on the more significant changes to the standard. It does not represent an official, legal, nor necessarily complete interpretation of the standard. If specific questions arise, the standard itself should be reviewed and relied on, rather than this summary.

Summary

This final rule replaces the previous 29 CFR 1910.134 that was adopted by OSHA in 1971. The new standard requires employers to establish and maintain a respiratory protection program to protect their employees who wear respirators.

The major changes to the respiratory protection standard include:

- definitions important to the standard;
- requirement for a program administrator;
- requirements when respirator use is not required, but permitted;
- establishment of a cartridge change schedule when gas and/or vapor respirators are used that do not have end-of-service-life indicators;
- restrictions for non-high efficiency particulate air filters approved under 30 CFR 11 to particle size distributions of contaminants with a mass median aerodynamic diameter (MMAD) greater than 2 micrometers.
- mandatory medical evaluation questionnaire;
- requirements for fit testing all tight-fitting respirators with a repeat frequency of at least every 12 months; and
- specific qualitative and quantitative fit testing protocols.

The final standard also modifies some of the respirator requirements in other OSHA health standards that duplicate those in the final standard, such as fit testing requirements, and revises some other respirator-related provisions to make them consistent with 1910.134.

Dates

The final rule becomes effective April 8, 1998 except as follows:

- The determination that respirator use is required [paragraph (a)] shall be completed no later than September 8, 1998;
- Compliance with all other provisions of this section shall be completed no later than October 5, 1998.

Inside this issue

Volume 16 Number 2 1998

OSHA 29 CFR 1910.134:
A summary and discussion 1
Summary 1
Dates 1
Permissible practice 2
Definitions 2
Respiratory protection program 2-3
Selection of respirators 3-4
Medical evaluation 4-5
Fit testing 5-6
Use of respirators 6-7
Maintenance and care of respirators 7
Breathing air quality 8
Identification of filters, cartridges and canisters 8-9
Program evaluation 9
Recordkeeping 9
Appendices 9-11
Substance specific standards 11-12
3M Professional and technical development program on respiratory protection 12

Permissible practice

The paragraphs describing permissible practice in the final rule are essentially unchanged from the previous 1910.134. The paragraph in the previous standard outlining employee responsibilities has been deleted.

Definitions

The final standard includes definitions of important terms used in the regulatory text. Some of the more important definitions are:

Emergency situation: Any occurrence such as, but not limited to, equipment failure, rupture of containers, or failure of control equipment that may or does result in an uncontrolled significant release of an airborne contaminant.

End-of-service-life indicator (ESLI): A system that warns the respirator user of the approach of the end of adequate respiratory protection, for example, that the sorbent is approaching saturation or is no longer effective.

Escape-only respirator: A respirator intended to be used only for emergency exit.

Filtering facepiece (dust mask): A negative pressure particulate respirator with a filter as an integral part of the facepiece or with the entire facepiece composed of the filtering medium.

Helmet: A rigid respiratory inlet covering that also provides head protection against impact and penetration.

High efficiency particulate air (HEPA) filter: A filter that is at least 99.97% efficient in removing monodisperse particles of 0.3 micrometers in diameter. The equivalent NIOSH 42 CFR 84 particulate filters are the N100, R100, and P100 filters.

Hood: A respiratory inlet covering that completely covers the head and neck and may also cover portions of the shoulders and torso.

Immediately dangerous to life or health (IDLH): An atmosphere that poses an immediate threat to life, would cause irreversible adverse health effects, or would impair an individual's ability to escape from a dangerous atmosphere.

Loose-fitting facepiece: A respiratory inlet covering that is designed to form a partial seal with the face.

Negative pressure respirator (tight fitting): A respirator in which the air pressure inside the facepiece is negative during inhalation with respect to the ambient air pressure outside the respirator.

Physician or other licensed healthcare professional (PLHCP): An individual whose legally permitted scope of practice (i.e., license, registration or certification) allows him or her to independently provide, or be delegated the responsibility to provide, some or all of the health care services required by paragraph (e) of 1910.134.

Respiratory inlet covering: That portion of a respirator that forms the protective barrier between the user's respiratory tract and an air-purifying device or breathing air source, or both. It may be a facepiece, helmet, hood, suit or a mouthpiece respirator with nose clamp.

Service life: The period of time that a respirator, filter or sorbent, or other respiratory equipment provides adequate protection to the wearer.

Tight-fitting facepiece: A respiratory inlet covering that forms a complete seal with the face.

User seal check: An action conducted by the respirator user to determine if the respirator is properly seated to the face.

Respiratory protection program

This paragraph of the new 1910.134 requires the employer to develop and implement a written respiratory protection program with required worksite-specific procedures and elements for required respirator use. A suitably trained program administrator must administer the program. In addition, certain program elements may be required for voluntary use to prevent potential hazards associated with the use of the respirator. The Small Entity Compliance Guide contains criteria for the selection of a program administrator and a sample program that meets the requirements of this paragraph. Copies of the Small Entity Compliance Guide will be available on or about April 8, 1998 from the Occupational Safety and Health Administration's Office of Publications, Room N 3101, 200 Constitution Avenue, NW, Washington, DC, 20210 (202-219-4667).

