

# Respiratory Hazards and The Right Protection



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By: Neil Webster, CSP, OHST, Contributor

# Respiratory Hazards in Construction Work

Construction can be a pretty dirty business. Over 2 million workers in the U.S. have regular exposure to dusty conditions at work. Approximately 90% of those 2 million are employed in the construction industry.

A commercial construction project subjects personnel to a wide variety of conditions, including noise, vibration, weather, uneven working surfaces and numerous respiratory hazards. Injury and illness data indicate a direct correlation between elongated work in the construction industry and future health-related issues for those that work in the trades.

Let's break up a typical interior building renovation project into two basic phases—demolition and new installation—and examine the general activities and variety of respiratory hazards that can be present in each phase.

## Demolition

During the demolition phase, trade workers can expect to be exposed to an abundance of airborne particulates that can occur during the breaking, crushing or chipping of existing

materials to make way for new materials. Common activities in a demolition project include:

- ▶ **Concrete removal:** concrete mixes contain large amount of quartz (silica) and limestone
- ▶ **Drywall removal:** gypsum exposure possible
- ▶ **Carpet removal:** carpet fibers and general dust accumulated in the carpet
- ▶ **Ceiling tile removal:** possible exposure to cellulose (The tops of ceiling tiles always contain dust, especially if the metal deck above has sprayed on fireproofing, which commonly contain slag wool and Portland cement.)
- ▶ **Steel removal using a torch:** lead fumes and other metal fumes
- ▶ **Insulation removal:** fiberglass and rockwool

## New Installation

The installation phase contains plenty of opportunities for exposure to airborne hazards. Typical activities in this phase include:

- ▶ **Cutting wood:** sawdust generation
- ▶ **Installing drywall:** gypsum dust

- ▶ **Sanding joint compound:** quartz, limestone, perlite dust
- ▶ **Daily housekeeping (sweeping):** general nuisance dust and whatever debris falls to the floor during installation activities
- ▶ **PVC Pipe installation (primer and solvent cement):** methyl ethyl ketone, acetone, cyclohexanone
- ▶ **Tile mastic:** limestone, quartz, volatile organic compounds (VOCs)
- ▶ **Metal pipe installation:** soldering fumes
- ▶ **Duct sealant:** VOCs
- ▶ **Latex (water-based) paint application using an airless sprayer:** polyvinyl acetate, titanium dioxide.

## How Much is Too Much?

As you can see, there are plenty of opportunities for personnel on the site to inhale a wide variety of contaminants throughout the entire project. How many industries have the potential for these constant respiratory exposures (and in different settings and constantly changing environments) to exist day after day, year after year?

OSHA lists an 8-hour, time-weighted average exposure limit of 15mg/m3 for total dust exposure to Particulates Not Otherwise Regulated (PNOR) and a respirable dust exposure limit of 5mg/m3. Many of the particulate exposures a trade worker would commonly be exposed to fall under this standard. Even so, samples for total dust and respirable dust are not commonly collected during construction work.

Of the data that is collected, it indicates that tradespersons in general have total dust exposure well below OSHA levels. We should keep in mind that the total dust and respirable dust exposure limits set by OSHA are decades old. Silica exposure, which causes silicosis, a serious health condition which causes premature death, has gained some traction in the last 20+ years—for good reason. However, daily exposure to dusty conditions, as found every day in the construction industry, is not healthy—especially considering the synergistic effect of particulate inhalation and cigarette smoking, which is still fairly prevalent in the construction industry.

**How to Reduce Risks**

So, what can be done? The use of wet methods during the demolition phase will absolutely reduce airborne particulate exposure for not just the demolition crew, but the entire work site. Using water or water mist to reduce airborne concentration of dusts is possible but not always feasible. Issues include lack of availability, constant cleanup, freezing or icy conditions in cold weather, etc.

The next best option, utilizing negative air pressure, also significantly reduces airborne particulates. Containing a demolition project to be able to produce an adequate negative pressure environment is also possible—but again, not always feasible, because of logistical issues around creating the necessary airflows for contaminate reduction.

Using vacuums instead of brooms only has limited applicability. That leaves most projects in the position of

combining an engineering control (such as water mist) with personal protective equipment (respiratory protection) to keep personnel safe.

The construction industry has struggled for many years with proper respiratory protection for the workforce. Complying with regulations is important, but gaining employee acceptance is everything. After being properly trained and fit-tested, if a tradesperson finds their respiratory protection to be uncomfortable; doesn't have the right look; or is extremely inconvenient, the likelihood that they will continue to wear that respirator falls dramatically.

