



Supervisors' Safety Update

Ideas and Strategies for Leaders



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NIOSH CERTIFICATION CRITERIA FOR PARTICULATE RESPIRATORS

By SeaBright Insurance Loss Control

Background: Requirements for respiratory protection can be confusing because more than one government agency is involved in determining the standards. OSHA sets the overall respiratory program standards, describing requirements for a written program, fit testing, training, recordkeeping, etc. These are 29 CFR 1910.134 for general industries with identical codes set as 1926.103 for construction. State plan safety and health codes must also be at least as stringent as these. However, it is the National Institute for Occupational Safety and Health (NIOSH) that certifies respiratory protection *devices*. At one time, NIOSH shared this responsibility with the Mine Safety and Health Administration (MSHA). As of July 1995, NIOSH has exclusive authority for testing and certifying respirators and filters under 42 CFR, except for certain mine emergencies. Respirators used in health care settings must also meet the performance criteria of the federal Centers for Disease Control (CDC). So, if you look to the written standards for clarity on this issue, there may be more than one place to look.

This article will attempt to explain the rules regarding respiratory protection *devices*—specifically as to the testing, certification, and approval of negative pressure *air-purifying* respirators. These are the most commonly used type of respirators, which filter out undesirable *particulates* from the air. They include disposable respirator masks, as well as half-masks or full-face masks with cartridges. In this discussion, we are not covering rules that apply to *air-supplying* respirators of any kind.

NIOSH is updating its entire respirator-certification program in a series of modules, divided by each respirator type, but the entire process may take some time to complete. At this time, nine classes (more details below) of *particulate* respirator filters bear approval labels from NIOSH. Standards for all other respirator classes have been incorporated into the 42 CFR without changes for the time being.

When did these standards become effective?

The respirator standard - 42 CFR 84 - became effective on July 10, 1995 and is generally referred to as PART 84. These regulations were developed by NIOSH to replace the old 30 CFR PART 11 regulations under which NIOSH and the Mine Safety and Health Administration certified respirators jointly. After July 10, 1998, only Part 84 - certified respirators and filters are to be sold.

Why were these changes made?

The old 30 CFR Part 11 respirator certification standard was first issued in 1972. Some of the particulate filter certification testing procedures were based on very old data developed by the Bureau of Mines during the 1930s that has not been updated since. The new research, testing, and manufacturing technology made the particulate filter certification procedures in Part 11 obsolete.

What is the effect of this change?

These requirements reflect 20 years of advances in respiratory protection technology, are much more demanding than the old tests, and provide much better evidence of the filter's ability to remove airborne particles. Today's revised Part 84 is based on tests using a worst-case penetrating aerosol (an aerosol that produces maximum filter penetration) so that the newly certified filters can be used against any size of particulate found in the workplace. This is significant because research has demonstrated that particles less than 2

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micrometers in size can penetrate some dust/mist and dust/mist/fume filters that previously had been certified and in use. If the diameter of particulate is less than 2 micrometers, or is unknown, a Part 11 *High Efficiency Particulate Air* (HEPA) filter, or a Part 84 certified filter should be used. These filters can be used without particle size analysis or filter penetration testing.

How can I tell which respirators or cartridges are certified under the Part 84 standard?

A sequence of approval numbers (TC-84A-xxxx) is used for non-powered particulate respirators certified under Part 84. Respirators may be stamped with a variety of NIOSH, MSHA or DHHS (Dept. of Health and Human Services) emblems. The NIOSH website contains a listing of approved particulate filtering face piece respirators and a searchable certified equipment list to help you.¹

All NIOSH-approved filtering facepiece respirators are marked with the manufacturer's name, the part number (P/N), the protection provided by the filter (e.g., N95, P100), and "NIOSH." Some filtering facepiece respirators approved by NIOSH may have the NIOSH approval number (TC-84A-xxxx) as an additional identification marking.

What are the filter classes?

Rather than by hazard type, such as dust, mist or fumes, filters are classified by their ability to resist degradation in the presence or absence of oil particles. Part 84 certification provides for nine *classes* of filters, based on three *levels* of filter efficiency and three *categories* of resistance to filter efficiency degradation. For example, a filter marked N95 means an N series filter that is at least 95% efficient.