Program elements

The elements of the respiratory protection program are essentially the same as in the previous 1910.134, however, they have been organized differently. The employer is required to provide respirators, training, and medical evaluations at no cost to the employee. The term "standard operating procedures" has been replaced with "worksite-specific procedures." The standard explains:

In any workplace where respirators are necessary to protect the health of the employee or whenever respirators are required by the employer, the employer shall establish and implement a written respiratory protection program with worksite-specific procedures. The program shall be updated as necessary to reflect those changes

in workplace conditions that affect respirator use. The employer shall include in the program the following provisions of this section, as applicable:

1. Procedures for selecting respirators for use in the workplace;
2. Medical evaluations of employees required to use respirators;
3. Fit testing procedures for tight-fitting respirators;
4. Procedures for proper use of respirators in routine and reasonably foreseeable emergency situations;
5. Procedures and schedules for cleaning, disinfecting, storing, inspecting, repairing, discarding and otherwise maintaining respirators;
6. Procedures to ensure adequate air quality, quantity and flow of breathing air for atmosphere-supplying respirators;
7. Training of employees in the respiratory hazards to which they are potentially exposed during routine and emergency situations;
8. Training of employees in the proper use of respirators, including putting on and removing them, any limitations on their use, and their maintenance; and
9. Procedures for regularly evaluating the effectiveness of the program.

Program administrator

The employer shall designate a program administrator who is qualified by appropriate training or experience that is commensurate with the complexity of the program to administer or oversee the respiratory protection program and conduct the required evaluations of program effectiveness.

Voluntary use

For those situations where respirator use is not required by OSHA, but is permitted by employers upon request by employees, the standard indicates:

An employer may provide respirators at the request of employees or permit employees to use their own respirators, if the employer determines that such respirator use will not in itself create a hazard. If the employer determines that any voluntary respirator use is permissible, the employer shall provide the respirator users with the information contained in Appendix D [of 1910.134] (''Information for Employees Using Respirators When Not Required Under the Standard'').

In addition, the employer must establish and implement those elements of a written respiratory protection program necessary to ensure that any employee using a respirator voluntarily is medically able to use that respirator, and that the respirator is cleaned, stored, and maintained so that its use does not present a health hazard to the user.

Exception: Employers are not required to include in a written respiratory protection program those employees whose only use of respirators involves the voluntary use of filtering facepieces (dust masks).

The reasoning OSHA provides in the Federal Register is, "There are no medical limitations on the use of these respirators [filtering facepieces], so employers who allow their use need only ensure that masks are not dirty or contaminated, that their use does not interfere with employees ability to work safely, and that they provide the employees with the information contained in Appendix D . . . of the final rule." OSHA did not explain how the burden of a filtering facepiece respirator with an N100 particulate filter is different than the burden of an elastomeric half facepiece with N100 particulate filters. Published studies indicate the weight of either of these types of respirator is not a concern.

Voluntary use as described by this section should not be construed as all respirator use below the PEL or TLV. If the **employer requires** respirator use in this case, it is not voluntary.

Selection of respirators

This paragraph requires the employer to evaluate respiratory hazard(s) in the workplace, identify relevant workplace and user factors, and base respirator selection on these factors. The respiratory hazard evaluation includes "a reasonable estimate of employee exposures to respiratory hazard(s)." Where the employer cannot identify or reasonably estimate the employee exposure, OSHA requires the employer to consider the atmosphere as IDLH. The paragraph also specifies appropriately protective respirators for use in IDLH atmospheres, and limits the selection and use of air-purifying respirators.

In this section OSHA requires that the employer select a respirator certified by the National Institute for Occupational Safety and Health (NIOSH) and use it in compliance with the conditions of its certification.

Some substance specific standards specified the number of sizes and manufacturers of elastomeric facepieces. OSHA had proposed similar restrictions for 1910.134. In the final rule, however, OSHA changed the provision to be more performance oriented. OSHA requires that the employer "select respirators from a sufficient number of respirator models and sizes so that the respirator is acceptable to, and correctly fits, the user." This new wording now applies to the substance specific standards as well.

Respirators for IDLH atmospheres

The employer shall provide the following respirators for employee use in IDLH atmospheres:

1. A full facepiece pressure demand self-contained breathing apparatus (SCBA) certified by NIOSH for a minimum service life of thirty minutes, or
2. A combination full facepiece pressure demand supplied-air respirator (SAR) with auxiliary self-contained air supply.

The effect of this paragraph is to eliminate the use of demand SCBAs and 15-minute pressure demand SCBAs approved by NIOSH for entry into IDLH atmospheres. This requirement is the same as that which has been "state of the art" for many years. The time restriction of 30 minutes does not apply to the airline respirator (SAR) with the auxiliary SCBA, as long as entry is made using the airline mode.

For respirators provided only for escape from IDLH atmospheres, OSHA requires that they "be NIOSH-certified for escape from the atmosphere in which they will be used."

OSHA still maintains all oxygen-deficient (<19.5%) atmospheres shall be considered IDLH. **Exception:** If the employer demonstrates that, under **all foreseeable** [3M's emphasis] conditions, the oxygen concentration can be maintained within the ranges specified in Table II of 1910.134 (i.e., for the altitudes set out in the table), then any atmosphere-supplying respirator may be used. [See Table 1.]