The respirator of choice for the construction industry has been the N95 due to its light weight and availability. More important is the N95's high level of convenience due to its disposable nature. Case studies at workplaces that require moderate respirator use show the annual total cost of ownership (per wearer) for a disposable N95 mask is extremely high compared to the cost of re-usable, half-face air-purifying respirators fitted with HEPA cartridges. However, the culture of the construction industry leans towards the disposability of an N95, and that remains the standard.

The lack of availability of the N95 due to the COVID-19 pandemic has caused many tradespersons to wear inadequate or no respiratory protection. While half-face, air-purifying respirators with HEPA cartridges have been available during the pandemic, the overall culture of the construction industry does not support an instant change to re-usable respiratory protection.

Clouds of dust have been widely accepted as an effect of construction work. It's way past time to change the narrative. ■

*Neil Webster, CSP, OHST, is the EHS Manager for DPS Group, a full-service engineering and construction management firm that specializes in the Life Sciences industry.*



Case studies show the annual total cost of ownership (per wearer) for a disposable N95 mask is high compared to the cost of re-usable, half-face air-purifying respirators fitted with HEPA cartridges. (photo courtesy DPS Group)

# Get PAPRs and Accessories

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**Are you looking for PAPRs or accessories?** We have what you need. ILC Dover is fully stocked and promptly shipping orders for NIOSH-approved PAPR systems and accessories that will keep your team safe and protected from infectious diseases, including **COVID-19** and other airborne pathogens. Orders can be shipped in just 1-2 weeks!

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### Is it time to replace your PAPR parts?

Consult the checklist found at <https://www.ilcdover.com/wp-content/uploads/2018/03/ILC-Dover-PAPRs-Spares-Maintenance-Checklist.pdf> after each use to inspect your system for any signs of damage or wear that may affect performance of the respirator and reduce the degree of protection provided.

### Infectious Disease PAPRs

*ILC Dover offers a range of hoods and accessories designed to work with the ILC Dover Sentinel XL® blower system.*





photo courtesy ClearSpace

# Respiratory Protection: More Important than Ever

By: Barbara Nessinger, Editor-in-Chief

Here are some insights from these two experts in their respective fields.

**IHW:** What aspects of OSHA's fit-test standard do you see as most important right now? How is your company addressing the need to make employers and employees aware of its importance?

**Stephanie Lynch:** I think knowledge of its requirements and current exemptions, as they pertain to you and your industry, are most important right now. We offer educational webinars and blog posts, as well as email blasts to our customer base. We try to make sure our customers are up to date on the most current information for their respiratory protection program.

**Jon Imms:** The COVID pandemic has increased the need to ensure a facial seal for negative-pressure products. However, given the poor supply of negative-pressure products on the market, industry has been forced to use products other than those that they have been fit-tested on. As a result, OSHA has had to relax its requirements and allow the use of alternative products—without an annual fit test. ClearSpace is a Powered Air Purifying Respirator which is positive pressure. With a positive-pressure respirator, you reduce the risk of user contamination, even with a poor fit.

**IHW:** Have there been many conversations/discussions with your customers about the need to train employees on how to fit-test their respirators? If so, what kind of training has been put in place?

**Lynch:** Yes; we offer extensive training on the use of both the Quantifit and QuantiCheck, as well as guidance on compliance, to the best of our abilities.

**Imms:** The topic of correct fit is more prevalent than prior to the COVID-19 pandemic; however, ClearSpace has always placed a high level of importance on the training of respiratory products to ensure compliance with the particular nuances of the respiratory products being used. ClearSpace provides a number of avenues to achieve compliance, with online video-based training and face-to-face, live online training.

**IHW:** How can you help end-users with hazard assessment for their respirator needs—especially in light of keeping workers safe from COVID-19?



Use and maintenance of respirators is part of OSHA's Guidance on Preparing Workplaces for COVID-19. This includes fitting based on the hazard, as well as consistent and proper wearing of the respirator. (photo courtesy OHD, LLLP)

The COVID-19 pandemic has affected every aspect of daily life. This includes the reopening of workplaces around the country. State and local standards/regulations regarding COVID-19 are varied and, in some cases, difficult to enforce. Of the OSHA standards that will likely be referred to frequently, respiratory protection will be at the forefront.

*Industrial Hygiene in the Workplace* talked with two different companies currently dealing with the COVID-19 crisis about OSHA's respiratory fit-test standards and how this affects their businesses. Stephanie Lynch, Ph.D., is Product Manager for OHD, LLLP, a global company devoted to fit testing for respiratory PPE.

