National Personal Protective Technology Laboratory

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CV&SDB/NPPTL/NIOSH
Respiratory Protection – Let’s Clear the Air
A little about us…
NPPTL Program Management

- Scientific evaluations
- Program evaluations
- Emergency response

Technology Research
- Respiratory Protection
- Protective Clothing & Ensembles
- Human Performance
- Surveillance
- Workplace Interventions
- Outreach

Evaluation and Testing
- Performance testing
- Standards development testing
- Research testing
- Site and Product audits
- Product investigations
- Fielded equipment evaluations
- Firefighter fatality respirator and clothing evaluations

Conformity Verification
- Conformity assessment
  - Engineering evaluation
  - Respirator certification
  - Quality assurance evaluation
- Standards development
  - 42 CFR 84
  - Consensus standards
- Policy development
NPPTL Program Management

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Established Federal Standard

Title 42 Code of Federal Regulations, Part 84
Technical Performance Requirements

- Subparts H through O covering the performance requirements for,
  - Basic classifications
    - Air-Purifying
    - Atmosphere-Supplying
A broad range of testing capabilities

Over 250 different test procedures

- Approval testing
  - Gas and vapor removal
  - Particulate filtration
  - SCSR/SCBA performance evaluations
  - Fit-testing
  - Environmental Chambers
  - Breathing and metabolic simulators
Quality Assurance Requirements

- Subpart E
  - Basic elements of an acceptable quality assurance program
Audits provide post-market assurances.

- Regular site audits are conducted on manufacturing facilities.
- Product audits are conducted regularly.
- Investigations of non-conformance are conducted.
Product audit testing

- Products purchased off open market
- Subjected to same tests as certification
- Audit failures can result in rescission of approval
- Selection – based on auditing logic, observed problems, failures, and site audit results
Manufacturing site audits

- Visit several sites annually
- Evaluate overall manufacturing processes
- Ensure currently submitted quality manual and procedures are being followed
- Ensure personnel are trained
- Review inspection processes
OSHA’s and MSHA’s Roles

Where respirators are employed, they must be approved by NIOSH.

- MSHA
  - Workplace enforcement
  - Co-approver of particular respirator types used in mining

- OSHA
  - Workplace enforcement
30 CFR, §75.1714-1 Approved self-rescue devices.
- The requirements of §75.1714 shall be met by making available to each person referred to in that section a self-rescue device or devices, which have been approved by MSHA and NIOSH under 42 CFR part 84, as follows:
Compliant Use of Respirators

OSHA requires the use of respirators to be well controlled.

“Must select a respirator certified by the National Institute for Occupational Safety and Health (NIOSH) which must be used in compliance with the conditions of its certification.”

29 CFR 1910.134
29 CFR Considerations for Respirator Use

(a) Permissible Practice
(b) Definitions
(c) Respiratory Protection Program
(d) Selection of Respirators
(e) Medical Evaluation
(f) Fit Testing
(g) Use of Respirators
(h) Maintenance and Care of Respirators
(i) Breathing Air Quality and Use
(j) Identification of Filters, Cartridges, and Canisters
(k) Training and Information
(l) Program Evaluation
(m) Recordkeeping
OSHA Regulatory Update

March 2016
- update to the OSHA Silica Standard
Respirators are classified “N,” if they are Not resistant to oil, “R” if somewhat Resistant to oil, and “P” if strongly resistant (oil Proof). Thus, there are nine types of disposable particulate respirators:

N-95, N-99, and N-100;
R-95, R-99, and R-100;
P-95, P-99, and P-100
Air-Purifying Approval Labs
Particulate Respirators – FFRs?

Filtering Facepiece Respirator

Elastomeric Half Mask with Particulate Filters
Tight-Fitting Respirators

Both FFRs and Elastomeric Half Mask (or Full Facepiece) types are **tight fitting**.

Tight-fitting respirators must be fit tested.

Wearers must not have facial hair that interferes with the respirator seal.

NIOSH Science Blog posted 2 November 2017 –

“To Beard or not to Beard? That’s a good Question!”
Loose-Fitting Respirators

Loose-fitting types of interest include –

- PAPRs
- Supplied-Air Respirators
Powered Air-Purifying Respirator - PAPR

- HE – High Efficiency
  - Instantaneous DOP
  - Silica Dust - Loading
The Silica Dust Chamber
PAPRs

Loose-Fitting

Tight-Fitting
APF
Assigned Protection Factor
### Table I: Assigned Protection Factors