Assigned protection factors

The new 1910.134 does not contain assigned protection factors (APFs). OSHA intends to promulgate APFs in the future. In the interim, OSHA expects employers to take the best available information into account when selecting respirators. 3M believes this information to be those APFs established by the American National Standards Institute (ANSI) in ANSI Z88.2-1992 rather than the NIOSH-recommended APFs for several reasons:

1. The APFs established by ANSI are based on more recent information;
2. They are based largely on workplace protection factor (WPF) studies instead of fit testing;
3. They used data from NIOSH-approved respirators instead of United States Bureau of Mines-approved respirators; and
4. They provided more complete documentation regarding how the APFs were established.

Respirators for atmospheres that are not IDLH

For atmospheres that are not IDLH, OSHA requires that the respirator selected be appropriate for the chemical state and physical form of the contaminant. OSHA has also placed some other restrictions on air-purifying respirators that are new to the OSHA standard. The following is a summary:

For protection against gases and vapors, the employer shall provide:

1. An atmosphere-supplying respirator, or
2. An air-purifying respirator, provided that:
   - The respirator is equipped with an end-of-service-life indicator (ESLI) certified by NIOSH for the contaminant; or
   - If there is no ESLI appropriate for conditions in the employer's workplace, the employer implements a change schedule for canisters and cartridges that is based on objective information or data that will ensure that canisters and cartridges are changed before the end of their service life. The employer shall describe in the respirator program the information and data relied upon and the basis for the canister and cartridge change schedule and the basis for reliance on the data. OSHA has not yet specifically stated what data is required. A number of organizations are working on developing data.

For protection against particulates, the employer shall provide:

1. An atmosphere-supplying respirator; or
2. An air-purifying respirator equipped with a filter certified by NIOSH under 30 CFR part 11 as a high efficiency particulate air (HEPA) filter, or an air-purifying respirator equipped with a filter certified for particulates by NIOSH under 42 CFR part 84; or
3. For contaminants consisting primarily of particles with mass median aerodynamic diameters (MMAD) of at least 2 micrometers, an air-purifying respirator equipped with any filter certified for particulates by NIOSH. In general, mechanically-generated dusts are greater than 2 micrometers MMAD. This requirement ceases with products certified to 42 CFR part 84.

Table 1 Oxygen-deficient atmospheres for which the employer may rely on atmosphere-supplying respirators

Altitude (feet)	Percent 0_2
Less than 3,001	16.0 – 19.5
3,001–4,000	16.4 – 19.5
4,001–5,000	17.1 – 19.5
5,001–6,000	17.8 – 19.5
6,001–7,000	18.5 – 19.5
7,001–8,000[1]	19.3 – 19.5

[1]Above 8,000 feet, the exception does not apply. Oxygen-enriched breathing air must be supplied above 14,000 feet.

Medical evaluation

Respirator use may place a physiological burden on employees that varies with the type of respirator worn, the job and workplace conditions in which the respirator is used, and the medical status of the employee. Accordingly, this paragraph specifies the minimum requirements for medical evaluation that employers must implement to determine the employee's ability to use a respirator.

The medical evaluation is required to be conducted **before** the employee is fit tested or required to use the respirator in the workplace. The employer may discontinue an employee's medical evaluations when the employee is no longer required to use a respirator.

The employer shall identify a physician or other licensed health care professional (PLHCP) to perform medical evaluations using a mandatory medical questionnaire or an initial medical examination that obtains the same information as the medical questionnaire (Sections 1 and 2, Part A of Appendix C of 1910.134). Any PLHCP (e.g., nurse practitioners, physician assistants, occupational health nurses) may evaluate the employee's medical ability to use a respirator provided that the PLHCP is authorized to do so by state license, certification or registration. There may be some variation by state regarding who is capable of performing the evaluation.

Follow-up medical examination

Follow-up medical examinations are required for employees who give a positive response to any question among questions 1 through 8 in Section 2, Part A of Appendix C or whose initial medical examination demonstrates the need for a follow-up medical examination. The follow-up medical examination shall include any medical tests, consultations or diagnostic procedures that the PLHCP deems necessary to make a final determination. Pulmonary function tests are only required if the PLHCP deems them necessary.

Supplemental information for the PLHCP

Supplemental information must be provided to the PLHCP before making a recommendation concerning an employee's ability to use a respirator. This information must include, among other things, the type and weight of the respirator to be used by the employee, a copy of the written respiratory protection program and a copy of1910.134.

Medical determination

The employer is required to obtain a written recommendation regarding the employee's ability to use the respirator from the PLHCP. The recommendation shall provide only the following information:

- Any limitations on respirator use related to the medical condition of the employee, or relating to the workplace conditions in which the respirator will be used, including whether or not the employee is medically able to use the respirator;
- The need, if any, for follow-up medical evaluations; and
- A statement that the PLHCP has provided the employee with a copy of the PLHCP's written recommendation.

