



WTP COVID-19 BRIEF

Workplace Respiratory Hazard Assessment: Preventing Inhalation of the SARS-CoV-2 Virus

This brief covers various precautions to protect workers from inhalation of the SARS-CoV-2 virus that causes COVID-19. It includes background information, a framework to assess occupational risk categories and select respiratory protective equipment, and recommendations for prevention and control.

Understanding Respiratory Hazards

A comprehensive review of inhalation risks is called a **respiratory hazard assessment**. Every workplace should conduct a respiratory hazard assessment to determine the level of exposure risk to SARS-CoV-2 and other inhalation hazards.

The SARS-CoV-2 virus may be transmitted by very small, microscopic particles suspended in the air. The smallest particles can remain suspended in the air for minutes to hours and transmit infection (Figure 1).

Some people with COVID-19 may be asymptomatic (no symptoms) or pre-symptomatic (infected but have not yet developed symptoms). Both asymptomatic and pre-symptomatic people can transmit the SARS-CoV-2 virus in workplaces. People may release respiratory droplets containing the virus when breathing, speaking, singing, exercising, coughing, and sneezing.¹

¹ Centers for Disease Control and Prevention (CDC). COVID-19. Scientific Brief: SARS-CoV-2 Transmission.

Breathing in infectious particles is an important way COVID-19 spreads from person-to-person

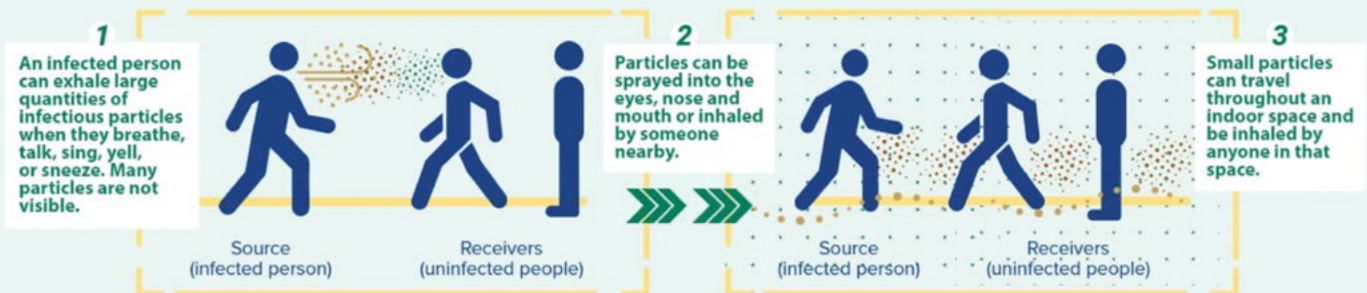


Figure 1. Image shows how COVID-19 can spread from person-to-person.

Source: COVID-19: The Virus in the Air Fact Sheet, American Conference of Governmental Industrial Hygienists.

There are several factors that may increase workers' risk of inhaling the virus, such as:

- The amount of time spent working near other people in enclosed spaces.
- The number of people working in an enclosed space.
- Whether the work is performed indoors or outdoors.
- The effectiveness of ventilation systems in filtering and replacing the air.

Using Respiratory Protection in the Workplace

Workers should wear a face covering as this helps reduce the risk of inhaling and spreading the SARS-CoV-2 virus. There is no standard approach to the selection and use of face coverings in most work settings, but it is important to note that all face coverings are not created equal. When selecting a face covering there are certain factors that can affect efficiency and performance, such as leakage, level of filtration, breathing resistance, and how tightly it fits to a person's face. Some examples of differences are illustrated in Figure 2.

Employers should not allow the use of masks or cloth face coverings as a replacement for respirators when they are needed. According to the [Occupational Safety and Health Administration \(OSHA\) Respiratory Protection Standard](#), medical clearance, training, and fit testing are essential for the effective use of respirators in the workplace. For employers who require workers to wear respirators, the standard requires development of a written respirator protection program. It is important that workers are provided with and wear the make, model, and size respirator they are fit tested for. If workers have issues getting a good fit or experience discomfort, employers are required to provide alternative respirator models and sizes to choose from.

The National Institute for Occupational Safety and Health (NIOSH) approves respirators (see the [NIOSH-approved list of respirators](#)). NIOSH also provides new performance recommendations for Workplace Performance and Workplace Performance Plus masks to improve source control and workplace safety when respirators are not required. The new manufacturing criteria adhere to the [ASTM Standard Specification for Barrier Face Coverings, F3502- 21](#).²

² ASTM International is a standards-setting organization that sets safety and quality standards for manufacturers.

Understanding Product Differences



Respirators

"3.1.8 *respirator, n*— Personal protective equipment (PPE) designed to protect the wearer from inhalation of hazardous atmospheres."



Medical Face Masks

"3.1.7 *medical face mask, n*—an item of protective clothing designed to protect portions of the wearer's face, including the mucous membrane areas of the wearer's nose and mouth, from contact with blood and other body fluids during medical procedures."



Barrier Face Coverings

"3.1.3 *barrier face covering, n*—a product worn on the face specifically covering at least the wearer's nose and mouth with the primary purpose of providing source control and to provide a degree of particulate filtration to reduce the amount of inhaled particulate matter."

Figure 2: Differences between types of face coverings – respirators, medical face masks, and barrier face coverings.
Source: [An Overview of Specification F3502-21 on Barrier Face Coverings](#), ASTM International.