Jon Imms is Global Technical & Product Director for ClearSpace Technology, a maker of respirators with a specialty in "innovative and quality respirator design and manufacturing." Although the companies for which they work make different products, their customers have similar needs, and they both face the same challenges—especially in such unprecedented times as these.

**Imms:** All manufacturers have a responsibility to ensure that potential users of their products understand the benefits but also the limitations of their products. Not all purchasers of products make direct contact with the manufacturer, so any limitations regarding workplace hazards are clearly outlined in the various products' user manuals. Where possible, we work with the end-users of our products regarding the hazards in their particular workplaces to ensure that the appropriate product is selected; however, the responsibility for the selection of appropriate respiratory equipment ultimately lies with the end-user.

**Lynch:** Many of our employees have worked in respiratory protection for years, and we are always happy to assist any of our customers with an assessment of the respiratory protection they need for the hazards they face, [including] COVID-19.



CleanSpace's Powered Air Purifying Respirator is a positive-pressure respirator, helping to reduce the risk of user contamination. (photo courtesy CleanSpace)

### MAINTAINING & USING RESPIRATORS

The use and maintenance of respirators is also part of OSHA's Guidance on Preparing Workplaces for COVID-19. This includes fitting based on the hazard; consistent and proper wearing of the respirator; regular inspections, maintenance, replacement; and proper cleaning, storage and disposal, if needed.

#### We asked Stephanie and Jon if (and how) this might have changed how they approach the end-users of their PPE:

**Imms:** It hasn't changed for us. CleanSpace has always been focused on the correct use and maintenance of our products and provides a number of avenues to achieve compliance, again, with online, video-based training and face-to-face live online training.

**Lynch:** We don't offer PPE, but the respirator manufacturers we work with are promoting many novel approaches, such as the use of reusable elastomeric respirators in healthcare and qualitative testing for filtering facepiece/N95 respirators to allow for reuse.

#### IHW: What, if any, respirator maintenance, inspection and replacement protocols or programs have you seen with regard to staying in compliance? Does your company assist clients with such needs?

**Lynch:** OSHA 1910.134 App B-2 lays out how to comply, and your respirator manufacturer can also provide you with guidelines. We can help customers walk through how the OSHA standard applies to them and their situation.



OHD offers extensive training on the use of both the Quantifit and QuantiCheck fit-testing products, as well as guidance on compliance to its customers. (photo courtesy OHD, LLLP)

**Imms:** CleanSpace requires minimal maintenance. However, inspection and replacement of damaged or faulty product is essential to maintain respiratory protection compliance. CleanSpace provides clear guidance of the maintenance, inspection and replacement protocols via our user manuals and various training options.

### CLEANING, STORAGE AND RESPIRATORY PROGRAMS

Cleaning and storage of respirators and respiratory equipment is more important than ever. This is covered by OSHA 1910.134 App B-2, and most manufacturers offer respirator specific guidance.

The American National Standard Practices for Respiratory Protection also includes sections on employer and wearer responsibilities to ensure that accepted, approved practices are upheld with regard to respirator safety.

#### IHW: How can you aid customers in establishing and administering an acceptable respirator program?

**Lynch:** We provide and sponsor training and materials on respiratory protection and program administration. Most recently, we gave a webinar called "Safely (Re)Implementing your Respiratory Protection Program," and we sponsored a webinar on "Respiratory Protection Programs –Maintaining Your Program in Uncharted Waters." ■

## OSHA COVID-19 Violations Pass the \$3-Million Mark

Since the start of the coronavirus pandemic through Nov. 12, 2020, OSHA has issued 232 citations arising from inspections for violations relating to coronavirus, resulting in proposed penalties totaling \$3,148,452.

OSHA inspections have resulted in the agency citing employers for violations, including failures to:

- Implement a [written respiratory protection program](#);
- Provide a medical evaluation, respirator fit test, training on the proper use of a respirator and personal protective equipment;
- [Report](#) an injury, illness, or fatality;
- Record an injury or illness on OSHA [recordkeeping forms](#); and
- Comply with the [General Duty Clause](#) of the Occupational Safety and Health Act of 1970

OSHA has already announced citations relating to the coronavirus arising out of 203 inspections, which can be found at [dol.gov/newsroom](https://www.dol.gov/newsroom).

In addition to those inspections, [29 inspections](#) have resulted in coronavirus-related citations totaling \$296,919 from OSHA relating to one or more of the above violations from Nov. 6 to Nov. 12, 2020. ■

## OSHA Issues Guidance to Employers on Frequently Cited COVID-19 Standards

OSHA has issued [guidance](#) and an accompanying [one-pager](#) to help employers understand which standards are most frequently cited during coronavirus-related inspections. OSHA based these documents on data from citations issued, many of which were the result of complaints, referrals and fatalities in industries such as hospitals and health-care, nursing homes and long-term care facilities, and meat/poultry processing plants.

