

TABLE 8—AIR-SUPPLY-LINE REQUIREMENTS AND TESTS—Continued
[42 CFR part 84, subpart J]

| Specific requirements | Requirements for the air-supply lines of the indicated type of supplied-air respirators | | |
|---------------------------------|--|--------------------------|---|
| | Type A | Type B | Type C |
| Tightness | No air leakage shall occur when the hose and couplings are joined and the joint(s) are immersed in water and subjected to an internal air pressure of 35 kN/m. ² (5 pounds per square inch) gage. | None | Leakage of air exceeding 50 cc. per minute at each coupling shall not be permitted when the hose and couplings are joined and are immersed in water, with air flowing through the respirator under a pressure of 173 kN/m. ² (25 pounds per square inch) gage applied to the inlet end of the air-supply hose, or at twice the maximum respirator-supply pressure that is specified by the applicant, whichever is higher. |
| Permeation of hose by gasoline. | The permeation of the hose by gasoline will be tested by immersing 7.6 m. (25 feet) of hose and one coupling in gasoline, with air flowing through the hose at the rate of 8 liters per minute for 6 hours. The air from the hose shall not contain more than 0.01 percent by volume of gasoline vapor at the end of the test. | Same as for Type A | Same as for Type A, except the test period shall be 1 hour. |
| Detachable coupling | None | None | A hand-operated detachable coupling by which the wearer can readily attach or detach the connecting hose shall be provided at a convenient location. This coupling shall be durable, remain connected under all conditions of normal respirator use, and meet the prescribed tests for strength and tightness of hose and couplings. |

Subpart K—Non-Powered Air-Purifying Particulate Respirators

§ 84.170 Non-powered air-purifying particulate respirators; description.

(a) Non-powered air-purifying particulate respirators utilize the wearer's negative inhalation pressure to draw the ambient air through the air-purifying filter elements (filters) to remove particulates from the ambient air. They are designed for use as respiratory protection against atmospheres with particulate contaminants (e.g., dusts, fumes, mists) that are not immediately dangerous to life or health and that contain adequate oxygen to support life.

(b) Non-powered air-purifying particulate respirators are classified into three series, N-, R-, and P-series. The N-series filters are restricted to use in those workplaces free of oil aerosols. The R- and P-series filters are intended

for removal of any particulate that includes oil-based liquid particulates.

(c) Non-powered air-purifying particulate respirators are classified according to the efficiency level of the filter(s) as tested according to the requirements of this part.

(1) N100, R100, and P100 filters shall demonstrate a minimum efficiency level of 99.97 percent.

(2) N99, R99, and P99 filters shall demonstrate a minimum efficiency level of 99 percent.

(3) N95, R95, and P95 filters shall demonstrate a minimum efficiency level of 95 percent.

§ 84.171 Non-powered air-purifying particulate respirators; required components.

(a) Each non-powered air-purifying particulate respirator described in §84.170 shall, where its design requires, contain the following component parts:

- (1) Facepiece, mouthpiece with noseclip, hood, or helmet;
- (2) Filter unit;
- (3) Harness;
- (4) Attached blower; and
- (5) Breathing tube.

(b) The components of each non-powered air-purifying particulate respirator shall meet the minimum construction requirements set forth in subpart G of this part.

§ 84.172 Breathing tubes; minimum requirements.

Flexible breathing tubes used in conjunction with respirators shall be designed and constructed to prevent:

- (a) Restriction of free head movement;
- (b) Disturbance of the fit of facepieces, mouthpieces, hoods, or helmets;
- (c) Interference with the wearer's activities; and
- (d) Shutoff of airflow due to kinking, or from chin or arm pressure.

§ 84.173 Harnesses; installation and construction; minimum requirements.

(a) Each respirator shall, where necessary, be equipped with a suitable harness designed and constructed to hold the components of the respirator in position against the wearer's body.

(b) Harnesses shall be designed and constructed to permit easy removal and replacement of respirator parts, and, where applicable, provide for holding a full facepiece in the ready position when not in use.

§ 84.174 Respirator containers; minimum requirements.

(a) Except as provided in paragraph (b) of this section each respirator shall be equipped with a substantial, durable container bearing markings which show the applicant's name, the type of respirator it contains, and all appropriate approval labels.

(b) Containers for single-use respirators may provide for storage of more than one respirator, however, such containers shall be designed and constructed to prevent contamination of respirators which are not removed, and to prevent damage to respirators during transit.

