

**Industrial
Hygiene**
in the **Workplace**

Combustible Dust & Respiratory Protection

SPONSORED BY:





Contents

Fit Testing: More Than Size and Fit	3
Reusable Half-Mask Respirators.....	6
Respiratory Protection Program Management & Fit-Testing Update ..	8
Compliance Meets Comfort with Innovative Respiratory Solutions...	9
Breathe Easy: A 10-Step Respiratory Protection Training Plan	12
Respirators Aren't Going Anywhere	14
Upgrade Respiratory Protection—Now!	16
Respiratory Protection for Unsurpassed Safety and Productivity ...	18
Maximize Safety When Working With Combustible Dust	20
Technological advances in dust monitoring equipment: Protecting your workforce's health keeps getting easier.	22
Combustible Dust Explosions: Are You at Risk?.....	24





Fit Testing: More Than Size and Fit

Awareness of Respirator Fit Testing or Face Fit Testing has increased over the years due to an expansion in regulation globally and from impacts of the global pandemic. Many times, the focus is strictly on two of the benefits, sizing the respirator and confirming the fit of the respirator. These are both very important aspects as the correct size and fit is critical in the protection provided by the respiratory protective equipment (RPE), but there are several other important benefits from fit testing that are often overlooked. Two critical aspects are respirator integrity and confirmed proper donning of the respiratory protection which each have their own effect on the given protection.

The standard that drives the requirements for RPE and its proper use for the U.S. market is OSHA CFR 1910.134 held within 1910 Subpart I Personal Protective Equipment. The standard notes that “A respirator shall be provided to each employee when such equipment is necessary to protect the health of such employee. The employer shall provide the respirators which are applicable and suitable for the purpose intended. The employer shall be responsible for the establishment and maintenance of a respiratory protection program, which shall include the requirements outlined in paragraph (c) of this section. The program shall cover each employee required by this section to use a respirator.” When a respirator is issued, fit testing is required before the initial use as stated in section 1910.134(f) “Fit testing. This paragraph requires that, before an employee may be required to use any respirator with a negative or positive pressure tight-fitting facepiece, the employee must be fit tested with the same make, model, style, and size of respirator that will be used. This paragraph specifies the kinds of



fit tests allowed the procedures for conducting them, and how the results of the fit tests must be used”. Fit Testing is also required to be performed at least annually or if there is a change to the respirator used (size, style, model or make) (1910.134(f)(2) or if there are changes in an employee’s physical condition, weight changes etc. 1910.134(f)(3).

The sections of the OSHA standard 1910.134 that follow, include requirements such as Maintenance and care of respirators, Cleaning and disinfecting, Inspection and Repair. OHD’s customer base performs hundreds of thousands of fit tests annually across a diverse makeup of industries. It is unfortunately true that most respirators are rarely inspected or repaired, and this is especially true in Industrial market segments. Why is this important? Although size and fit are important, the integrity and functionality of the respiratory protection is critical to the performance and protection achieved as noted not only by OSHA but by respirator

manufacturers. If there are integrity issues from missed inspections or repairs, the RPE will not protect the employee to the designed level, ultimately reducing or eliminating the individual importance of the size and fit aspects.

A Quantitative fit test, utilizing an accurate technology such as Controlled Negative Pressure (CNP) used within the **OHD QuantiFit2®**, will identify respirator integrity issues as well as confirming the size and fit of the respirator. This elevates the importance of a fit test from size and fit to a RPE testing process. Identifying faults and required repairs ultimately boosts a company's respiratory protection program. One real world example of this dynamic was demonstrated

within a company who upgraded their fit testing program to CNP. As the company performed CNP fit testing on employees and their issued respirators, failures began to occur. After initial failure troubleshooting proved that the testing was being conducted correctly, the company began inspecting the respirators. Ultimately this led the company to identify faulty parts, dirty components, and integrity issues with the failing respirators. CNP fit testing enhanced the program, propelling the company to repair or replace these respirators with confirmed fully functional respirators.

Without an accurate fit testing system these issues could go unnoticed as they had in the years prior, which lead to a

reduction of the protection of the health and safety of the employee. That threat of reduced health and safety is what we are all working to eliminate, and through accurate fit testing this can become a more achievable future.

One other key aspect is the use of the employee's assigned or personally issued respirator in fit testing. Companies that use surrogate respirators for fit testing lose the important aspect of testing the assigned respirator to identify any faults or integrity issues. OHD highly recommends testing in assigned respirators that are used in the field wherever possible.

Donning and training is another key benefit that is often overlooked with respect to fit testing. OSHA requires that all RPE be issued with training before first use and at least annually 1910.134(k). One of the best ways to confirm that an employee knows how to properly don, doff, tighten, adjust, and properly wear the respirator is through the initial fit test and repeated annual fit test. If respiratory protection is not donned properly, the value of size and fit is greatly reduced as is the protection of the employee. One benefit of the REDON protocol, exclusivity accepted for CNP and used within the QuantiFit2®, is that the employee is required to don and reproduce this donning multiple times throughout the fit testing process on at least an annual basis. Alongside a company's training program, fit testing with an accurate technology confirms that the training is not just an exercise but that the employee can retain that information as well as execute it with an accurate donning, achieving a good fit.

Use your fit testing to not only achieve excellence in sizing and fit but also to achieve the additional benefits of donning and integrity checks of the RPE selected to protect your most important asset, your employees.

[Learn more about the QuantiFit2 Here!](#) ■



OSHA compliant!



QuantiFit2[®]

Removing the Limits of Respirator Fit Testing

The OHD QuantiFit2 is a highly specialized instrument that utilizes OHD's scientifically proven and patented Controlled Negative Pressure (CNP) technology to directly measure respirator leakage. This innovative technology performs the fastest, easiest, and most precise respirator fit test available, ensuring the best protection and fit for you and your employees.

Take your fit testing to new places, even outside.

Key Features:

- No Consumables (Probes, Alcohol, Wicks, etc.)
- 2 Minute Fit Test
- AutoStart Functionality
- Battery Power (Optional)
- Test Countless Individuals Simultaneously
- *Recognized Globally (OSHA, CSA, HSE, ISO, NFPA)*
- Lifetime Powertrain Warranty

To request additional information visit us at QuantiFit2.com

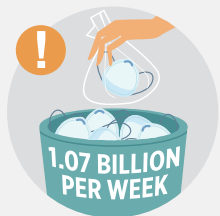


REUSABLE HALF-MASK RESPIRATORS

While disposable masks serve an important role across many industries and various settings to help keep workers safe, they can also present several challenges, especially when it comes to sustainability. While this has long been the case, the COVID-19 pandemic only accelerated the trend to create more waste.