Selecting Respiratory Protection Based on Occupational Activity Risk Categories

Risk categories for exposure to the SARS-CoV-2 virus are determined primarily based on whether a worker has close contact with people. Close contact is defined as contact within six feet for 15 minutes or more over a 24-hour period. The level of risk may also increase during times of accelerated community transmission. Table 1 describes the types of face coverings and respiratory protections that should be considered based on the occupational activity risk category.

Table 1: Respiratory Protection Based on Risk Category, Job Task, and Community Prevalence

Risk Category	Description	Minimum Respiratory Protection	Additional Considerations
Low risk	For jobs and tasks of 15 minutes or less over a 24-hour period and greater than six feet distance from a coworker or customer.	Face coverings other than respirators may be acceptable. NIOSH recommends barrier face coverings that conform to both the ASTM Standard Specification for Barrier Face Coverings (F3502-21) and the NIOSH workplace performance/performance plus masks. During periods of more highly transmissible SARS-CoV-2 variants, like Omicron, many experts recommend the use of respirators even for low-risk activities. ³	Centers for Disease Control and Prevention (CDC) COVID-19, Types of Masks and Respirators NIOSH Making Masks for the Workplace ASTM Standard Specification for Barrier Face Coverings, F3502-21 NIOSH Barrier Face Coverings and Workplace Performance/Performance Plus Masks
Close, prolonged activities with people suspected or known to be infected	For jobs and tasks that involve prolonged (greater than 15 minutes over a 24-hour period) or close contact (within six feet) with people suspected or known to be infected with SARS-CoV-2.	At least a filtering facepiece respirator (FFR) series N, P, R; 95, 99, 100 filters Select either: a) a disposable FFR or b) reusable half-face elastomeric respirator or Powered Air Purifying Respirator (PAPR)	OSHA Respiratory Protection Standard (29 CFR 1910.134) requires that they be equipped with a NIOSH-approved respirator and filter. Any filter series (N, R, or P) that is at least 95% effective may be used (e.g., N95 or P100). For additional information, see NIOSH-Approved Particulate Filtering Facepiece Respirators . Staff should also wear the appropriate eye protection such as protective eyewear, goggles, or a face shield as needed. ⁴ A reusable full-facepiece elastomeric respirator or PAPR may also be used, which would provide both respiratory and eye protection.
Accelerated community transmission and/or workplace outbreaks	For jobs and tasks performed during periods of accelerated community transmission or a workplace outbreak, extra precautions must be taken.	At least an FFR series N, P, R; 95, 99, 100 filters Select either: a) a disposable FFR or b) reusable half-face elastomeric respirator	To determine where increasing cases in the community are occurring, the CDC COVID Data Tracker is helpful. Depending on the prevalence of COVID-19 in the community, an N95 or higher-level respirator and eye protection are recommended for all employees who are potentially exposed.

³ CDC Morbidity and Mortality Weekly Report, Effectiveness of Face Mask or Respirator Use in Indoor Public settings for Prevention of SARS-CoV-2 Infection – California, February – December 2021, 71(6); 212-216.

⁴ OSHA Personal Protective Equipment Standard (29 CFR 1910.132) and NIOSH Eye Safety Infection Control.

Additional Recommendations to Protect Workers

Protecting workers from inhalation of SARS-CoV-2 virus and other infectious particles requires a combination of measures. The recommendations in this brief are most successful when the following protections are also in place:

- Staff are fully vaccinated and/or being tested for infection on a regular basis.
- Where possible, limit interactions between staff by enforcing physical distancing or limiting time spent together in break rooms, conference rooms, offices, etc.
- Identify job tasks, occupations, and departments where close contact among staff and other people can be reduced.
- Minimize and exclude contact with workers or people with known or suspected infection of the SARS-CoV-2 virus as much as possible.
- Assess and implement ventilation, filtration, and/or use of portable air cleaners as needed. (For more information, see [WTP COVID-19 Brief: Selection and Use of Portable Air Cleaners to Protect Workers from Exposure to SARS-CoV-2](#)).
- Use signage, written safety protocols, and training to ensure that workers are aware of the safety plan and how to comply with it.
- Require use of universal face coverings when indoors and on shared transportation.

- Use respiratory protection in compliance with the [OSHA Respiratory Protection Standard](#) when the risk assessment shows it is needed and when other measures are not adequate to prevent inhalation exposure.
- Implement flexible, non-punitive paid sick leave and supportive policies and practices to prevent and reduce transmission among employees.⁵
- Collaborate with local and state departments of health to identify if community infection rates impact these recommendations.



5 [CDC. COVID-19. Guidance for Businesses and Employers Responding to Coronavirus Disease 2019.](#)

RESOURCES

Resources to help workplaces conduct respiratory risk assessments and develop an effective respiratory protection program can be found in many places, including some of the following:

[American Conference of Governmental Industrial Hygienists \(ACGIH\) COVID-19 Fact Sheet: Workers Need Respirators](#)

[ACGIH Additional COVID-19 Resources and References](#)

[COVID-19 International Research Team](#)

[NIEHS Worker Training Program COVID-19 Resources](#)

[NIOSH Healthcare Respiratory Protection Resources](#)

[NIOSH Making Masks for the Workplace, New Performance Masks for Workplaces, Interim Guidance from NIOSH on New Masks Which Build Upon the ASTM International Standard for Face Coverings](#)

[OSHA Enforcement Guidance for Respiratory Protection and the N95 Shortage Due to the Coronavirus Disease 2019 \(COVID-19\) Pandemic](#)

[OSHA Respiratory Protection eTool](#)

[The National Academies of Sciences, Engineering, and Medicine: Frameworks for Protecting Workers and the Public from Inhalation Hazards](#)