If the PLHCP finds a medical condition that may place the employee's health at increased risk if a negative pressure respirator is used, the employer shall provide a powered air-purifying respirator (PAPR) if the PLHCP's medical evaluation finds that the employee can use such a respirator. If a subsequent medical evaluation finds that the employee is medically able to use a negative pressure respirator, then the employer is no longer required to provide a PAPR.

Additional medical evaluations

At a minimum, the employer shall provide additional medical evaluations if:

1. An employee reports medical signs or symptoms that are related to ability to use a respirator;
2. A PLHCP, supervisor or the respirator program administrator informs the employer that an employee needs to be reevaluated;
3. Information from the respiratory protection program, including observations made during fit testing and program evaluation, indicates a need for employee reevaluation; or
4. A change occurs in workplace conditions (e.g., physical work effort, protective clothing and temperature) that may result in a substantial increase in the physiological burden placed on an employee.

Note: Annual medical evaluations are not required.

Fit testing

Before an employee may be required to use any respirator with a negative or positive pressure tight-fitting facepiece, the employee must be fit tested with the same make, model, style and size of respirator that will be used. OSHA specifies the kinds of fit tests allowed, the procedures for conducting them, conditions for additional fit tests, and how the results of the fit tests must be used.

For employees using a tight-fitting facepiece respirator, an appropriate qualitative fit test (QLFT) or quantitative fit test (QNFT) must be passed. Employees using tight-fitting facepiece respirators must be fit tested:

- Prior to initial use of the respirator,
- Whenever a different respirator facepiece (size, style, model or make) is used, and
- At least annually thereafter.

Additional fit tests must be conducted whenever:

- The employee reports changes in the employee's physical condition that could affect respirator fit, or
- The employer, PLHCP, supervisor or program administrator makes visual observations of changes in the employee's physical condition that could affect respirator fit. Such conditions include, but are not limited to, facial scarring, dental changes, cosmetic surgery or an obvious change in body weight.

The fit test shall be administered using an OSHA-accepted QLFT or QNFT protocol. The OSHA-accepted QLFT and QNFT protocols and procedures are contained in Appendix A of 1910.134. QLFT may only be used to fit test negative pressure air-purifying respirators that must achieve a fit factor of 100 or less [APF ≤ 10]. If the fit factor measured during a QNFT is equal to or greater than 100 for tight-fitting half facepieces, or equal to or greater than 500 [APF ≤ 50] for tight-fitting full facepieces, the QNFT has been passed with that respirator.

Fit testing of tight-fitting atmosphere-supplying respirators and tight-fitting powered air-purifying respirators shall be accomplished by performing **quantitative or qualitative** [3M's emphasis] fit testing in the negative pressure mode, regardless of the mode of operation (negative or positive pressure) that is used for respiratory protection. The following requirements apply to fit testing atmosphere-supplying and powered air-purifying respirators:

1. Qualitative fit testing of these respirators shall be accomplished by temporarily converting the respirator user's actual facepiece into a negative pressure respirator with appropriate filters, or by using an identical negative pressure air-purifying respirator facepiece with the same sealing surfaces as a surrogate for the atmosphere-supplying or powered air-purifying respirator facepiece.
2. Quantitative fit testing of these respirators shall be accomplished by modifying the facepiece to allow sampling inside the facepiece in the breathing zone of the user, midway between the nose and mouth. This requirement shall be accomplished by installing a permanent sampling probe onto a surrogate facepiece, or by using a sampling adapter designed to temporarily provide a means of sampling air from inside the facepiece. [3M probed respirators or the 3M 601 Quantitative Fit Test Adapter may be used.]
3. Any modifications to the respirator facepiece for fit testing shall be completely removed, and the facepiece restored to NIOSH-approved configuration, before that facepiece can be used in the workplace. [If the QNFT Adapter is used, it must be removed before the worker wears that respirator in the workplace.]

Use of respirators

OSHA requires employers to establish and implement procedures for the proper use of respirators. These requirements include prohibiting conditions that may result in facepiece seal leakage, preventing employees from removing respirators in hazardous environments, taking actions to ensure continued effective respirator operation throughout the work shift, and establishing procedures for the use of respirators in IDLH atmospheres or in interior structural firefighting situations.

Facepiece seal protection

Respirators with tight-fitting facepieces are not permitted to be worn by employees who have:

1. Facial hair that comes between the sealing surface of the facepiece and the face or that interferes with valve function; or
2. Any condition that interferes with the face-to-facepiece seal or valve function.

The employer shall ensure that equipment, such as corrective glasses or goggles or other personal protective equipment is worn in a manner that does not interfere with the seal of the facepiece to the face of the user.

For all tight-fitting respirators, a user seal check must be performed each time the respirator is put on. The procedures in Appendix B–1, or ones recommended by the respirator manufacturer that the employer demonstrates are as effective as those in Appendix B–1 must be used. [The following article demonstrates the effectiveness of 3M-recommended user seal checks. Myers, W. R., M. Jaraiedi, and L. Hendricks: Effectiveness of Fit Check Methods on Half Mask Respirators. *Appl. Occup. Environ. Hyg.* 10(11):934-942. 1995.]