In fact, at the height of the COVID-19 pandemic, the United States generated an entire year's worth of medical waste in only two months.¹

CHALLENGES WITH USING DISPOSABLE RESPIRATORS



An estimated **1.07 billion** maximum number of disposable face masks were **thrown away per week** in the U.S. at the height of the COVID-19 pandemic.²



The CDC recommends **reusing one N95** a maximum number of **5 times**.³



The **average shelf life** for disposable N95 respirators is **3-5 years**.⁴

REUSABLE HALF-MASK RESPIRATORS CAN HELP



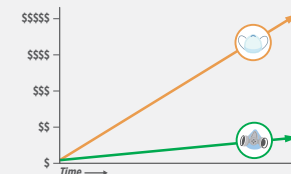
SUSTAINABLE

Designed to be repeatedly cleaned, disinfected, and placed back into service, helping to eliminate unnecessary waste.



EXTENDED STORAGE LIFE

Respirators can be stored indefinitely for stockpile purposes. Respirator filters have proven storage time of 10 years.



COST-EFFECTIVE

A comparative cost analysis found reusable elastomeric respirators to be less costly to stockpile than disposable masks.⁶

The MSA Advantage® 900 half-mask respirator is an effective solution that provides healthcare professionals and other essential workers with secure respiratory protection. With the elimination of the exhalation valve and addition of the speaking diaphragm, it allows for clearer communication between the wearer and others and is suitable for use when sterile environments are needed. Learn more at msasafety.com/advantage900



MSA ADVANTAGE® 900 HALF-MASK RESPIRATOR

The first NIOSH-approved elastomeric respirator with both a speaking diaphragm and no exhalation valve, the Advantage 900 helps to clarify and amplify speech for improved communication between the wearer and others, while also filtering exhaled breath to help reduce the likelihood of contaminating the surrounding area.

Learn more at [MSAsafety.com](https://www.MSAsafety.com)

MSA
The Safety Company

By: Rob Brauch, COHC, Contributor

Respiratory Protection Program Management & Fit-Testing Update

Let's start with the obvious—the worldwide response against COVID-19 has impacted just about every facet of our daily lives.

At first, there was conflicting information about how the disease was passed from person-to-person and what the death tally might become if the disease was left unchecked. Meanwhile, governments and the medical community were trying to find ways to better treat those affected and decrease mortality rates.

From the onset of COVID, the reassuring voice of the industrial hygiene community was there as a crucial resource of rational, science-based guidance, combined with known best practices for controlling the spread of biohazards and pathogens. As it became clear that the virus was spread primarily through the air, it was also recognized that there are proven ways to protect oneself by utilizing protective equipment already found in the workplace.

PPE, such as tight-fitting respirators, became a major focus of attention. Frontline workers and first responders in healthcare and public services needed well-functioning PPE to mitigate exposure. Yet, the global market was being inundated with PPE of all types that were arguably shoddy at best (and outright counterfeit at worst), due to demand that far outstripped supply.

The U.S. saw Emergency Use Authorizations from the FDA; Temporary Enforcement Guidance documents from DOL/OSHA; and many advisements from CDC and others in government and academia regarding things like use of non-NIOSH-approved respirators with lower protection ratings, possible decontamination and reuse of N95s, etc. Suddenly, it all got very complicated.

Proper Use of PPE

Availability and proper use of PPE for respiratory protection is essential for slowing the spread of the virus to workers. Methods for ensuring proper fit and function of respirators have been around for many years, but the massive increase in individuals wearing PPE sheds new light on how they get selected and fit-tested. Some healthcare facilities moved from qualitative fit-test methods to quantitative, due to concerns about loss of taste and smell from COVID infection and to increase the number of workers who could be fitted on any given day.

The healthcare industry was exempted from part of OSHA's Respiratory Protection Program requiring annual fit-testing, after the Wicker Amendment passed in 2005, although that was repealed not long after. During COVID, OSHA temporarily suspended the annual fit-test requirement on March 14, 2020. On the surface, this was done to cut down the number of individual N95s used up during testing (i.e., probe-inserted, not usable) or perhaps time taken to do qualitative fit-testing (OSHA's 2019 RFT protocol using particle counting devices takes 2.5 minutes).

Effective June 21, 2021, OSHA issued a "COVID-19 Healthcare Emergency Temporary Standard," with a "mini respiratory protection program" component (29 CFR 1910.504). Per OSHA: "It applies only to specific circumstances specified under the ETS, generally when workers are not exposed to suspected or confirmed sources of COVID-19 but where respirator use could offer enhanced worker protection. The mini respiratory protection program does not replace or substitute for OSHA's normal Respiratory Protection standard (29 CFR 1910.134)."

The mini program does away with the Medical Evaluation, Fit Testing and Written Program requirements of 29 CFR 1910.134.

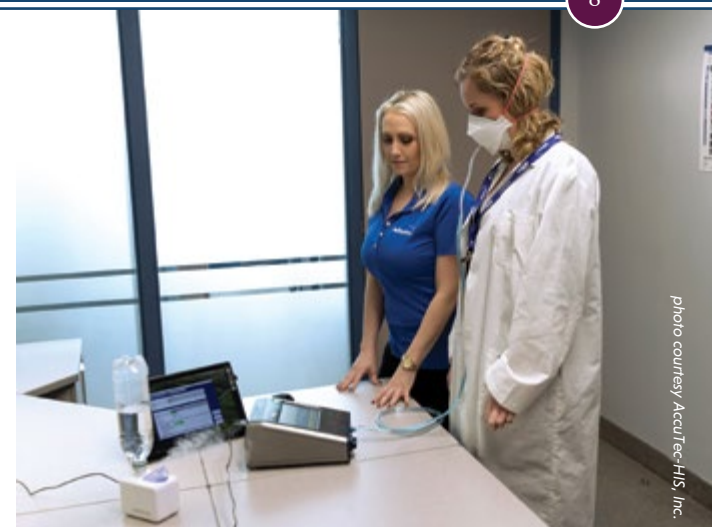


photo courtesy AccuTec-IHS, Inc.

While this ETS has good intentions for relaxing the burdens of a compliant RPP under 1910.134(c), it seems to reinforce the exclusion of the healthcare industry from proven best practice in RPP implementation. What that may mean for future outbreaks is something worth considering.

The Best of Best Practices

Regulatory standards sometimes have differences that appear at odds with current best practice—but it seems, in this instance, to lead to a less demanding regulatory environment—no matter how well-intentioned.

Today, we might say we are winning the battle against COVID-19 and its variants. With the U.S. closing in on herd immunity, it's reasonable to step back and review what we learned and what has changed. But we should also consider whether these changes in regulatory environment could put healthcare workers at greater risk when the next pandemic occurs.

It is this author's view that applying best practice is superior to meeting minimal levels of compliance, regardless of the hazard, and should be considered especially in times of global crisis. **IHW**

[Rob Brauch, COHC, is President of AccuTec-IHS, Inc.]