To help you remember the filter series, use the following guide: **N** = Not resistant to oil; **R** = Resistant to oil; **P** = oil Proof

Filter Class	Description
N95, N99, N100	Filters at least 95%, 99%, 99.97% of airborne particles. Not resistant to oil.
R95, R99, R100	Filters at least 95%, 99%, 99.97% of airborne particles. Somewhat resistant to oil.
P95, P99, P100	Filters at least 95%, 99%, 99.97% of airborne particles. Strongly resistant to oil.

Will these filters last longer?

Current OSHA standards require employers to establish a respirator cartridge change schedule and refer to NIOSH standards as a model. Note that OSHA has an excellent respiratory e-tool at OSHA.gov including 3 additional methods of determining cartridge life. The current NIOSH service-time-limit recommendations for non-powered particulate filter respirators are that filter elements should be replaced at the following frequencies:

All filters. The service life of all filters is limited by considerations of hygiene, damage, and breathing resistance. All filters should be replaced whenever they are damaged, soiled, or causing noticeably increased breathing resistance.

N-series filters generally should be used and reused subject only to considerations of hygiene, damage, and increased breathing resistance. However, for dirty workplaces that could result in high filter loading (i.e., 200 mg), service time for N-series filters should only be extended beyond 8 hours of use (continuous or intermittent) by performing an evaluation in specific workplace settings that demonstrates: (a) that extended use will not degrade the filter efficiency below the efficiency level specified in Part 84, or (b) that the total mass loading of the filter(s) is less than 200 mg. These determinations would need to be repeated whenever conditions change or modifications are made to processes that could change the type of particulate generated in the user's facility.

R-series filters should be used only for a single shift (or for 8 hours of continuous or intermittent use) when oil is present. However, service time for the R-series filters can be extended using the same two methods described above for N-series filters. These determinations would need to be repeated whenever conditions change or modifications are made to processes that could change the type of particulate generated in the user's facility.

P-series filters should be used and reused in accordance with the manufacturer's time-use limitation recommendations when oil aerosols are present. P-series filters should be used and reused subject only to considerations of hygiene, damage, and increased breathing resistance if oil aerosols are not present.

30 CFR part 11 filters should be replaced at least daily or more often if breathing resistance becomes excessive or if the filter suffers physical damage (tears, holes, etc.) Filter elements designed to be cleaned and reused should be cleaned at least daily in accordance with the manufacturer's instructions. Between uses, filters should be packaged to reduce exposure to conditions which cause filter degradation, such as high humidity.

¹ NIOSH site http://www.cdc.gov/niosh/nppt/topics/respirators/disp_part/RespSource3.html#a

How do I select the right respirator filters?

As in the past, each manufacturer will provide specifications for the correct filter to use, depending on the type and concentration of the atmospheric contaminant. To select the correct respirator/filters the following conditions must be known:

- The identity and concentration of the particulates in the workplace air;
- The OSHA or MSHA Permissible Exposure Limit (PEL);
- The NIOSH Recommended Exposure Limit (REL), or other occupational exposure limit for the contaminant.

Users must also know the Immediately Dangerous to Life or Health (IDLH) concentration, including oxygen deficiency, and any service life information available for combination cartridges or canisters they plan to use. In no case should an air-purifying respirator be used in IDLH concentrations.

What is an “APF” and how do I use it?

The **APF** is the specific “Assigned Protection Factor,” defined as the minimum anticipated level of protection provided by a specific *type* of respirator. For example, an APF of 10 means that the respirator should reduce the airborne concentration of a particulate by a factor of 10, or to 10% of the ambient concentration - assuming that a fit test/check was passed. Multiplying the occupational exposure limit by the APF for a respirator gives the *maximum* workplace concentration in which that respirator can safely be used. For example, if the APF for a half-mask respirator is 10 and the PEL is 5 mg/m³, then 50 mg/m³ is the highest workplace concentration in which this half-mask respirator can be used in the presence of that contaminant. If the ambient concentration is greater than 50 mg/m³, a more protective respirator with a higher APF must be used. This announcement concerning OSHA’s guidance document explains:

WASHINGTON -- [Assigned Protection Factors](#) (APF), a new guidance document published by the Occupational Safety and Health Administration (OSHA), provides employers with vital information for selecting respirators for employees exposed to contaminants in the air.