Continuing respirator effectiveness

The employer shall ensure that employees leave the respirator use area:

1. To wash their faces and respirator facepieces as necessary to prevent eye or skin irritation associated with respirator use; or
2. If they detect vapor or gas breakthrough, changes in breathing resistance or leakage of the facepiece; or
3. To replace the respirator or the filter, cartridge or canister elements.

If the employee detects vapor or gas breakthrough, changes in breathing resistance or leakage of the facepiece, the employer must replace or repair the respirator before allowing the employee to return to the work area.

Procedures for IDLH atmospheres

For all IDLH atmospheres, 1910.134 identifies, among other things, the number of standby people and the type of equipment located outside the IDLH atmosphere. Employee(s) located outside the IDLH atmospheres are to be equipped with:

1. Pressure demand or other positive pressure SCBAs, or a pressure demand or other positive pressure supplied-air respirator with auxiliary SCBA; and
2. Appropriate retrieval equipment for removing the employee(s) who enter(s) these hazardous atmospheres where retrieval equipment would contribute to the rescue of the employee(s) and would not increase the overall risk resulting from entry.

Procedures for interior structural firefighting

In addition to the requirements set forth above under procedures for IDLH atmospheres, in interior structural fires, the employer shall ensure that:

1. At least two employees enter the IDLH atmosphere and remain in visual or voice contact with one another at all times;
2. At least two employees are located outside the IDLH atmosphere; and
3. All employees engaged in interior structural firefighting use SCBAs.

Additional information about the duties of the standby persons is found in the standard.

Maintenance and care of respirators

This paragraph of 1910.134 requires the employer to provide for the cleaning and disinfecting, storage, inspection and repair of respirators used by employees.

Cleaning and disinfecting

The employer shall provide each respirator user with a respirator that is clean, sanitary and in good working order. The respirators must be cleaned and disinfected by using either:

1. The procedures in Appendix B–2 of 1910.134, or
2. Procedures recommended by the respirator manufacturer, provided that such procedures are of equivalent effectiveness.

Equivalent effectiveness simply means that the procedures used must ensure that the respirator is properly cleaned and disinfected in a manner that prevents damage to the respirator and does not cause harm to the user.

The respirator cleaning and disinfecting intervals are the same in the new 1910.134 as in the previous standard. An additional requirement has been added to the new 1910.134 that requires respirators used in fit testing and training to be cleaned and disinfected after each use.

When conducting fit testing, 3M recommends cleaning the respirator with the 3M 504 Respirator Wipe Pad between test subjects.

Storage

The respirator storage requirements are essentially unchanged except for the additional requirement that emergency respirators be stored in accordance with any applicable manufacturer instructions.

Inspection

Respirator inspection requirements underwent very little change. An addition to the new standard requires that emergency escape-only respirators shall be inspected before being carried into the workplace for use. The previous standard had a requirement that air cylinders on SCBAs be fully charged. The new 1910.134 requires air and oxygen cylinders to be maintained in a fully charged state and to be recharged when the pressure falls to 90% of the manufacturer's recommended pressure level.

For respirators maintained for emergency use, the new standard is more specific regarding the inspection record. The respirator standard now requires that the employer:

1. Certify the respirator by documenting the date the inspection was performed, the name (or signature) of the person who made the inspection, the findings, required remedial action, and a serial number or other means of identifying the inspected respirator; and
2. Provide this information on a tag or label that is attached to the storage compartment for the respirator, is kept with the respirator, or is included in inspection reports stored as paper or electronic files. This information shall be maintained until replaced following a subsequent certification.

Repairs

The respirator repair requirements are more specific. The employer shall ensure that respirators that fail an inspection or are otherwise found to be defective are removed from service, and are discarded or repaired or adjusted in accordance with the following procedures:

1. Repairs or adjustments to respirators are to be made only by persons appropriately trained to perform such operations and shall use only the respirator manufacturer's NIOSH-approved parts designed for the respirator;
2. Repairs shall be made according to the manufacturer's recommendations and specifications for the type and extent of repairs to be performed; and

3. Reducing and admission valves, regulators and alarms shall be adjusted or repaired only by the manufacturer or a technician trained by the manufacturer.

Breathing air quality

Essentially unchanged from the previous standard, this paragraph requires the employer to provide employees using atmosphere-supplying respirators (supplied-air and SCBA) with breathing gases of high purity. OSHA did update the Compressed Gas association reference from 1966 to 1989. The standard states that, "Compressed breathing air shall meet at least the requirements for Type 1-Grade D breathing air described in ANSI/Compressed Gas Association Commodity Specification for Air, G–7.1–1989 [G–7.1–1989 does not use the Type 1 designation. It only includes gaseous air.] and, to include:

1. Oxygen content (v/v) of 19.5-23.5%;
2. Hydrocarbon (condensed) content of 5 milligrams per cubic meter of air or less;
3. Carbon monoxide (CO) content of 10 ppm or less;
4. Carbon dioxide content of 1,000 ppm or less; and
5. Lack of noticeable odor.

The employer is also required to ensure that oxygen concentrations greater than 23.5% are used only in equipment designed for oxygen service or distribution.