Compliance Meets Comfort with Innovative Respiratory Solutions

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

Miller® respiratory solutions are engineered to go beyond the arc, benefiting users in the most demanding, industrial applications – maximizing user comfort and providing around-the-clock protection. 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 ensure work environments maintain compliance. Read below to learn more about the lineup of Miller® Powered Air Purifying Respirators and Supplied Air Respirators.

PAPR with T94-R™

Miller® Powered Air Purifying Respirators are compatible with Miller® T94-R™ or T94i-R™ industrial welding helmets and are designed for optimal comfort and visibility so welders keep their system on throughout long work days, increasing arc-on time and maintaining compliance. The low-profile breathing tube is positioned at the bottom of the neck, staying flat against the back for easy, unrestricted movement.

The exclusive patent-pending DualTec™ manifold system with six adjustable air vents and dual speeds allows users to customize airflow, providing maximum cooling relief and helps reduce dry eyes and nose.

Other PAPR System features include:

- Lightweight blower assembly to reduce user fatigue
- Audible and vibrating alarm notifies user of low battery or restricted airflow
- Load-bearing shoulder straps to reduce lower back strain

- Lithium-ion batteries that run up to 8-hours (two are included with each system)

Face Shield PAPR

Ideal for metal grinding, finishing, and clean-up applications, Miller® Face Shield PAPR enhances comfort and visibility to increase all-day wear. Available in Clear, Shade 3 and Shade 5 Lens Shades where each lens can be replaced and switched out depending upon application.

Other Face Shield PAPR features include:

- A lightweight, low-profile blower assembly with three adjustable air speeds to maximize comfort in various work conditions
- View fan speed, filter timer, battery level and current time with LCD Display
- HDV Technology provides a sharp, detailed view at any angle with minimal distortion to help reduce eye fatigue
- Gen 5 headgear provides enhanced support, stability and comfort
- Optional Heavy Duty Head Seal which provides an assigned protection factor (APF) of 1000

Hard Hat PAPR with T94iH-R™

For environments that require respiratory protection plus a higher level of head protection, such as those with overhead cranes, the Hard Hat PAPR offers a comfortable and compliant solution. The Hard Hat PAPR comes equipped with a MSA V-Gard® hard hat that complies with ANSI/ISEA Z89.1 and CSA Z94.1 standards. The iconic “V” design deflects objects and provides added protection in the event of impact.



The 44-square-inch integrated HDV Grind Shield provides a larger, clear viewing area for grinding and other tasks. In addition, the lift-to-talk head assembly improves communication, allowing the user to have access to the face without removal of the head assembly.

Other Hard Hat PAPR System features include:

- MSA Fas-Trac® III ratchet-suspension headgear provides exceptional comfort, reducing pressure points while increasing stability
- Quick-release one-piece cover lens with HDV simplifies lens changes, reducing downtime
- HDV Technology provides a sharp, detailed view at any angle with minimal distortion to increase visibility
- Optional Heavy Duty Head Seal which provides an assigned protection factor (APF) of 1000

SAR with T94i-R™

Miller® Supplied Air Respirators are compatible with a Miller® T94i-R™ helmet assembly and come with a C50 air regulator that supplies down to 50-degree Fahrenheit of Grade D air under the hood, heightening productivity and relieving heat stress. Note: Performance under different applications may vary.

Other SAR System features include:

- 360-degree swivel air hose connection alleviates hose coiling, reducing potential trip hazards
- 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

Reduce Exposure Levels and Help Gain Compliance

Providing a clean and compliant work environment doesn't need to be complicated. When evaluating your needs, it's important to consult with an Industrial Hygienist and follow OSHA's Hierarchy of Controls to establish and implement an effective respiratory program. It may be necessary to implement multiple solutions to achieve desired results.

Ordering Information

For further information on Miller® respiratory protection solutions, please visit MillerWelds.com. To place an order, contact a local Miller® distributor and discover how you can increase user comfort and maintain compliance within your workplace. ■



Are You Aware of our **Three** “Workplace” Publications?

Print. Digital. Thought Leadership. A Combo.

Reach these different industries:

- | | | | |
|------------------------|----------------------------|------------------------------|----------------------|
| » Chemicals | » Food & Beverage | » Oil & Gas/Petro/Refineries | » Transportation Mfg |
| » Construction | » Manufacturing/Industrial | » Rubber & Plastics | » Warehousing |
| » Distribution Centers | » Metals | » Technology | » Water/Wastewater |

Contact Randy at 586-227-9344 or randy@rdgmedia.net to see how we can put the right one to work for your company.



Miller® Welding Safety & Health

Innovative Respiratory Solutions

Industrial compliance.
Exceptional comfort.

Industrial respiratory protection has never been more comfortable. Engineered to go beyond the arc, Miller® respiratory solutions benefit users in the most demanding, industrial applications – maximizing user comfort and providing around-the-clock protection.

Learn more at MillerWelds.com/respiratory



By: Mark Stromme, Contributor

Breathe Easy: A 10-Step Respiratory Protection Training Plan

Employees depend on a respirator to keep them safe and healthy when working in a hazardous atmosphere. Make sure they understand how to safely use the equipment.

Overview

Before you can require employees to wear respirators, the Occupational Safety and Health Administration (OSHA) requires you to take steps to prevent the hazardous atmosphere from developing in the first place. Some of these control measures can include:

- Enclosing an operation
- Substituting a less hazardous material
- Providing improved general ventilation
- Installing local exhaust ventilation

If these control measures aren't feasible or effective (or while the control measures are being put into place), employees must wear respiratory protection. Proper training is critical, because improper use of a respirator can lead to serious illness or death.

Specific Training Elements

Follow this 10-step approach to effectively train on respirator use. The rest of this article is written in a script-type format for you, the safety trainer, to deliver to company employees.

1) Introduce the Topic

Your employer takes steps to keep the air clean. You can help keep these control measures effective. There are several ways to go about doing so for an employer. For example, if a certain operation is set up so that a chemical is enclosed in tanks, piping or other containers, make sure you keep the equipment closed. If a job calls for using a certain chemical,

don't substitute something else. When it comes time to turn on ventilation equipment to do a job, make sure you use the equipment; if said equipment isn't working properly, report the problem immediately.

Despite these control measures, sometimes the air still isn't safe to breathe. In this case, you'll have to wear a respirator while you work.

2) Explain Air Contaminants

Air contaminant hazards can include dusts, aerosol mists, metal fumes, evaporated vapors, released gases or oxygen-deficient atmospheres. Some particulates can cause metal fume fever, silicosis or asbestosis. In the short term, some chemical vapors can cause dizziness or nausea; in the long term, some can cause liver damage or cancer. Some gases act as asphyxiants, and overexposure can cause death. Similarly, oxygen-deficient atmospheres can be deadly.