§ 84.175 Half-mask facepieces, full facepieces, hoods, helmets, and mouthpieces; fit; minimum requirements.

(a) Half-mask facepieces and full facepieces shall be designed and constructed to fit persons with various facial shapes and sizes either:

(1) By providing more than one facepiece size; or

(2) By providing one facepiece size which will fit varying facial shapes and sizes.

(b) Full facepieces shall provide for optional use of corrective spectacles or lenses, which shall not reduce the respiratory protective qualities of the respirator.

(c) Hoods and helmets shall be designed and constructed to fit persons with various head sizes, provide for the optional use of corrective spectacles or lenses, and insure against any restriction of movement by the wearer.

(d) Mouthpieces shall be equipped with noseclips which are securely attached to the mouthpiece or respirator and provide an airtight seal.

(e) Facepieces, hoods, and helmets shall be designed to prevent eyepiece fogging.

(f) Half-mask facepieces shall not interfere with the fit of common industrial safety corrective spectacles.

§ 84.176 Facepieces, hoods, and helmets; eyepieces; minimum requirements.

Facepieces, hoods, and helmets shall be designed and constructed to provide adequate vision which is not distorted by the eyepieces.

§ 84.177 Inhalation and exhalation valves; minimum requirements.

(a) Inhalation and exhalation valves shall be protected against distortion.

(b) Inhalation valves shall be designed and constructed and provided where necessary to prevent excessive exhaled air from adversely affecting filters, except where filters are specifically designed to resist moisture.

(c) Exhalation valves shall be:

- (1) Provided where necessary;
- (2) Protected against damage and external influence; and

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(3) Designed and constructed to prevent inward leakage of contaminated air.

§ 84.178 Head harnesses; minimum requirements.

(a) All facepieces shall be equipped with head harnesses designed and constructed to provide adequate tension during use and an even distribution of pressure over the entire area in contact with the face.

(b) Facepiece head harnesses, except those employed on single-use respirators, shall be adjustable and replaceable.

(c) Mouthpieces shall be equipped, where applicable, with adjustable and replaceable harnesses, designed and constructed to hold the mouthpiece in place.

§ 84.179 Non-powered air-purifying particulate respirators; filter identification.

(a) The respirator manufacturer, as part of the application for certification, shall specify the filter series and the filter efficiency level (i.e., "N95", "R95", "P95", "N99", "R99", "P99", "N100", "R100", or "P100") for which certification is being sought.

(b) Filters shall be prominently labeled as follows:

(1) N100 filters shall be labeled "N100 Particulate Filter (99.97% filter efficiency level)" and shall be a color other than magenta.

(2) R100 filters shall be labeled "R100 Particulate Filter (99.97% filter efficiency level)" and shall be a color other than magenta.

(3) P100 filters shall be labeled "P100 Particulate Filter (99.97% filter efficiency level)" and shall be color coded magenta.

(4) N99 filters shall be labeled "N99 Particulate Filter (99% filter efficiency level)" and shall be a color other than magenta.

(5) R99 filters shall be labeled "R99 Particulate Filter (99% filter efficiency level)" and shall be a color other than magenta.

(6) P99 filters shall be labeled "P99 Particulate Filter (99% filter efficiency level)" and shall be a color other than magenta.

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(7) N95 filters shall be labeled as "N95 Particulate Filter (95% filter efficiency level)" and shall be a color other than magenta.

(8) R95 filters shall be labeled as "R95 Particulate Filter (95% filter efficiency level)" and shall be a color other than magenta.

(9) P95 filters shall be labeled as "P95 Particulate Filter (95% filter efficiency level)" and shall be a color other than magenta.

§ 84.180 Airflow resistance tests.

(a) Resistance to airflow will be measured in the facepiece, mouthpiece, hood, or helmet of a particulate respirator (complete respirator) mounted on a test fixture with air flowing at continuous rate of 85 ± 2 liters per minute, before each test conducted in accordance with § 84.182.

(b) The resistances for particulate respirators upon initial inhalation shall not exceed 35 mm water column height pressure and upon initial exhalation shall not exceed 25 mm water column height pressure.

§ 84.181 Non-powered air-purifying particulate filter efficiency level determination.

(a) Twenty filters of each non-powered air-purifying particulate respirator model shall be tested for filter efficiency against:

(1) A solid sodium chloride particulate aerosol as per this section, if N-series certification is requested by the applicant.