The new standard also contains new requirements specific to cylinders of breathing air. The employer shall ensure that:

1. Cylinders of purchased breathing air have a certificate of analysis from the supplier that the breathing air meets the requirements for Grade D breathing air; and
2. The moisture content in the cylinder does not exceed a dew point of -50˚F (-45.6˚C) at 1 atmosphere pressure.

For compressors used to supply breathing air to respirators the employer must:

1. Minimize moisture content so that the dew point at 1 atmosphere pressure is 10˚F (5.56˚C) below the ambient temperature;
2. Maintain and replace or refurbish sorbent beds and filters periodically following the manufacturer's instructions;
3. Maintain a tag at the compressor containing the most recent change date and the signature of the person authorized by the employer to perform the change;
4. For compressors that are not oil-lubricated, ensure that carbon monoxide levels in the breathing air do not exceed 10 ppm;
5. For oil-lubricated compressors, use a high-temperature or carbon monoxide alarm, or both, to monitor carbon monoxide levels. If only high-temperature alarms are used, the air supply shall be monitored at intervals sufficient to prevent carbon monoxide in the breathing air from exceeding 10 ppm.

OSHA maintained the requirement that breathing air couplings be incompatible with outlets for nonrespirable worksite air or other gas systems. OSHA added a requirement that states, "No asphyxiating substance shall be introduced into breathing air lines."

Identification of filters, cartridges and canisters

The employer shall ensure that all filters, cartridges and canisters used in the workplace are labeled and color coded with the NIOSH approval label and that the label is not removed and remains legible.

Training and information

This paragraph requires the employer to provide effective training to employees who are required to use respirators. The training must be comprehensive, understandable and recur annually, and more often if necessary. This paragraph also requires the employer to provide the basic information on respirators in Appendix D of 1910.134 to employees who wear respirators when not required to do so by this standard or by the employer [voluntary use].

The employer must ensure that each employee can demonstrate knowledge of at least the following:

1. Why the respirator is necessary and how improper fit, usage or maintenance can compromise the protective effect of the respirator;
2. The limitations and capabilities of the respirator;
3. How to use the respirator effectively in emergency situations, including situations in which the respirator malfunctions;
4. How to inspect, put on and remove, use and check the seals of the respirator;
5. The procedures for maintenance and storage of the respirator;
6. How to recognize medical signs and symptoms that may limit or prevent the effective use of respirators; and
7. The general requirements of 1910.134.

The training shall be conducted in a manner that is understandable to the employee. The training must be provided prior to requiring the employee to use a respirator in the workplace.

Retraining

Retraining shall be administered annually, and when the following situations occur:

1. Changes in the workplace or the type of respirator render previous training obsolete;
2. Inadequacies in the employee's knowledge or use of the respirator indicate that the employee has not retained the requisite understanding or skill; or
3. Any other situation in which retraining appears necessary to ensure safe respirator use.

Voluntary use

The basic advisory information on respirators, as presented in Appendix D of 1910.134, shall be provided by the employer in any written or oral format, to employees who wear respirators when such use is not required by 1910.134 or by the employer.

Program evaluation

This section requires the employer to conduct evaluations of the workplace to ensure that the written respiratory protection program is being properly implemented, and to consult employees to ensure that they are using the respirators properly.

1. The employer shall conduct evaluations of the workplace as necessary to ensure that the provisions of the current written program are being effectively implemented and that the program continues to be effective.
2. The employer shall regularly consult employees required to use respirators to assess the employees' views on program effectiveness and to identify any problems. Any problems that are identified during this assessment shall be corrected. Factors to be assessed include, but are not limited to:
   - Respirator fit (including the ability to use the respirator without interfering with effective workplace performance);
   - Appropriate respirator selection for the hazards to which the employee is exposed;
   - Proper respirator use under the workplace conditions the employee encounters; and
   - Proper respirator maintenance.

Recordkeeping

This section requires the employer to establish and retain written information regarding medical evaluations, fit testing and the respirator program. OSHA states, "This information will facilitate employee involvement in the respirator program, assist the employer in auditing the adequacy of the program, and provide a record for compliance determinations by OSHA."

Medical evaluation. Records of medical evaluations required by this section must be retained and made available in accordance with 29 CFR 1910.1020.

Fit testing. The employer shall establish a record of the qualitative and quantitative fit tests administered to an employee including:

1. The name or identification of the employee tested;
2. Type of fit test performed;
3. Specific make, model, style and size of respirator tested;
4. Date of test; and
5. The pass/fail results for QLFTs or the fit factor and strip chart recording or other recording of the test results for QNFTs.

Fit test records shall be retained for respirator users until the next fit test is administered.

Written program. The employer shall retain a written copy of the current respirator program.

Written materials required to be retained under this part of 1910.134 shall be made available upon request to affected employees and to the Assistant Secretary or designee for examination and copying.

Appendices

Compliance with Appendix A, Appendix B–1, Appendix B–2 and Appendix C of 1910.134 is mandatory. Appendix D of this section is non-mandatory and is not intended to create any additional obligations not otherwise imposed or to detract from any existing obligations.