OSHA sets permissible exposure limits for many contaminants to help employers determine if employee exposures are at safe levels. If control measures don't reduce exposures to these safe levels, workers must wear respirators.

3) Outline Capabilities and Limitations of Your Respirators

There are basically two types of respirators: air-purifying respirators (including dust masks, gas masks, chemical cartridge respirators and powered air-purifying respirators) clean the air as you inhale, and atmosphere-supplying respirators supply you with a separate source of clean air (through a hose or a tank you carry on your back).



Employees depend on respirators to keep them safe and healthy when working in hazardous atmospheres. Using the equipment properly is of paramount importance. (photo courtesy J.J.Keller)

The capabilities of a respirator depend a lot on the type and amount of the air contaminant and the work being done. For example, a dust mask (an air-purifying respirator) is capable of filtering hazardous particulates from the air as you breathe, but it doesn't protect you from hazardous levels of solvent vapors.

An air-purifying respirator with organic vapor cartridges can protect you from certain levels of solvent vapors, but its protection stops when the vapor levels are very high. No air-purifying respirator can protect you when oxygen levels are too low; in this case, you must use an atmosphere-supplying respirator.



OSHA sets permissible exposure limits for many contaminants to help determine if employee exposures are at safe levels. If control measures don't reduce exposures to these safe levels, workers must wear respirators. (photo courtesy J.J.Keller)

4) Demonstrate How to Inspect, Put on and Remove, Use and Check the Seals of Your Respirators

Inspect the respirator before each time you use it. Inspect it again as you clean it. Self-contained breathing apparatus and respirators reserved for emergency use must be inspected monthly.

Each time you put on a respirator with a tight-fitting facepiece, you must perform two seal checks to be sure that the facepiece is properly seated and adjusted on your face. If you detect leaks during the seal checks, readjust the facepiece and repeat the checks.

5) Describe What to Do if a Respirator Malfunctions

It's a clear sign that something is wrong if you can smell or taste the contaminant while you work; or if your breathing becomes strained; or if you notice a respirator part isn't working properly. If your respirator stops working properly while you're in a hazardous atmosphere, immediately exit to a safe

area. Don't remove the respirator until you've left the hazardous atmosphere.

6) Explain How to Use a Respirator in Case of an Emergency

If there's a sudden release of a hazardous chemical while you're working in an area that has escape-only respirators available (for example, where ammonia or chlorine are stored), put on the emergency respirator as you exit.

Some employees may be trained and authorized to perform emergency responses that require respirator use. Examples would include confined space rescue, emergency response to chemical releases and interior structural firefighting. If you aren't authorized for these emergency actions, evacuate to a safe area.

7) Outline Procedures for Proper Respirator Maintenance and Storage

Don't wear a dirty or damaged respirator. Using the wrong procedures to clean a respirator can damage it, so follow instructions. For example, never use paint thinner or other harsh solvents to clean a respirator.

Know how to report damage and get repairs. Only the manufacturer's replacement parts can be used to repair a respirator. Store respirators so they will stay clean and will not be damaged.

8) Discuss Signs and Symptoms that Could Affect Employees' Safe Use of a Respirator

Even though you've passed a medical evaluation before you wear a respirator, remember that people can change. Medical changes can affect your ability to safely wear a respirator. Examples of these can include the development of shortness of breath, dizziness, coughing, wheezing, chest pain, chest

injuries, lung diseases, cardiovascular conditions or heart conditions.

9) Emphasize the Consequences of Improper Respirator Use

There are many examples of improper respirator use to discuss. One example would be using the wrong type of filter or cartridge with an air-purifying respirator. Employees may also be wearing a tight-fitting facepiece too loosely, so contaminated air could potentially leak in. Lastly, employees may not leave a contaminated area before removing the respirator.

10) Outline the Other Requirements in OSHA's Respiratory Protection Standard

Some of OSHA's other requirements include the following:

- The employer must identify and evaluate the respiratory hazards in the workplace
- Respirators are required when ventilation or other engineering controls aren't adequate to reduce exposures to safe levels
- The employer must have a written respiratory protection program
- The employer must provide employees with medical evaluations before they can use respirators
- Employees who must use a respirator with a tight-fitting facepiece must be fit-tested before they can use the respirator
- The employer must provide for cleaning, storing, inspecting and repairing respirators
- Atmosphere-supplying respirators must use high-purity breathing gases
- Filters, cartridges and canisters must be properly identified **IHW**



Mark Stromme is with J.J. Keller & Associates, Inc.



Respirators Aren't Going Anywhere

Respirators are crucial PPE that have always been important to protect workers in industries such as construction and manufacturing or any industry that involves the risk of inhaling harmful particles which can cause serious life-time damage such as dust particles, lead dust, silica, wood etc. The pandemic has only heightened the demand for N95 level protection and made it a household name. But according to experts, the virus is not going away and nor will the need for respirators¹.

Even with mask mandates lifting throughout most of Canada and the US, the need for effective respiratory protection will remain. Because Canada and the US have stringent workplace safety standards which requires companies to provided appropriate respirator protection equipment to employees where necessary they have and will continue to hold the dominate share of the disposable respirator market over 2021-2028 (USD 2.10 billion)².

Domestic Manufacturing: We can't continue to rely on China

As one of the world's largest manufacturing sectors, China houses the greatest volume of PPE and the majority of which being googles, medical masks and disposable respirators. Just like the start of the pandemic, China's lockdowns will once again wreak havoc on inflation and the supply chain.

*"Companies are beginning to panic. The downstream impact is coming, and it'll be heavy." John Bree, the chief risk officer at Supply Wisdom, said. "The latest China lockdowns combined with the Russia-Ukraine war is too heavy a burden. The global chaos is going to further exacerbate disruption and take inflation to a new level."*³

The pandemic has made it abundantly clear that we can longer rely on critical supplies to be sourced and manufactured overseas. In the State of the Union address, Biden vowed that everything from the deck of an aircraft carrier to the steel on highway guardrails would be made in America⁴.

"When we use taxpayer dollars to rebuild America, we're going to do it by buying American-Joe Biden

Organizations like AMMA (American Masks Manufacturing Association) are on a mission to help bring domestic mask manufacturing jobs back to the U.S. and to ensure America is ready for whatever the future has in store. Elastomeric respirators are nothing new, the Dentec Safety COMFORT-AIR® brand of respirators has been in the market for some 30 years. As a NIOSH Approved Respiratory Manufacturer based in Lenexa Kansas, with a 100% North American based supply chain for our Half Masks, Cartridges and Filters, Dentec Safety proudly joined AMMA in 2021. As the only elastomeric reusable respirator manufacturer AMMA member, Executive Director Nicolas Smit has been a huge advocate for the need for superior American Made respiratory protection for both the Canadian and American markets.