(2) A dioctyl phthalate or equivalent liquid particulate aerosol as per this section, if R-series or P-series certification is requested by the applicant.

(b) Filters including holders and gaskets; when separable, shall be tested for filter efficiency level, as mounted on a test fixture in the manner as used on the respirator.

(c) Prior to filter efficiency testing of 20 N-series filters, the 20 to be tested shall be taken out of their packaging and placed in an environment of 85 ± 5 percent relative humidity at 38 ± 2.5 °C for 25 ± 1 hours. Following the pre-conditioning, filters shall be sealed in a gas-tight container and tested within 10 hours.

(d) When the filters do not have separable holders and gaskets, the exhalation valves shall be blocked so as to ensure that leakage, if present, is not included in the filter efficiency level evaluation.

(e) For non-powered air-purifying particulate respirators with a single filter, filters shall be tested at a continuous airflow rate of 85 ±4 liters per minute. Where filters are to be used in pairs, the test-aerosol airflow rate shall be 42.5 ±2 liters per minute through each filter.

(f) *Filter efficiency test aerosols.* (1) When testing N-series filters, a sodium chloride or equivalent solid aerosol at 25 ±5 °C and relative humidity of 30 ±10 percent that has been neutralized to the Boltzmann equilibrium state shall be used. Each filter shall be challenged with a concentration not exceeding 200 mg/m³.

(2) When testing R-series and P-series filters, a neat cold-nebulized dioctyl phthalate (DOP) or equivalent aerosol at 25 ±5 °C that has been neutralized to the Boltzmann equilibrium state shall be used. Each filter shall be challenged with a concentration not exceeding 200 mg/m³.

(3) The test shall continue until minimum efficiency is achieved or until an aerosol mass of at least 200 ±5 mg has contacted the filter. For P-series filters, if the filter efficiency is decreasing when the 200 ±5 mg challenge point is reached, the test shall be continued until there is no further decrease in efficiency.

(g) The sodium chloride test aerosol shall have a particle size distribution with count median diameter of 0.075 ±0.020 micrometer and a standard geometric deviation not exceeding 1.86 at the specified test conditions as determined with a scanning mobility particle sizer or equivalent. The DOP aerosol shall have a particle size distribution with count median diameter of 0.185 ±0.020 micrometer and a standard geometric deviation not exceeding 1.60 at the specified test conditions as determined with a scanning mobility particle sizer or equivalent.

(h) The efficiency of the filter shall be monitored and recorded throughout the test period by a suitable forward-

light-scattering photometer or equivalent instrumentation.

(i) The minimum efficiency for each of the 20 filters shall be determined and recorded and be equal to or greater than the filter efficiency criterion listed for each level as follows:

- P100, R100 and N100: Efficiency ≥99.97%
- P99, R99 and N99: Efficiency ≥99%
- P95, R95 and N95: Efficiency ≥95%

§ 84.182 Exhalation valve leakage test; minimum requirements.

(a) Dry exhalation valves and valve seats will be subjected to a suction of 25 mm. water-column height while in a normal operating position.

(b) Leakage between the valve and valve seat shall not exceed 30 milliliters per minute.

Subpart L—Chemical Cartridge Respirators

§ 84.190 Chemical cartridge respirators: description.

(a) Chemical cartridge respirators including all completely assembled respirators which are designed for use as respiratory protection during entry into or escape from atmospheres not immediately dangerous to life and health, are described according to the specific gases or vapors against which they are designed to provide respiratory protection, as follows:

| Type of chemical cartridge respirator ¹ | Maximum use concentration, parts per million |
|--|--|
| Ammonia | 300 |
| Chlorine | 10 |
| Hydrogen chloride | 50 |
| Methyl amine | 100 |
| Organic vapor | ≥1,000 |
| Sulfur dioxide | 50 |
| Vinyl chloride | 10 |

¹ Not for use against gases or vapors with poor warning properties (except where MSHA or Occupational Safety and Health Administration standards may permit such use for a specific gas or vapor) or those which generate high heats of reaction with sorbent material in the cartridge.

² Maximum use concentrations are lower for organic vapors which produce atmospheres immediately hazardous to life or health at concentrations equal to or lower than this concentration.

(b) Chemical cartridge respirators for respiratory protection against gases or vapors, which are not specifically listed with their maximum use concentration, may be approved if the applicant