Appendix A to § 1910.134: Fit testing procedures (mandatory)

Part I. OSHA-accepted fit test protocols

The employer shall conduct fit testing using the procedures published in this appendix. The requirements in this appendix apply to all OSHA-accepted fit test methods, both QLFT and QNFT. The fit testing procedures and frequencies of the substance specific standards, such as asbestos, lead and benzene, have been replaced by the requirements of 1910.134 and Appendix A.

Qualitative fit test (QLFT) protocols

There are four OSHA-accepted protocols for qualitative fit testing:

1. Isoamyl acetate. The respirator must be equipped with cartridges designed to remove organic vapors.
2. Saccharin. The respirator must be equipped with a particulate filter of any class.
3. Bitrex.™ The respirator must be equipped with a particulate filter of any class.
4. Irritant smoke. The respirator must be equipped with class 100 particulate filters (N100, R100 or P100).

The exercise protocol for QLFT uses seven exercises performed for 1 minute each. The exercises are: normal breathing, deep breathing, moving head side-to-side, moving head up and down, bending over (jogging in place shall be substituted for this exercise in fit testing units that do not permit bending over at

the waist), talking and normal breathing. To accomplish the talking exercise, the test subject can read from a prepared text such as the Rainbow Passage, count backward from 100, or recite a memorized poem or song.

Quantitative fit test (QNFT) protocols

There are three OSHA-accepted protocols for quantitative fit testing:

1. Generated aerosol. Quantitative fit testing using a non-hazardous test aerosol (such as corn oil, polyethylene glycol 400 [PEG 400], di-2-ethyl hexyl sebacate [DEHS] or sodium chloride) generated in a test chamber, and employing instrumentation to quantify the fit of the respirator;
2. Portacount.™ Quantitative fit testing using ambient aerosol as the test agent and appropriate instrumentation (condensation nuclei counter) to quantify the respirator fit;
3. Controlled negative pressure. Quantitative fit testing using controlled negative pressure and appropriate instrumentation to measure the volumetric leak rate of a facepiece to quantify the respirator fit.

The exercise protocol for QNFT requires the same seven exercises used for QLFT plus a grimace exercise. The grimace exercise is performed by smiling and frowning for 15 seconds. However, the grimace exercise is not used in the calculation of the fit factor.

Aerosol fit test methods

The generated aerosol and ambient aerosol condensation nuclei counter (CNC) quantitative fit testing (Portacount™) protocols quantitatively fit test respirators with the use of a probe. The respirator must be equipped with class 100 filters before fit testing. The probed respirator is only used for quantitative fit tests. A probed respirator has a special sampling device, installed on the respirator, that allows the probe to sample the air from inside the mask. A probed respirator is required for each make, style, model and size that the employer uses and can be obtained from the respirator manufacturer or distributor. The respirator manufacturers and the CNC instrument manufacturer, TSI Inc., also provide probe attachments (TSI sampling adapters) that permit fit testing in an employee's own respirator. A minimum fit factor pass level of at least 100 is necessary for a half-mask respirator and a minimum fit factor pass level of at least 500 is required for a full facepiece negative pressure respirator.

Controlled negative pressure (CNP) quantitative fit testing protocol

The CNP protocol provides an alternative to aerosol fit test methods. The CNP fit test method technology is based on exhausting air from a temporarily sealed respirator facepiece to generate and then maintain a constant negative pressure inside the facepiece. The rate of air exhaust is controlled so that a constant negative pressure is maintained in the respirator during the fit test. The level of pressure is selected to replicate the mean inspiratory pressure that causes leakage into the respirator under normal use conditions. With pressure held constant, air flow out of the respirator is equal to air flow into the respirator. Therefore, measurement of the exhaust stream that is required to hold the pressure constant in the temporarily sealed respirator yields a direct measure of leakage air flow into the respirator. The CNP fit test method measures leak rates through the facepiece as a method for determining the facepiece fit for negative pressure respirators. The CNP instrument manufacturer Dynatech Nevada also provides attachments (sampling manifolds) that replace the filter cartridges to permit fit testing in an employee's own respirator. To perform the test, the test subject closes his or her mouth and holds his or her breath, after which an air pump removes air from the respirator facepiece at a pre-selected constant pressure. The facepiece fit is expressed as the leak rate through the facepiece, expressed as milliliters per minute. The quality and validity of the CNP fit tests are determined by the degree to which the in-mask pressure tracks the test pressure during the system measurement time of approximately five seconds. Instantaneous feedback in the form of a real-time pressure trace of the in-mask pressure is provided and used to determine test validity and quality. A minimum fit factor pass level of 100 is necessary for a half-mask respirator and a minimum fit factor of at least 500 is required for a full facepiece respirator.

Part II. New fit test protocols

The new standard contains provisions for new fit test methods to be approved by OSHA. Any person may submit to OSHA an application for approval of a new fit test protocol. If the application meets the following criteria, OSHA will initiate a rulemaking proceeding under section 6(b)(7) of the OSH Act to determine whether to list the new protocol as an approved protocol in this Appendix A.

The application must include a detailed description of the proposed new fit test protocol. This application must be supported by either:

1. A test report prepared by an independent government research laboratory (e.g., Lawrence Livermore National Laboratory, Los Alamos National Laboratory, the National Institute for Standards and Technology) stating that the laboratory has tested the protocol and had found it to be accurate and reliable; or
2. An article that has been published in a peer-reviewed industrial hygiene journal describing the protocol and explaining how test data support the protocol's accuracy and reliability.