"The supply chain problems are very concerning because there are so many downstream effects that can be easily avoided. If workers are given masks with reliable protection against infection, problems along the supply chain would be minimal and the economy could start to repair itself.

Anyone looking for protection from COVID-19, air pollution including wildfire smoke, needs to be protected from carcinogenic airborne particulates, anyone doing home

renovations where you could be exposed to dangerous airborne particulates could use elastomeric respirators. The mining, construction, pharmaceutical and agricultural industries could also greatly benefit from using elastomeric respirators." – Nicolas Smit

Reusable Respirators: Less waste, less cost

As the disposable respirator market and demand has grown so quickly, with it so has the amount of waste sent to landfill. The rapid need for disposable respirators for healthcare workers as well as many other industries mentioned above has led to a huge uptick in the environmental toll that medical and disposable mask waste is costing us. The COVID-19 pandemic is estimated to have generated 7,200 tons of medical waste daily, most of which are disposable masks⁵. Disposable N95 waste alone will generate 6,700 lbs/ 1000 people a year.

Every industry that relied on respiratory protection before the pandemic and since now has a social responsibility to do better and make more sustainable choices. The bonus? Moving away from disposable respirators will not only lessen your environmental impact but shifting to reusable respirators will prove a huge cost savings. For example, based on 2020 stats, if all American healthcare workers were issued 1 Comfort-Air®NxMD reusable respirator, in a **90-day period** there would be a costs savings of **\$805,840,00** and a total of **10,292,165 LBs** of mask waste diverted from landfill.

The future of respiratory protection is here, and Dentec Safety is ready to protect North American frontline workers AND our economy with our safer, more sustainable AMERICAN MADE solution. ■

¹ Utah health experts, like Fauci, say COVID pandemic isn't over | KSL.com

² Disposable Respirator Market Size, Share | Global Report [2028] (fortunebusinessinsights.com)

³ China lockdowns: A nightmare for supply chains and inflation | Fortune

⁴ Why American Mask Makers Are Going Out of Business – The New York Times (nytimes.com)

⁵ The environmental toll of disposable masks | MIT News | Massachusetts Institute of Technology



American Made Respiratory Protection For Americans Workers



Our Masks Are Different: Never buy or wear a disposable N95 again!

From silica dust or asbestos protection to COVID-19 defense, Comfort-Air® Reusable Respirators replace disposable N95's completely.
Choose from Dentec's complete line of Respiratory Protection for ANY Application!



SUPERIOR PROTECTION



ENHANCED COMFORT



EASY TO BREATHE



LESS WASTE, LESS COST



MADE IN AMERICA

WWW.DENTECSAFETY.COM

Upgrade Respiratory Protection—Now!

COVID is not going away any time soon.

Omicron cases continue to surge in the U.S. and other countries worldwide. On January 23rd, 2022, an article in [cityam.com](https://www.cityam.com) announced:

“Various media across Scandinavia and the UK are reporting the emergence of a new Covid variant that is so infectious and spreading so fast that nearly half of all cases in Denmark are now the new mutation, named BA.2, with more than 400 confirmed infections across the UK. The new mutation has reportedly also popped up in Norway, Sweden, Singapore and India.”

In terms of Omicron, health officials believe the vaccines are still working against it, but the bad news is even fully vaccinated people are still contracting COVID. The COVID-19 vaccinations significantly reduce your chances of severe illness and death (across multiple age groups), but to avoid contracting or spreading COVID you NEED to wear a proper mask.

New variants will continue to pop-up until we contain and stop transmission. That’s why proper mask protection is a critical piece of the overall strategy to control the rapid spread of the virus; take pressure off our healthcare systems; and prevent future variants. Vaccines are a safeguard measure and the last line of defense, but they don’t prevent the spread. If we don’t control and stop the spread, we will keep getting new variants, and the endpoint to the pandemic will keep moving farther and farther away.

Medical and 3-ply masks aren't cutting it.

To summarize the point above: If you don’t want to contract or spread COVID, wear a mask, but it’s important to note that more data is proving that a higher grade of protection is needed to prevent the spread. What’s even scarier is that 3-ply medical masks that are being sold to the medical industry are proving ineffective in protecting frontline workers.

SARS-CoV-2, the virus that causes COVID-19, is airborne. Airborne pathogens require high-quality respirators that provide an airtight seal to our faces that will filter out airborne particles better than medical masks and disposable N95 respirators. We need to encourage everyone to wear masks that provide an airtight seal. According to an article in [Healthy Debate](#):

“Early in 2021, sociologist Zeynep Tufekci, who initially [called for universal mask wearing](#) in March 2020, wrote about the need for the public to [upgrade to better quality masks](#).

Students and high-risk workers (e.g., health-care staff, teachers and warehouse workers) still face barriers to accessing this essential equipment, while having to spend time in settings that present some of the highest levels of exposure to the virus.”

Three-ply, cloth and gator-style masks are ineffective against the spread of COVID, due to the fact they do not provide filtration; are loose fitting; and cannot provide a tight seal. Dr. Sanjay Gupta and Dr. Anthony Fauci reported that the only



A reusable elastomeric rubber respirator is reusable, safer, more comfortable and more economical than disposables. They can be used in healthcare applications, general industry or wherever workers are in close proximity. (photo courtesy Dentec Safety)

effective respirator to use is an N95 (or better) respirator that provides a tight seal.

COVID-19 has been unlike any pandemic the world has experienced. It has affected not only our health but our supply of critical PPE and, most importantly, respirators. Due to North America’s dependency on foreign supply of disposable N95 respirators, many workers contracted the virus and died as a result. The CDC reported *not* to use respirator protection with an exhalation valve, as it allows the air to exit the mask.

It has been an important goal to design a respirator that is reusable, safer, more comfortable and more economical than disposable, such as a reusable elastomeric rubber respirator without an exhalation valve. Such respirators can be used in healthcare applications, as well as general industry—or wherever a group of workers of any type must work in close proximity.

EFFICACY OF VARIOUS MASKS AGAINST COVID-19

SOURCE IS WEARING	RECEIVER IS WEARING				
	Nothing	Cloth FC	Surgical Mask	N95 FFR (10%)	N95 FFR (1%)
Nothing	15 MIN	20 MIN	30 MIN	2.5 HR	25 HR
Cloth FC	20 MIN	27 MIN	40 MIN	3.3 HR	33 HR
Surgical Mask	30 MIN	40 MIN	60 MIN	5 HR	50 HR
N95 FFR (10%)	2.5 HR	3.3 HR	5 HR	25 HR	250 HR
N95 FFR (1%)	25 HR	33 HR	50 HR	250 HR	2,500 HR

A cloth face covering (cloth FC) may be appropriate for the public to wear as source control, but they should limit proximity to others and time spent in an indoor space.