The one-pager and guidance document provide available resources that address the most frequently cited standards, including [Respiratory Protection](#), [Recording and Reporting Occupational Injuries and Illnesses](#), [Personal Protective Equipment](#) and the [General Duty Clause](#). The one-pager provides examples of requirements employers must follow, such as:

- Provide a medical evaluation before a worker is fit-tested or uses a respirator.
- Establish, implement, and update a written respiratory protection program with required worksite-specific procedures.

- Train workers to safely use respirators and/or other PPE in the workplace, and retrain workers about changes in the workplace that might make previous training obsolete.
- Store respirators and other PPE properly in a way to protect them from damage, contamination, and, where applicable, deformation of the facepiece and exhalation valve.
- Keep required records of work-related fatalities, injuries, and illness.

OSHA is providing the guidance to help employers protect workers and increase compliance with OSHA requirements.

OSHA's [On-Site Consultation Program](#) offers no-cost and confidential occupational safety and health services to small- and medium-sized businesses to identify workplace hazards, provides advice for compliance with OSHA standards, and assists in establishing and improving safety and health programs. On-Site Consultation services are separate from enforcement and do not result in penalties or citations. ■



# Welding Respiratory Protection in the Workplace

By: **Emily Janssen**, Marketing Specialist, Welding Accessories and Cutting Division

Respiratory protection in the workplace is essential to maintain a comfortable, productive and compliant work environment. Miller Electric, an Appleton, Wisconsin based company, specializes in welding products and focuses on innovative safety solutions that are made to protect the welder behind the hood and the environment in which they perform their job.

Choosing which type of respiratory protection based on the workers' needs and specific welding environment is critical. It's important to consult an industrial hygienist and follow OSHA's Hierarchy of Controls when making this decision. Read below to learn more about the advanced solution-focused products that Miller® offers to meet the crucial needs for welding safety and health.

## Half Mask Respirators

Miller LPR-100™ Series Half Mask Respirators provide up to 99.97% filtration of airborne particles and aerosols, both non-oil- and oil-based. These respirators are reusable with available replacement filters and are designed to fit comfortably under most welding helmets, maximizing the welder's field of vision.

Other features include:

- Large, non-return exhaust valve reduces heat buildup and user fatigue
- Wrap-around spark guard protects filter from spatter and other debris
- Four-point head strap adjustments with integrated comfort cushion provide a customized and comfortable fit
- Odor-free, non-allergenic latex and silicone free, made from medical grade materials

## Powered Air Purifying Respirators

Miller Powered Air Purifying Respirators are compatible with a Miller® T94-R™ or T94i-R™ industrial welding helmet and are designed for optimal comfort and visibility so the welder keeps their system on throughout long work days, increasing arc-on time and maintaining compliance. PAPRs have an exclusive Dualtec™ manifold system to customize helmet airflow with a six-point air distribution to maximize cooling through targeted air placement, providing heat stress relief. Each PAPR comes with two lightweight lithium-ion batteries that hold up to 8 hours of charge, eliminating the need to frequently switch out or recharge.

Other PAPR System features include:

- Integrated shoulder straps distribute system weight to alleviate lower back strain and fatigue
- Low-profile breathing-tube attachment eases on/off processes while flexible tube material eliminates snags in work cell
- Audible and vibrating alarms to notify users in noisy environments of low battery due to reduced airflow

## Supplied Air Respirators

Miller Supplied Air Respirators are compatible with a Miller® T94i-R™ helmet assembly and comes with a C50 air regulator to supply Grade D breathing air as cool as 50 degrees Fahrenheit under the hood, heightening productivity and relieving heat stress. Note: Performance under different applications may vary.



Miller® LPR-100™ with Weld-Mask™ 2

Other SAR System features include:

- 360-degree swivel air hose connection alleviates hose coiling, reducing potential trip hazards
- Dualtec™ manifold system optimizes helmet balance and sound
- Six-point air distribution system maximizes cooling through targeted air placement

- Air regulator can be positioned horizontally or vertically to naturally align with body movements

### FILTAIR® Fume Extraction

Miller FILTAIR® fume extractors are designed specifically for welding – drawing weld fumes away from the welder’s breathing zone and keeping your facility clean. Miller offers many types of fume extraction equipment – like our FILTAIR 130 Portable system, MWX, SWX, Capture 5 and Centralized systems – to best fit your environment and fume control needs.

