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Technical Bulletin

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Understanding Valved Filtering Facepiece Respirators in Non-Healthcare Workplaces - United States

Are valved N95 filtering facepiece respirators as protective to the wearer as unvalved filtering facepiece respirators?

Yes. A NIOSH-approved N95 filtering facepiece respirator with an exhalation valve offers the same protection to the wearer as one that does not have a valve.

"However, NIOSH-approved N95 respirators with an exhalation valve are not fluid resistant. Therefore, in situations where a fluid resistant respirator is indicated (e.g., in surgical settings), individuals should wear a surgical N95 or, if a surgical N95 is not available, cover their respirator with a surgical mask or a face shield. Be careful not to compromise the fit of the respirator when placing a facemask over the respirator."[1]

Why do some filtering facepiece respirators have valves?

Valves are included on some respirator models to reduce breathing resistance during exhalation and help reduce heat build-up inside the respirator. The exhalation valve does not impact a respirator's ability to provide respiratory protection. The valve is designed to open only during exhalation to allow exhaled air to exit the respirator and then close tightly during inhalation, so inhaled air is not permitted to enter the respirator through the valve.

As the wearer breathes out or speaks, some wearer-generated particles will be filtered by the respirator filter media and some unfiltered air may exit through the exhalation valve. During lower breathing rates, the valve on a respirator would not be expected to open very far during exhalation, which would create only a limited path for particles expelled by the wearer to navigate.

Does wearing a valved respirator help protect me?

3M valved respirator models are tested and certified by NIOSH as respiratory protection devices in the same manner that respirators without valves are certified. For example, a 3M 8511 valved respirator provides the same respiratory protection as a 3M 8210 respirator that does not have a valve, since both are certified by NIOSH as N95s. When properly selected and worn, both valved and unvalved respirators will help reduce the wearer's exposure to airborne particles, including potentially infectious aerosols.

What is the purpose of a respirator versus a face covering?

Particulate respirators are considered personal protective equipment (PPE) and are designed to help reduce the wearer's exposure to airborne particulate hazards. Respirators contain filter material and are designed to form a seal with the wearer's face, so that air passes through the filter (instead of around the edges) before it is inhaled. In the U.S., respirators are tested and certified by the U.S. National Institute for Occupational Safety and Health (NIOSH).

In contrast, cloth face coverings are not respirators and are not considered PPE. Face coverings are intended to help protect other people—not the wearer. Cloth face coverings can help contain large droplets, spit or phlegm expelled by the wearer, like covering a cough or sneeze with a face tissue. This containment of large particles from reaching other people is known as source control. Source control is defined as "the use of **masks** to cover a person's mouth and nose and to help reduce the spread of large respiratory droplets to others when the person talks, sneezes, or coughs."[2]

Unlike government-approved respirators, cloth face coverings are not designed and tested to reduce wearers' exposure to airborne particulates. They are not usually designed to seal to the user's face and likely are not made of materials that are tested and proven to capture fine particles. If respiratory protection for the wearer is needed, a face covering is not a substitute for a respirator.

How do valved filtering facepiece respirators compare with face coverings for source control?

During the COVID-19 pandemic there have been questions as to if valved filtering facepiece respirators should be used when source control is needed. The U.S Centers for Disease Control and Prevention (CDC) has called for individuals to be wearing face coverings that provide source control in many situations. Source control is defined as "the use of **masks** to cover a person's mouth and nose and to help reduce the spread of large respiratory droplets to others when the person talks, sneezes, or coughs."[2] The CDC states that unregulated barrier face coverings provide source control. The National Institute for Occupational Safety and Health has conducted research on valved N95 Filtering Facepiece Respirators (FFR) and found that **"**FFRs with an exhalation valve provide respiratory protection to the wearer and—according to the findings from this study—can also reduce particle emissions to levels similar to or better than those provided by surgical masks and unregulated barrier face coverings."[3]

When it comes to source control, is a face covering or valved filtering facepiece respirator better?