Anyone can be a source. Anyone can be a receiver.

With a cloth face covering, the user has 75% inward and outward leakage. A cloth face covering may be appropriate for the public to wear as source control, but they should limit proximity to others and time spent in an indoor space.

With a surgical mask, the user has 50% inward and outward leakage. A surgical mask may be appropriate for patients to wear as droplet protection source control. However, it does not provide adequate protection for workers from inhalable infectious particles.

With an N95 filtering facepiece respirator (FFR), the user has 1-10% inward leakage and outward leakage. Workers need a fit-tested respirator to prevent inhalation of infectious particles. Better respirators with higher protection factors should be used for high particle concentrations. (See chart “Efficacy of Various Masks Against COVID-19”)

No source control: We're not prepared for another pandemic.

At the start of COVID-19, many manufacturers jumped into the PPE space. However, without formal support and ongoing domestic contracts, many of these businesses have been forced to close. This will result in the North American market

having to return to relying on supply coming from offshore manufacturers. The supply chain problems are very concerning, because there are so many downstream effects that can be easily avoided. If workers are given masks with reliable protection against infection, problems along the supply chain would be minimal, and the economy could start to repair itself. This pandemic has proven that we need to be able to control our domestic manufacturing. It's not a question of if, but when the next pandemic hits, and we are not prepared to protect our healthcare workers and population.

The environmental impact of medical masks & disposable N95s is alarming!

The COVID-19 pandemic is estimated to generate 72,000 tons of medical waste everyday, most of which are disposable masks. Healthcare professionals are required to toss their disposable N95 after each patient interaction. Disposable N95 waste alone will generate 6,700lbs/1,000 people/year. How can we make public health a priority while simultaneously destroying the health of our planet?

Elastomeric respirators are a sustainable solution and are designed to be cleaned, decontaminated and reused. Because of this feature, one elastomeric can do the work of hundreds, if not thousands, of disposable N95 masks. Many hospitals and

healthcare facilities have already converted to elastomeric half mask respirators programs. Allegheny Health Network, as an example, found that within one month, it was able to decrease the number of N95 masks it needed by 95%.

The time to upgrade is now.

In terms of right now, and with the rapid spread of the new Omicron variant, any public space and business could and should move to elastomeric masks. In order to slow and stop the spread, we need to make high-grade mask protection a priority for all healthcare workers, teachers, grocery store employees and workers on factory lines. Anywhere you are near others, you should be wearing an N95 respirator. We can keep businesses open and the economy going by using this strategy of making high-grade respiratory protection a priority.

The U.S. government is looking to now put elastomeric respirators into widespread use. We can promote higher grade protections for the public with PSAs, government recommendations and regulations—including banning cloth masks in the workplace and having social media giants like Facebook and Twitter letting users know. Mainstream news organizations can work together to highlight the need for everyone to upgrade to masks that offer reliable protection. **IHW**



Respiratory Protection for Unsurpassed Safety and Productivity

The Optrel e3000X PAPR (powered air-purifying respirator) is the most powerful ventilated breathing protection system available on the market. Equipped with a TH3 HEPA filter, the NIOSH-approved **e3000x**, when paired with an Optrel helmet or softhood, filters out 99.8% of smoke, aerosols, dust and other toxins.

Optrel is a highly innovative manufacturer that puts the welder first when designing products. The company's desire to make work safer, easier and more productive for welders and businesses shines through. These innovations are exactly what we needed.

- Tony Hermanson, Chief Industries

The e3000x has an integrated airflow sensor, 3-level airflow adjustment, 14-hours of battery life, and up to 240 liters of air per minute, available at the touch of a button. Moreover,



the ergonomic harness and 3-point adjustment system position the respiratory system optimally across the back, saving energy and providing maximum comfort. The total weight of the PAPR including the filter, belt and battery is 1.560g, making it lightweight for all-day use.

The Optrel x3000x PAPR offers:

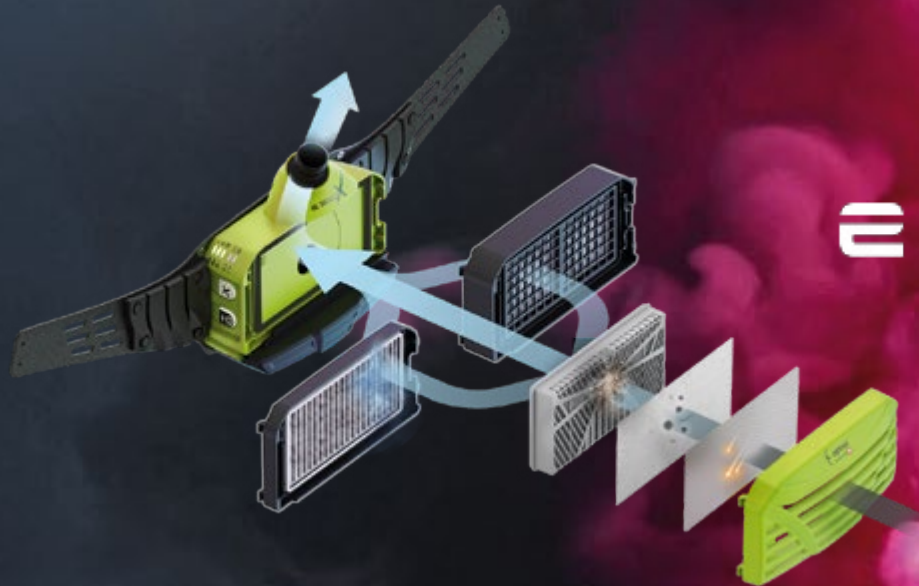
- The highest safety class (TH3) of respiratory protection, 99.98% efficient against environmental toxins including smoke, aerosols, and dust
- Integrated, automatic airflow control and calibration
- An intelligent alarm, triggering an audible and visible alert when the airflow level becomes saturated
- Even distribution of airflow throughout the PAPR hood, minimizing eye irritation and providing a cooling effect on the forehead
- 14-hour battery life and the ability to view the battery charge level easily

The e3000x PAPR can be paired with any Optrel PAPR hood. For enhanced optical clarity, pair the e3000x with the **CLT 2.0 PAPR** helmet. Patented Crystal Lens technology provides welders with a light transmission of 31% in light state (shade level 2) compared to the industry standard of 5%. This combination offers maximum protection, real-time accuracy and enhanced productivity.

Optrel is a leading international manufacturer of innovative active eye protection products for the welding, grinding,



and healthcare industries. The company's occupational safety products are used by welders, fabricators, metalworkers and healthcare professionals worldwide. Optrel AG is headquartered in Wattwil, Switzerland with its North American operations, Optrel, Inc., based in East Greenwich, Rhode Island, USA. For more information, visit www.optrel.us.



e 3000X

Can Your Organization Afford Not to Invest in Your Employees?