### Maximizing Respiratory Solutions

In addition to selecting the best respiratory solution for the application and environment, welding training is also important to establish and maintain successful respiratory management practices and compliance. It’s critical that employees understand proper respirator use and care to maximize the benefits these solutions can provide toward a cleaner and safer work environment.

### Ordering Information

For further information on Miller® respiratory protection solutions, please visit [MillerWelds.com](http://MillerWelds.com). To place an order, contact a local Miller distributor and discover how you can keep your employees comfortable, productive and compliant. ■



Miller® Supplied Air Respirator (left); Miller® Powered Air Purifying Respirator (right)

## Industry News & Trends at Your Fingertips

[www.industrialhygienepub.com](http://www.industrialhygienepub.com)

Updated daily, Industrial Hygiene in the Workplace’s news ticker is a fast-track to pertinent, continually evolving news and facts about COVID-19, Respiratory Compliance, Dust/Fume Control, Environmental Issues and much more! Our daily Industry News helps readers stay informed on what matters most to them—all in one place.



Miller® Welding Safety & Health

# ZoneFlow™ Fume Extraction Technology

## 5-Foot Capture Zone

Designed specifically for welding, ZoneFlow™ Technology captures weld fume up to five-feet from the arc compared to traditional systems that require the hood to be placed within 18 inches from the arc for effective fume capture.

With a capture zone that's up to three times larger, welders can significantly reduce arm interactions, increase arc-on time and boost productivity.

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Learn more at [MillerWelds.com/ZoneFlow](https://www.millerwelds.com/ZoneFlow)



# Safely Return to the Workplace with the Right Respiratory Protection

By: Lynn Feiner, Contributor

COVID-19 isn't going away anytime soon, and we are all adjusting to our "new normal." In this environment, the dangers don't discriminate by job or destination. Respiratory protection products that were once designed for certain workers, like clinicians, first responders, construction and manufacturing employees, are now essential for everyone.

Although face masks can now seem routine, some jobs require specific face masks or respirators, and these come with detailed donning and removal instructions. If we know and understand the proper ways to don and remove face masks and respirators, we are taking the first step to being more confident in our safer return to work and public spaces.

In this article, we are focusing on donning and removing techniques for a face mask, dual-layer face cover, disposable face shield, N95 disposable respirator and half facepiece respirator. It is important to note that some employers will have a written respiratory program, and it should include evaluation, training and fit-testing. Workers should have the opportunity to handle the disposable face shield or respirator; learn how to inspect it; don and remove it; have it properly fitted; and wear it in an uncontaminated environment.

These donning and removing techniques are only meant as a general guide and will differ with specific products. If you have questions, we recommend checking with your supervisor; reviewing the written respiratory program your employer may have in place; and checking OSHA or CDC guidelines.

## Face Mask

There are two versions of face masks: a mask with one or two elastic headbands and a mask with elastic bands that loop over the ears. When donning the face mask, users should follow these steps:

- If using a face mask with one or two elastic straps:
  - If two straps, pull the lower strap over the head and position around the neck.
  - Pull the top or single strap over the head and position so it is on the crown (top) of your head.
  - If provided, fit the flexible band on the nose bridge by pressing down so that it conforms to the shape of your nose.
  - Lastly, users should ensure that the mask is snug to the face and covers the chin.
  - To remove, pull the top strap off first and then the lower straps.
- If using a face mask with ear loops:
  - Secure the loops behind each ear.
  - If provided, fit the flexible band on the nose bridge by pressing down so that it conforms to the shape of your nose.
  - To remove, lift both the ear loops off the ears at the same time and then gently remove the mask from the face.

## Dual-Layer Face Cover

For some, returning to work will require wearing a face mask for longer periods of time. Honeywell has created a dual-layer face cover made of a washable fabric that features a hidden pocket allowing the wearer to easily remove and replace a disposable filter.<sup>1</sup> They can be used by consumers in public settings where social distancing measures are difficult to maintain, in accordance with CDC guidelines.

The face covering's base layer features seamless, three-dimensional knit construction using polyester, nylon and cotton that provides four-way stretch, minimizing gaps and enhancing comfort. It has a contoured design with adjustable ear loops and an adjustable nose clip for enhanced comfort, function and breathability for most adult face shapes and sizes. The face



Respiratory protection products that were once designed for certain workers, like clinicians, first responders, construction and manufacturing employees, are now essential for everyone. (photo courtesy Honeywell)

cover can block up to 95% of 3-micron-sized particles and 0.1-micron-sized particles when appropriately fitted.

