A Guide to Air-Purifying Respirators

Air-purifying respirators (APRs) work by removing gases, vapors, aerosols (airborne droplets and solid particles), or a combination of contaminants from the air through the use of filters, cartridges, or canisters. These respirators do not supply oxygen from other than the working atmosphere, and therefore cannot be used in an atmosphere that is oxygen-deficient[1] or immediately dangerous to life or health[2] (IDLH). The appropriate respirator for a particular situation will depend on the environment and the contaminant(s).

Filtering Facepiece Respirators

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Filtering facepiece respirators (FFRs) remove particles from the inhaled airstream of the wearer. They may be referred to as "N95 respirators". They are also sometimes called disposable respirators because the entire respirator is discarded when it becomes unsuitable for further use because of hygiene, excessive resistance, or physical damage.

FFRs are divided into classes based on their filtration capabilities. "N95" is a term referring to the N95 filter class, which removes at least 95% of airborne particles using a "most-penetrating" sized particle during "worst case" NIOSH testing. The FFR classes include N (not resistant to oil), R (somewhat resistant to oil), and P (strongly resistant to oil) series, which are available at 95, 99, and 100 filtration efficiency levels.

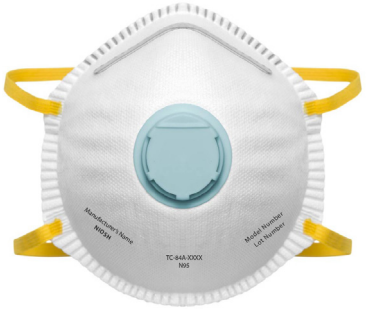
FFRs provide protection against particles, but not gases or vapors, and should not be used for respiratory protection to protect against hazardous gases or vapors. These classes and oil-resistant designations are applicable to all types of air-purifying respirators.

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.

FFRs form a tight seal against the user's face, covering the nose and mouth. As the user inhales air through the facepiece, particulate material collects on the fibrous material of the filter, which removes the particulate contaminant from the airstream. An FFR may have an exhalation valve located on the filter, which reduces breathing resistance during exhalation.



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[1] OSHA CFR 1910.134(b) defines oxygen-deficient as an atmosphere with an oxygen content below 19.5% by volume.

[2] IDLH values can be found at: https://www.cdc.gov/niosh/idlh/intridl4.html

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Filtering Facepiece Respirators (continued)

Because the effectiveness of this type of respirator relies upon the breathing air travelling through the filter, a tight seal to the user's face is very important. Therefore, the Occupational Safety and Health Administration (OSHA) (29 CFR 1910.134) requires an annual respirator fit test to ensure that users receive the expected level of protection by minimizing any leakage of unfiltered contaminant through gaps between the face and facepiece. When used with a respiratory protection program, including annual fit-testing, an FFR will reduce exposures by 1/10th. Another way to express this is that the OSHA Assigned Protection Factor (APF) is 10. For proper donning (putting on) and doffing (taking off) techniques of this type of respiratory protection, refer to the manufacturer's instructions.