Note that face coverings are not designed to fit tightly to the face and have gaps around the face. When the wearer breathes in and out, air will leak through those gaps, and exhaled air may potentially include expelled particles. Because of this, particles may potentially be expelled from face coverings and valved respirators – although the direction of the exhaled airflow will vary depending on the design (downward/forward for exhalation valves, around the edges for face coverings).

When considering whether valved filtering facepiece respirators provide source control, a recent NIOSH study concluded that filtering facepiece respirators "…with an exhalation valve provide respiratory protection to the wearer and can also reduce particle emissions to levels similar to or better than those provided by surgical masks, procedure masks, or cloth face coverings."[3] This finding demonstrates that valved filtering facepiece respirators are at least as effective as face coverings for source control.

What about face coverings with valves?

The CDC recommends that the general public should not wear face coverings with exhalation valves[4]. Face coverings are not regulated and therefore the valves on them are not regulated. Since face coverings are not designed to form a seal to the face, exhaled air will leak around the edges as well as through the valve. Additionally, there is no evidence that the valves operate as intended. Guidance around face coverings does not necessarily apply to NIOSH-approved respirators.

What is OSHA's Position on Respiratory Protection during the public health emergency?

Employers should continue to utilize respiratory protection for identified workplace hazards as per the OSHA respiratory protection standard (29 CFR 1910.134). For certain workplaces where exposure to COVID-19 cannot be controlled through administrative controls, physical distancing, barriers and ventilation employers may need to utilize personal protective equipment for this purpose. This includes "respirators (N95 filtering facepiece respirators or better, including elastomeric respirators, without exhalation valves or vents), face shields, protective gowns and gloves, to the workers at no cost."[5]

OSHA does not ban the use of valved respirators for previously identified "workplace hazards".

What if there is still concern about valved filtering facepiece respirators and source control?

Although filtering facepiece respirators have been found to provide at least as much source control as face coverings[3], there is an available option for 3M 8511 and 8511P respirator wearers who are still concerned about source control. NIOSH approved the following 3M™ Multi Use Duct Tapes as accessories for the 8511 and 8511P respirators:

- Black (3920-BK, 3960-BK)
- Red (3920-RD, 3960-RD)
- White (3920-WH, 3960-WH)
- Blue (3920-BL)
- Brown (3920-BR)
- Green (3920-GR)
- Orange (3920-OR)
- Yellow (3920-YL)

The tape can be used to cover the exhalation valve from the inside of the 8511 and 8511P respirators. The inside must be covered but the outside can also be covered if a visual indication is desired. Refer to the FAQ and user instructions for more information on this application.

Resources

- Filtering Facepiece Respirators FAQ: Workplace (3m.com)
- Filtering Facepiece Respirators FAQ: General Public (3m.com)
- 3M™ 8511 Particulate Respirator and 3M™ Multi Use Duct Tape FAQ
- 3M™ Particulate Respirator 8511 with 3M™ Multi Use Duct Tape

References

1) Centers for Disease Control and Prevention. "Personal Protective Equipment: Questions and Answers." Updated April 9, 2021. Personal Protective Equipment: Questions and Answers | CDC

2) Centers for Disease Control and Prevention. "Respiratory Protection vs. Source Control – What's the difference?" https://blogs.cdc.gov/niosh-science-blog/2020/09/08/source-control/

3) NIOSH [2020]. Filtering facepiece respirators with an exhalation valve: measurements of filtration efficiency to evaluate their potential for source control. By Portnoff L, Schall J, Brannen J, Suhon N, Strickland K, Meyers J. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication No. 2021-107. DOI: https://doi.org/10.26616/NIOSHPUB2021107

4) Centers for Disease Control and Prevention. "Your Guide to Masks". Updated April 6, 2021. https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/about-face-coverings.html

5) Occupational Safety and Health Administration. “Protecting Workers: Guidance on Mitigating and Preventing the Spread of COVID-19 in the Workplace.” Protecting Workers: Guidance on Mitigating and Preventing the Spread of COVID-19 in the Workplace | Occupational Safety and Health Administration (osha.gov)

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