When donning the dual-layer face cover, users should follow these steps:

- Start by removing a filter from the wrapper, unfold the filter and gently pull both sides to open.
- Locate the right (R) and left (L) labels on the filter wings and align the "R" and "L" bands on the inside of the face cover and slip each side under the band.
- Next, hold the face cover under the chin with the nosepiece facing outwards.
- Place one ear loop over the earlobe.
- Holding the face cover against the face with one hand, use the other hand to place the second ear loop over the other earlobe.
- Adjust tension and fit of the ear loops by sliding the bead on each side forward to tighten or sliding back to loosen.
- Mold the nose area to the shape of the face by running fingertips of both hands from the top of the nose piece down both sides while pressing inward.

<sup>1</sup> Note: Not FDA approved and not intended for medical use.

To remove the dual-layer face cover:

- While holding the dual-layer face cover in one hand, use the other hand to remove each ear loop by lifting over earlobes one at a time, then lift and remove from the face.
- Remove the single use filter and dispose of properly. To safely discard the used filter, place it in a plastic bag and put it in the trash.
- Place the face cover in washing machine to clean.

### Disposable Face Shield

For those that want to add a secondary layer of protection, they can utilize a disposable face shield. The disposable face shield complies with U.S. government regulations for optical performance, splash and droplets, and includes an anti-fog coating to minimize fogging and visibility issues.<sup>2,3</sup>

The shield is designed to provide large coverage over the face and has an elastic band for extra comfort and near-universal fit.

When donning a disposable face shield, you should follow these steps:

- Make sure that the strap is pre-inserted through loop #1.
- Slide the strap downwards through loop #2 and pull to tighten the strap.
- Slide the strap upwards through loop #3 and pull tight to complete.
- Next, bending forward, hold on to the face shield with both hands and expand the elastic with your thumbs and place the strap behind your head, so that the foam rests on your forehead.
- Once the shield is situated, check to make sure it covers the front and sides of the face and no areas are left uncovered.

To remove, one should hold the face shield with his or her dominant hand to maintain its position on the face. Then pull the strap over the head, and while still holding the face shield in one hand, lift and remove the face shield.

### N95 Disposable Respirator

N95 respirators are tight-fitting respirators that filter out at least 95% of particles in the air. Particle sizes vary tremendously,

and N95 respirators are tested by NIOSH to the most penetrating size particle, which is 0.075 microns,  $\pm 0.02$ . Honeywell's DC301N95 respirator has not been tested or certified against any pathogens or viruses such as COVID-19. When properly fitted and worn, minimal leakage occurs around the edges of the respirator when the user inhales. When donning the Honeywell DC301N95 molded cup disposable respirator, you should follow these steps:

- First, hold the respirator in the palm of your hand with straps facing towards the floor.

- Next, hold the respirator under the chin with the nosepiece facing outwards.
- Then pull the lower head strap around the neck below the ears and while holding the respirator in against the face with one hand, place the upper strap above the ears around the crown of the head
- Place your hands on each side of the respirator and move slightly right, left, up and down, to adjust the position of the respirator and achieve the most optimal fit on the face
- Mold the nose clip over your cheeks and bridge of the nose to obtain a tight seal.

## CHOOSING DUST MONITORING EQUIPMENT: A DELICATE BALANCE

Industrial operators know prolonged exposure to the fine dust particles generated by either construction or industrial operations can be hazardous to human health, contributing to both lung and cardiovascular disease. To prevent harmful effects on workers (and, sometimes, people in surrounding communities), operators are required to measure the concentration of airborne pollutants or particulates generated in order to ensure that the levels of pollutants stay within required concentrations. To do this, an air-quality monitoring program is required and should be one that best meets cost and accuracy requirements.

When determining which dust-monitoring equipment or dust gauges to use, it's helpful to consider the methods used to measure dust and which one best meets your needs. The two methods used to measure particulate matter (such as PM10, PM2.5, PM1 and TSP) are a filter-based gravimetric method and a real-time method.

Gravimetric instruments (also known as reference instruments) use a quantitative measure based on the mass of the solid. The instruments collect particles on ventilated filters. The filters then need to be processed at a laboratory to determine the concentration of the particulate or pollutant. Although the gravimetric method is typically the most accurate option, it is the costliest and requires daily or weekly manual filter weighing and lab analysis.

Real-time monitors, a.k.a. optical monitors, use the principles of light scattering or light absorption. By sensing the light reflected by a particle stream onto a photodetector, this equipment can calibrate the concentration of particulate mass. These monitors can be more affordable than gravimetric instruments, as the optical sensors they utilize less costly and can be purchased as an all-inclusive, fully-integrated station—complete with internal data-logging, communication capability and a power supply. ■



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<sup>2</sup> Note: The disposable face shield complies with ANSI/ISEA Z87.1-2015 Clause 8.1.2 droplet & splash hazard-face shields for U.S. and with EN 166:2001 Clause 7.2.4 protection against droplets & splashes of liquids for E.U.