In this competitive job market, employee retention is crucial. To attract and retain a dedicated workforce, your organization must prioritize employee health, safety, productivity, and satisfaction.

SAFEGUARD EMPLOYEE HEALTH

The optrel e3000x PAPR system is the most powerful ventilated breathing system on the market.

- TH3 HEPA filter
- NIOSH-approved
- Filters out 99.8% of smoke, aerosols, dust, viruses, and other toxins, when paired with an optrel hood
- Optional A1B1E1 gas filter

INCREASE PRODUCTIVITY & SATISFACTION

Designed for comfort, the e3000x is lightweight and suitable for all-day wear.

- Ergonomic fit and 3-point adjustment system with optional shoulder harness
- 18-hour battery life
- Weighs only 1560g, including filter, belt and battery
- 3 airflow adjustments, up to 240 liters of air per minute



SEE
WHAT YOU
CAN DO

optrel.us



Maximize Safety When Working With Combustible Dust

All it takes for a dust explosion to occur at your facility is for oxygen, an ignition source, and a combustible dust cloud to come together in a confined space. If your operation generates dust, you probably already have some mitigation processes in place. However, to ensure that your efforts are effective enough, it is important to understand the nature of a dust explosion; what to include in your safety plan; regulatory requirements; and how to safely maintain your dust collection system.

Explosion Event

After the initial explosion or deflagration event, elastic rebound shockwaves occur, which cause more dust clouds. Secondary deflagrations and explosions are caused by these dust clouds jarred loose from the primary explosion. The explosion pentagon repeats itself until one of the five elements is no longer present. All this happens in an average time span of less than 500 milliseconds.



After an initial explosion or deflagration event, elastic rebound shockwaves occur, which cause more dust clouds. Secondary deflagrations and explosions are caused by the dust clouds jarred loose from the primary explosion. The explosion pentagon repeats itself until one of the five elements is no longer present. (Image courtesy Camfil APC)

Combustible Dust Safety Planning

Some accidents are unpreventable, but the consequences can be limited. Many accidents can be avoided with the proper education, planning and equipment.

Training: A vital component to a combustible dust safety program is educating personnel to recognize unsafe conditions. Training ideally should include what conditions to

watch out for; how to report them to management; when it is necessary to take preventative action; and what steps to take to mitigate possible disaster. This means, in addition to OSHA-required training in work safety applicable to their specific jobs, workers should learn about facility programs for controlling ignition sources and dust. This includes pre-employment training and ongoing education, especially if their duties or processes change. Managers and supervisors also need to know how to process information received from workers, so unsafe practices can be addressed immediately.

Key Safety Program Components: Although the specifics of a combustible dust safety program depend on the processes taking place, it should include the following core elements:

- Facility analysis to identify open and hidden areas where combustible dusts might accumulate; ways in which the dust could be dispersed into the air; and potential ignition sources
- Process hazard analysis, which OSHA requires on each process point generating dust
- Dust hazard analysis, which the National Fire Protection Association (NFPA) requires, to determine if the process-generated dust is explosive



This image shows dust accumulation at an industrial facility. (Image courtesy Camfil APC)

- Plan detailing how to remove the dust hazard from each process
- Housekeeping policy describing cleaning processes to control the buildup of combustible dust
- Maintenance and inspection schedule to keep equipment operating properly and in compliance with relevant regulations
- Detailed plan on how to execute, manage and adjust the elements of the combustible dust program

NFPA Standards

The NFPA sets safety standards for managing combustible dust. NFPA standards are not laws, but you should take them very seriously, because failure to comply puts your facility and workers at risk for devastating combustible dust fires and explosions. In addition, OSHA uses these standards to evaluate risk and cite safety violations. Noncompliance can also lead other authorities having jurisdiction (AHJ) to withhold permits or insurance companies to deny coverage.

These are the main NFPA standards you need to know if your facility handles combustible dust:

NFPA 652 Combustible Dust Standard provides requirements for managing combustible dust fires and explosions across industries, processes and dust types. As noted above, owners or operators of a facility that generates combustible dust must conduct a dust hazard analysis; develop a plan for managing fire and explosion dangers; and provide training for workers who potentially could be affected by the hazards. A dust hazard analysis includes the process machinery that produces dust and the dust collection system itself.

NFPA 654 Standard for Preventing Fire and Dust Explosions from Combustible Particulates applies to all phases of the manufacturing, processing, blending, conveying, repackaging and handling of combustible particulate solids or hybrid mixtures, regardless of concentration or particle size. It defines



The NFPA sets safety standards for managing combustible dust. While they are not laws, they should be taken seriously; failure to comply puts the facility and workers at risk for devastating combustible dust fires and explosions. (Image courtesy Camfil APC)

requirements of facilities for process hazard analysis, management of process change, performance-based design requirements, facility and system design, and process equipment explosion protection.

The performance-based design option specifies that, if the AHJ approves of another method for protecting your dust collector from explosions, you can use that method instead of one specified in the standard. An example of an AHJ is a local or regional public safety authority, such as a fire marshal.

NFPA 68 Standard on Explosion Protection by Deflagration Venting covers all prescriptive and performance-based design requirements and calculations for deflagration venting. These systems vent combustion gases and pressures resulting from a deflagration within an enclosure in order to minimize structural, mechanical and physical damage.

NFPA 69 Standard on Explosion Prevention Systems prescribes the design of prevention controls including inlet and outlet ducting, spark-extinguishing systems and methods for preventing an explosion from traveling back into the building or to process locations upstream of inlet ductwork.

NFPA 484 Standard for Combustible Metals magnifies the level of attention needed for applications dealing with metal dust types because of the severity of explosions and ease of ignition of metal dust. It also applies to processing or finishing operations that produce combustible metal powder or dust.

NFPA 61 Standard for the Prevention of Fires and Dust Explosions in Agricultural and Food Processing Facilities covers requirements for operations that handle, process or store dry agricultural bulk materials, including grains, oilseeds, agricultural seeds, legumes, sugar, flour, spices, feeds, starch and other related materials.

Safe Operation of the Dust Collection System

Using a dust collection system that is properly designed for your specific operation can significantly reduce combustible dust in the work environment. However, the dust collection system itself can be a source of an explosion—if it is not protected. This is because dust collectors are closed vessels full of dry particles that can form a dust cloud and become ignited if the fan draws in a spark or flame. Therefore, it is imperative to outfit the dust collection system with protection equipment, such as explosion venting. A dust explosion in an unprotected

dust collector produces a high-pressure wave that can fragment the housing and send heat, flames and dangerous projectiles into the surrounding area.