<table>
<thead>
<tr>
<th>Type of Respirator, 2</th>
<th>Quarter mask</th>
<th>Half mask</th>
<th>Full facepiece</th>
<th>Helmet/Hood</th>
<th>Loose-fitting facepiece</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Air-Purifying Respirator</td>
<td>5</td>
<td>10</td>
<td>50</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>2. Powered Air-Purifying Respirator (PAPR)</td>
<td>—</td>
<td>50</td>
<td>1,000</td>
<td>25</td>
<td>1,000x</td>
</tr>
<tr>
<td>3. Supplied-Air Respirator (SAR) or Airline Respirator</td>
<td>• Demand mode</td>
<td>—</td>
<td>10</td>
<td>50</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>• Continuous flow mode</td>
<td>—</td>
<td>50</td>
<td>1,000</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>• Pressure-demand or other positive-pressure mode</td>
<td>—</td>
<td>50</td>
<td>1,000</td>
<td>—</td>
</tr>
<tr>
<td>4. Self-Contained Breathing Apparatus (SCBA)</td>
<td>• Demand mode</td>
<td>—</td>
<td>10</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>• Pressure-demand or other positive-pressure mode (e.g., open/closed circuit)</td>
<td>—</td>
<td>—</td>
<td>10,000</td>
<td>10,000</td>
</tr>
</tbody>
</table>

**Notes:**

1. Employers may select respirators assigned for use in higher workplace concentrations of a hazardous substance for use at lower concentrations of that substance, or when required respirator use is independent of concentration.

2. The assigned protection factors in Table I are only effective when the employer implements a continuing, effective respirator program as required by this section (29 CFR 1910.134), including training, fit testing, maintenance, and use requirements.

3. This APF category includes filtering facepieces, and half masks with elastomeric facepieces.

4. The employer must have evidence provided by the respirator manufacturer that testing of these respirators demonstrates performance at a level of protection of 1,000 or greater to receive an APF of 1,000. This level of performance can best be demonstrated by performing a WPF or SWPF study or equivalent testing. Absent such testing, all other PAPRs and SARs with helmets/hoods are to be treated as loose-fitting facepiece respirators, and receive an APF of 25.

5. These APFs do not apply to respirators used solely for escape. For escape respirators used in association with specific substances covered by 29 CFR 1910 subpart Z, employers must refer to the appropriate substance-specific standards in that subpart. Escape respirators for other IDLH atmospheres are specified by 29 CFR 1910.134(d)(2)(ii).
<table>
<thead>
<tr>
<th>Condition</th>
<th>Minimum respiratory protection required to meet the NIOSH REL (0.05 mg/m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 0.5 mg/m³ (10 x REL)</td>
<td>Any half-mask, air-purifying respirator with a high-efficiency particulate filter†</td>
</tr>
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<td>&lt;= 0.5 mg/m³ (10 x REL)†</td>
<td>Any half-mask, air-purifying respirator with a high-efficiency particulate filter†</td>
</tr>
<tr>
<td>&lt;= 1.25 mg/m³ (25 x REL)</td>
<td>Any powered, air-purifying respirator with a high-efficiency particulate filter, or any supplied-air respirator equipped with a hood or helmet and operated in a continuous-flow mode (for example, type CE abrasive-blasting respirators operated in the continuous-flow mode)</td>
</tr>
<tr>
<td>&lt;= 2.5 mg/m³ (50 x REL)</td>
<td>Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter, or Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter</td>
</tr>
<tr>
<td>&lt;= 50 mg/m³ (1,000 x REL)</td>
<td>Any supplied-air respirator equipped with a half-mask and operated in a pressure-demand or other positive-pressure mode (for example, a Type CE abrasive-blasting respirator operated in a positive-pressure mode)‡</td>
</tr>
<tr>
<td>&lt;= 100 mg/m³ (2,000 x REL)</td>
<td>Any supplied-air respirator equipped with a full facepiece and operated in a pressure-demand or other positive-pressure mode (for example, a Type CE abrasive-blasting respirator operated in a positive-pressure mode)‡</td>
</tr>
<tr>
<td>Planned or emergency entry into environments containing unknown concentrations or concentrations &gt; 100 mg/m³ (2,000 x REL)</td>
<td>Any self-contained breathing apparatus equipped with a full facepiece and operated in a pressure-demand or other positive-pressure mode, or Any supplied-air respirator equipped with a full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in a pressure-demand or other positive-pressure mode.</td>
</tr>
<tr>
<td>Firefighting</td>
<td>Any self-contained breathing apparatus equipped with a full facepiece and operated in a pressure-demand or other positive-pressure mode</td>
</tr>
<tr>
<td>Escape only</td>
<td>Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter, or Any appropriate escape-type, self-contained breathing apparatus</td>
</tr>
</tbody>
</table>

*<= is less than or equal to; > is greater than.
† The new NIOSH respirator certification regulation (42 CFR 84) became effective July 10, 1995, and replaces the old regulation (30 CFR 11). High-efficiency is the appropriate filter for respirable crystalline silica under 30 CFR 11; N100, R100, and P100 are the appropriate filters for respirable crystalline silica under 42 CFR 84.
‡ Assigned protection factor (APF) times the NIOSH REL. The APF is the level of protection provided by each type of respirator.
§ Type CE abrasive-blasting respirators are the only respirators suitable for use in abrasive-blasting operations. Instruction about the purpose and set-up of regulated areas marking the boundaries of work areas containing crystalline silica.
Where can I find other PELs?

- “The NIOSH Pocket Guide to Chemical Hazards”
The NIOSH Certified Equipment List

- How would I know what types of respirators provide the protection called for?

CEL – The Certified Equipment List
Quality Partnerships Enhance Worker Safety and Health

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