<sup>3</sup> Note: The disposable face shield is FDA Registered

For some, returning to work will require wearing a face mask for longer periods of time. This dual-layer face cover is made of a washable fabric and features a hidden pocket, allowing the wearer to easily remove and replace a disposable filter. (photo courtesy Honeywell)

or cartridge onto the cartridge connectors in the facepiece.

To don the half facepiece respirator, follow the steps outlined in the manufacturer's user instructions for the respirator you will be wearing. The following steps are a general guide:

- Perform a user seal-check to ensure a good fit:
  1. Place both hands over the respirator—do not disturb the position of the respirator.
  2. Exhale sharply. A positive pressure should be felt inside the respirator.
  3. If you detect air leaking in readjust the respirator by:
    - a. applying additional pressure on the nose clip to achieve a secure seal on the nose;
    - b. adjusting the position of the respirator on your face; and/or
    - c. adjusting the position of the head straps.
- To remove the N95, you should hold the respirator with your dominant hand to maintain its position on the face. Then pull the top strap over the head, followed by the bottom strap and, while still holding the respirator in one hand, lift and remove the mask.

### Half-Mask Respirators

Workers in industrial settings may need to wear a half facepiece respirator designed to minimize breathing of airborne contaminants. Users should always inspect a half facepiece respirator before each use. If any parts are missing or damaged, replace those parts or the entire facepiece. If you are using a replaceable pad style filter, make sure the pad filter is in the filter holder and facing the correct direction. Then thread the filter assemblies onto the cartridge connectors. If you are not using pad filters, but using P100 filters or filter cartridge combination instead, simply thread the filter

- Adjust the upper and lower head straps to their full outward position.
- With one hand holding the respirator, place chin inside the chin cup and the top of the respirator over the nose.
- With the other hand, position the cradle suspension on the center of your head. Remove any slack in the upper straps by pulling the two end tabs back and towards the ears.
- Fasten the bottom straps behind the neck, making sure it is under any hair. Remove any slack in the bottom straps by pulling the end tabs back towards the front.
- Next, tighten the upper head straps in small, equal increments to ensure the top half of the respirator is tightened evenly and centered on the face.
- Then tighten the lower head straps by pulling evenly on the end straps in the back of the respirator until the entire respirator is snug, comfortable and centered on your face.

Once the facepiece is in position, perform a user seal-check to ensure the mask is in good working order.

To perform a positive pressure seal-check, place the palm of your hand over the exhalation valve, so it is completely sealed

and exhale gently. If there is a good seal, the facepiece will be pushed away from your face very slightly. To perform the negative pressure seal-check, place the palm of each hand over the two filters, so they are completely sealed, and inhale. Hold your breath for five seconds. If there is a good seal, the facepiece will be pulled inward toward your face.

To remove the respirator, simply unfasten the bottom straps and then loosen the upper straps. Use one hand to hold the facepiece and lift the mask off.

Although we cannot cover instructions for all respiratory protection, this article covers a few types that may be used more frequently as we return to work.

### Conclusion

Honeywell is working to implement solutions that help provide a safer and healthier way for people to return to work, school and public spaces. Having the right respiratory protection and knowing how to properly wear it allows us to adapt to our new normal, get back to work and start reshaping the future as we know it. ■



*Lynn Feiner is Sr. Offering Manager for Air-Purifying and SCBA Respiratory Protection at Honeywell.*

### Additional Links & Resources:

- » <https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/cloth-face-cover-guidance.html>
- » <https://www.osha.gov/SLTC/respiratoryprotection/>
- » <https://www.honeywell.com/en-us/shop/safety>
- » <https://safety.honeywell.com/en-us/products/by-category/head-eye-face-protection/face-shields/honeywell-disposable-face-shield>
- » <https://safety.honeywell.com/en-us/products/by-category/respiratory-protection/disposable-respirators/one-fit-molded-cup-niosh>
- » [https://www.honeywellsafety.com/Products/Respiratory\\_Protection/Honeywell\\_North\\_HM500\\_Series\\_Half\\_Mask.aspx?site=/europe](https://www.honeywellsafety.com/Products/Respiratory_Protection/Honeywell_North_HM500_Series_Half_Mask.aspx?site=/europe)

# Five Things to Know for an Effective Written Respiratory Program

By: Robin Regan, Contributor

Whether you work in construction, chemical/pharmaceuticals, healthcare or confined spaces, the risk of exposure to respiratory hazards is inevitable. Just because it's not always visible, protection against these hazards is more than a nuisance—exposure to dust, gases and vapors can lead to serious, life-threatening diseases.