If OSHA determines that additional information is required before the Agency commences a rulemaking proceeding under this section, OSHA will so notify the applicant and afford the applicant the opportunity to submit the supplemental information.

Initiation of a rulemaking proceeding will be deferred until OSHA has received and evaluated the supplemental information.

Appendix B–1 to § 1910.134: User seal check procedures (mandatory)

The individual who uses a tight-fitting respirator is to perform a user seal check to ensure that an adequate seal is achieved each time the respirator is put on. Either the positive and negative pressure checks listed in this appendix, or the respirator manufacturer's recommended user seal check method shall be used. User seal checks are not substitutes for qualitative or quantitative fit tests.

I. Facepiece positive and/or negative pressure checks

A. Positive pressure check. Close off the exhalation valve and exhale gently into the facepiece. The face fit is considered satisfactory if a slight positive pressure can be built up inside the facepiece without any evidence of outward leakage of air at the seal. For most respirators, this method of leak testing requires the wearer to first remove the exhalation valve cover before closing off the exhalation valve and then carefully replace it after the test.

B. Negative pressure check. Close off the inlet opening of the canister or cartridge(s) by covering with the palm of the hand(s) or by replacing the filter seal(s), inhale gently so that the facepiece collapses slightly, and hold the breath for ten seconds. The design of the inlet opening of some cartridges cannot be effectively covered with the palm of the hand. The test can be performed by covering the inlet opening of the cartridge with a thin latex or nitrile glove. If the facepiece remains in its slightly collapsed condition and no inward leakage of air is detected, the tightness of the respirator is considered satisfactory.

II. Manufacturer's recommended user seal check procedures

The respirator manufacturer's recommended procedures for performing a user seal check may be used instead of the positive and/or negative pressure check procedures provided that the employer demonstrates that the manufacturer's procedures are equally effective.

Appendix B–2 to § 1910.134: Respirator cleaning procedures (mandatory)

These procedures are provided for employer use when cleaning respirators. They are general in nature, and the employer, as an alternative, may use the cleaning recommendations provided by the manufacturer of the respirators used by their employees, provided such procedures are as effective as those listed in Appendix B–2. Equivalent effectiveness simply means that the procedures used must accomplish the objectives set forth in Appendix B–2, i.e., they must ensure that the respirator is properly cleaned and disinfected in a manner that prevents damage to the respirator and does not cause harm to the user.

Appendix C to § 1910.134: OSHA respirator medical evaluation questionnaire (mandatory)

See 1910.134 for the medical questionnaire.

Appendix D to § 1910.134: Information for employees using respirators when not required under the standard (non-mandatory)

See 1910.134 for the contents of Appendix D.

Substance specific standards

The OSHA substance specific standards, such as asbestos, benzene, formaldehyde and lead, now refer to the new 1910.134. The fit testing protocols published in the substance specific standards have been withdrawn. All of the substance specific standards require fit testing to be performed as described in 1910.134. This means 1910.134 determines the number of sizes and models of respirators, frequency of fit tests, protocols for performing fit tests, and determines when one can use qualitative or quantitative fit testing.

Compliance with the medical evaluation requirements of 1910.134 is not mentioned for substance specific standards. This is because these standards have their own medical **surveillance** requirements (which may or may not be useful in determining a worker's ability to use a respirator).

The requirement for an end-of-service-life indicator or cartridge change schedule has not been included in those standards that already had a similar requirement (e.g., acrylonitrile, 1,3-butadiene, benzene, formaldehyde and vinyl chloride).

The respirator selection tables in these standards have **not** changed. The assigned protection factors and respirator terminology is the same as before January 8, 1998. OSHA stated that, "these tables will remain unchanged until resolution of the reserved portions [APFs] of this final standard."

3M Professional and technical development program on respiratory protection

3M is offering a 4 1/2-day course that will provide the information to design, implement, maintain and evaluate a comprehensive respiratory protection program. Break-out workshops within the course will provide hands-on reinforcement of lecture subjects.

Topics will include **the new OSHA Respiratory Protection Standard 29 CFR 1910.134**, ANSI requirements, respirator capabilities and limitations, respirator selection, 42 CFR part 84 filters, medical evaluations, fit testing, breathing air quality for supplied air respirators, air quality testing and self-contained breathing apparatus.

To register or obtain more information, call 1-800-659-0151, ext. 275.

1998 Locations and Dates

Minneapolis, MN .....July 13-17
Portland, OR .....September 14-18
Phoenix, AZ .....October 19-23

Tech line

To reach 3M's Technical Service staff with questions regarding our products, you can call 1-800-243-4630. If you wish to contact your local sales representative, you can leave a message by calling 1-800-896-4223.

Visit the 3M OH&ESD web site

Information on 3M OH&ESD products as well as on current issues in respiratory protection can be obtained by visiting our web site.

Our address is:
http://www.mmm.com/occsafety

3M Occupational Health and Environmental Safety Division
3M Center, Building 275-6W-01
St. Paul, MN 55144-1000

70-0708-4444-7