OSHA revised its existing Respiratory Protection standard in 2006 to add APFs and Maximum Use Concentration (MUC) provisions. APF means the workplace level of respiratory protection that a respirator or class of respirators is able to provide to workers. The higher the APF number (5 to 10,000), the greater the level of protection provided to the user. APFs are used to select the appropriate class of respirators that will provide the necessary level of protection against airborne contaminants. Such exposures can come from particles or a gas or vapor.

MUC represents the limit at which the class of respirator is expected to provide protection. Whenever a hazard's exposure level exceeds MUC, employers should select a respirator with a higher APF. MUC means the maximum atmospheric concentration of a hazardous substance for which a worker can be expected to be protected when wearing a respirator.

"Proper respirator selection prevents exposure to hazardous contaminants and is an important component of an effective respiratory protection program," said Deputy Assistant Secretary of Labor for OSHA Donald G. Shalhoub. "This guidance document serves as another useful resource for protecting the health and safety of workers at risk for respiratory illnesses."

APF and MUC are mandatory respirator selection requirements that can only be used after respirators are properly selected and are used in compliance with the entire standard. The Respiratory Protection standard requires fit testing, medical evaluations, specific training and proper respirator use. The standard applies to general industry, construction, longshoring, shipyard and marine terminal workplaces.

Under the Occupational Safety and Health Act of 1970, employers are responsible for providing a safe and healthful workplace for their employees. OSHA's role is to promote the safety and health of America's working men and women by setting and enforcing standards; providing training, outreach and education; establishing partnerships; and encouraging continual process improvement in workplace safety and health. For more information, visit www.OSHA.gov.

Respirator fit tests:

This requirement has not changed as a result of the standard, but employers should be aware that OSHA requires all respirator users to be properly fit-tested using a quantitative or qualitative fit test when respirators are initially assigned to a user, and periodically thereafter.

- A qualitative fit test (QLFT) is a pass/fail test that relies on the ability of the user to detect a test agent. OSHA has three testing protocols using different test agents: isoamyl acetate (banana oil), saccharin, “bitrex” solution and stannic chloride (irritant smoke).
- Quantitative (QNFT) fit testing does not depend on the wearers’ ability to detect a test agent. Instead instruments are used to measure the face seal leakage based on the difference in concentrations on the inside vs. outside of the respirator.

In addition to fit testing, whether qualitative or quantitative, respirator users *must* perform a fit check (positive and negative pressure test) each time the respirator is worn.

Summary:

To quote OSHA: **“Respirators should be used for protection only when engineering controls have been shown to be infeasible for the control of the hazard or during the interim period when engineering controls are being installed”**. To select a respirator, assess your exposure, account for local factors such as the job-site and worker characteristics, understand the concept of assigned protective factors and know the various kinds of respirators and their relevant characteristics.

For Further Information:

OSHA resources: Refer to <http://www.osha.gov/dts/osta/oshasoft/index.html> where a list of e-tools may be found.

Click to the respiratory e-tool at <http://www.osha.gov/SLTC/etools/respiratory/index.html>.

The OSHA respiratory Advisor Genius is at http://www.osha.gov/SLTC/etools/respiratory/respirator_selection_apf.html.

Find respirator safety videos at <http://www.osha.gov/SLTC/respiratoryprotection/index.html#trainingvideos>.

The complete text of the APF guidance document is at <http://www.osha.gov/Publications/3352-APF-respirators.pdf>.

For various resources visit the NIOSH Home Page on the World Wide Web at <http://www.cdc.gov/niosh/homepage.html>.

Some of the respiratory protection references on their site include:

http://www.cdc.gov/niosh/npptl/topics/respirators/disp_part/RespSource.html Respirator Trusted-Source Information Page

http://www.cdc.gov/niosh/npptl/topics/respirators/disp_part/ NIOSH approved particulate filtering face piece respirators

http://www2a.cdc.gov/drds/cel/cel_form_code.asp searchable certified equipment list

http://www.cdc.gov/niosh/blog/nsb101409_respirator.html NIOSH science blog concerning respirators and H1N1 influenza

http://www.cdc.gov/h1n1flu/guidance/ill-hcp_qa.htm Q&A on Respiratory Protection 2009 H1N1 of Healthcare Workers

http://www.cdc.gov/niosh/npptl/topics/respirators/disp_part/RespSource3.html NIOSH Ancillary Respirator Information page