There is no “one-mask-fits-all” approach to respiratory protection, but sometimes, safety professionals have trouble identifying the best solution for their exact environment. If you're in the process of reviewing your respiratory program or starting from scratch, here are five things to consider in respiratory PPE selection.

## 1. Written respiratory programs are OSHA-required

Per OSHA standards, if respirators are being used in the workplace, a written program addressing all onsite respiratory hazards is mandatory. This program should be adaptable and fluid to accommodate any changes that may arise. These written programs need to be site-specific and designed to address their unique set of problems and solutions. They must be reviewed at least annually, and if changes are presented from a new contaminant/concentration or a new engineering control.

## 2. Focus on contaminant concentration to select the right respirator

When selecting a respirator, focus on identifying the hazard and the specific contaminant at hand. Respirators are frequently recommended strictly by the work being done or the contaminant present—but it is the concentration that matters most.

For example, most workers exposed to [respirable crystalline silica](#) use an N95 disposable respirator. These types of respirators are tested and certified to protect workers up to 500mcg

of silica per cubic meter, which is 10 times the permissible exposure limit set by OSHA.

However, if a worker is exposed to an environment with 1,000mcg of silica per cubic meter, they risk developing silicosis or other life-threatening illnesses. Even if an N95 disposable respirator is the solution at hand, in this situation, it would not be enough protection for that concentration. Instead, this worker would be best protected by a full-face respirator with a quantitative fit-test or a powered air-purifying respirator (PAPR).

## 3. Medical evaluations and fit-testing are mandatory before worker usage

Prior to selecting a respirator, workers must complete a medical evaluation to ensure they can safely use it. For most applications, this is done for every new hire. Certain contaminants, such as respirable crystalline silica, may require more frequent medical evaluations. These evaluations can often be done without leaving the workplace, by simply completing an online questionnaire. Contaminant-specific medical evaluations are typically done in person, as they may involve chest x-rays, pulmonary function tests and more.

Once a worker is medically cleared to wear a respirator, they must be fit-tested to determine that the respirator fits properly against their face. A correctly worn respirator will be completely sealed around the nose, cheeks and chin to ensure contaminants cannot enter through gaps or breaks in the seal.

A seal check needs to be conducted every time a tight-fitting respirator is put on, and any additional fit-testing is required annually and when the respiratory model or size changes.

Remember, facial hair can influence fit and can compromise the seal of a tight-fitting respirator. This does include disposable respirators,

despite dangerous myths that disposable respirators do not require fit-testing. OSHA states that the entire sealing surface must be clear of facial hair, and new growth of facial hair may not exceed one day. However, the same is not true for loose-fitting hoods and helmets. They can be used with facial hair, because they utilize positive pressure and do not seal directly against the face.

## 4. Training and on-going education promotes effective usage

It's one thing to have the right respirator, but full protection is not achieved when workers aren't using the equipment correctly. On-going training and continued education on PPE helps workers and safety managers determine why, when and where to use respiratory protection. It also helps to define where there are respirator limitations; inspection needs; and to define a filter/cartridge change-out schedule.

We've established that N95 respirators, for instance, need to be fit-tested before use. People not only need to be medically evaluated; they also need to be effectively trained to ensure they understand how to put them on, as well as their protective limitations.

## 5. Ensure proper care and use of respirators—both routine and emergency use

Beyond knowing which respiratory protection to use and how to use it, it's equally as important to properly care for it. Proper storage, routine cleaning (if required) and adhering to suggested life of masks and cartridges is important. If the respirator gets damaged or soiled, workers need to leave the work area and inform supervisors about the issue immediately.

## Conclusion

In 2018, the fourth-most cited OSHA standard was the Respiratory Protection



Protection against respiratory hazards is more than a nuisance—exposure to dust, gases and vapors can lead to serious, life-threatening diseases. (photo courtesy Honeywell Industrial Safety)

Standard:1910.134. Only by selecting the correct respirator; having an updated written respiratory program; ensuring that medical evaluations and fit-testing are completed; and ensuring the equipment is cared for properly for all workers can we effectively protect workers against respiratory hazards in their work environments. ■

*Robin Regan is Product Sales Manager for Respiratory Protection at Honeywell Industrial Safety. Honeywell offers respiratory protection for any environment, from disposables; air and powered air purifying respirators (APR and PAPR); and a full range of cartridges, filters and other accessories to air-supplied systems and self-contained breathing apparatuses (SCBA). Learn more at <https://safety.honeywell.com/en-us/products/by-category/respiratory-protection>*

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