If your facility produces or processes combustible dusts, your collection system must be equipped with deflagration protection as set by the applicable NFPA Standards. You can add prescriptive controls to protect the system or performance-based controls. Camfil's integrated safety monitoring filter is an example of a performance-based control device.



Dust collection systems should include protection equipment, such as explosion venting. A dust explosion in an unprotected dust collector produces a high-pressure wave that can fragment the housing and send heat, flames and dangerous projectiles into the surrounding area. (Image courtesy Camfil APC)

An integrated safety monitoring filter (also called an iSMF) installed on the top of a dust collector protects the downstream equipment and work area, because it acts as a flame front barrier. Flameless vents can be installed over a standard explosion vent to extinguish the flame front as it exits the vented area, stopping it from leaving the device.

Mitigating Risk

Dealing with combustible dust is a challenging but necessary duty. Fortunately, combustible dust is a hazard that can be managed, to a great extent, with thorough planning and attention to detail. Understanding the recipe for an explosion; developing a safety program; and incorporating the appropriate NFPA-compliant explosion protection devices on your dust collector can help you manage the risk of personnel injury and damage to your equipment and facility. **IHW**

About the Author

Andy Thomason is the Senior Applications Specialist at Camfil Air Pollution Control (APC), where he provides application support to the sales and customer base and technical support to new product development. For information, contact 800-479-6801 or 870-933-8048; email filterman@camfil.com; or visit www.camfilapc.com.

Technological advances in dust monitoring equipment: Protecting your workforce's health keeps getting easier.

Dust is everywhere, we do know this for certain. We also have confidence in our understanding of the risks associated with airborne particulate in the respiratory system and the long-term effects that this has on an individual's health.

Our responsibility now lays entirely with protecting our workforce as best as we can by following guidance and implementing protective measures within the workplace. But what are our options and where do we even begin when it comes to monitoring for these hazards to implement protective measures within the workplace?

As NIOSH point out in the manual of analytical methods (NMAM)¹, industrial hygiene methods are geared towards measuring personal exposure, which for the last six decades has typically meant deploying a personal air sampling pump. The fundamentals of Air Sampling pumps have not changed over the last 60 years however latest technological developments and advancements to digital flow calibrators improve Industrial Hygienist's productivity and increase the successful outcome of their campaign.

This leads us to our first uncertainty, what equipment is best for your requirements?

Not sure whether you have a potential risk?

With handheld real-time dust monitors you can carry out workplace assessments with a wave of your hand. These devices will assist you understanding dust levels, whether control measures are effective and what areas exposure may be highest.

Introducing the Microdust Pro:
The Microdust Pro is a real-time handheld, data logging instrument for the

¹ NIOSH Manual of Analytical Methods (5th Edition)



detection of airborne dusts, fumes, and aerosols. Perfect for walkthrough surveys, the qualitative data provides insights that gravimetric air sampling methods cannot do on their own. Its calibration insert can be used before and after each survey too to ensure that your results are accurate.

It's all about personal exposure.

If a risk has been established, then its personal exposure measurements that are needed to compare to exposure limits. This means a personal sampling pump is needed!

What to look for in a pump:

- 1. Intrinsically Safe design**
For use in all environments including hazardous ones
- 2. Adjustable flow rate**
Using different sampling heads requires varying flow rates of the Air Sampling Pump
- 3. Impressive back pressure capabilities**
Prevents the pump from blockages during a sample
- 4. Pulsation value**
Designed to maintain a steady flow ensures respirable samples using cyclones are accurate.
- 5. Long battery life**
You need to measure the exposure of an entire shift so 8 hours minimum is required
- 6. User friendly**
The pumps are worn by individuals, so you do not want them to be intrusive or heavy
- 7. Ingress Protection**
For easy decontamination and to protect the unit against water and dust.
- 8. Easy data download & analysis**
Once you have the data, it needs to be easily transferred from the device to your preferred method of analysis, then easily understood to determine the measures required.

Introducing the Apex2:

Not only have Casella achieved all the above, but they have also taken each point and excelled at it. With a pulsation value of <10% you can have to confidence in the integrity of your samples. Plus, and Pro models also incorporate Bluetooth connectivity with Casella's bespoke Airwave software; workers can be monitored remotely without being distracted, boosting productivity levels even further.



This software is simple and easy to use, providing real-time status updates, allowing collected data to be emailed alongside photos and notes, adding context to the data, and further simplifying the reporting process.

Once the sampling is complete it's now time to send it to the laboratory to be analysed! It is then up to you to implement control measures to protect your workforce – back to the part of the process we do know!

When it comes to Air Sampling pumps, it is vital that you can rely on the equipment itself and have confidence in the results. Casella take the stress out of Air Sampling with our innovative equipment. Get in touch today to see how we can help you. ■

CASELLA

MicrodustPro™

Real-Time Dust Monitors

Apex2

Personal Air Sampling Pumps



Working today for a
healthier tomorrow

MicrodustPro™

Hand held ideal for walkthrough surveys

Datalogging instrument for detection of airborne dusts

Unique onsite calibrator device for confidence in results

Apex2

Intrinsically Safe & IP65 Design

Bluetooth capabilities for wireless data transmission

Up to 35 hours of battery life for full shift monitoring

Monitor the pump remotely with Casella's FREE Airwave App

13 Pratts Junction Road, Sterling, MA 01564-2305

T: (800) 366 2966

E: info-us@casellasolutions.com

www.casellasolutions.com



By: Tim Turney, Contributor

Combustible Dust Explosions: Are You at Risk?

Between 1980 and 2005, the U.S Chemical Safety and Hazard Investigation Board (CSB) identified 281 combustible dust incidents that ultimately led to the death of 119 workers and 718 injured workers, on top of extensive damage to the respective facilities. In many of these incidents, both managers and workers were unaware of the associated safety and health risks that extensive amounts of dust in the air posed, with prolonged exposure to airborne dust associated with health conditions such as chronic breathing, lung problems and possibly heart disease.¹

Combustible dust explosions are one of the largest and most fatal potential accidents when working with materials that produce large quantities of fine dust particles—posing a threat to the health of those working in these environments. For many, coal dust, grain storage and flour mills are immediately associated with dust explosions, as they make primetime news. However, any workplace that generates dust is potentially at risk of dust explosions, including agriculture, woodworking facilities, paper, plastics, textiles and pharmaceuticals. Materials that do not normally burn in larger pieces are also still at risk of becoming explosive in certain conditions, such as aluminum and iron.

What Creates Dust?

Dust is created when materials are transported, handled, processed, polished, ground and shaped. Dust can also form from abrasive blasting, cutting, crushing, mixing, sifting or screening dry materials. The build-up of dried residue from the processing of wet materials can also generate dust.

Levels of dust in the workplace continuously rise from such daily activity, which is why employers need to stay vigilant to the amounts of dust in the workplace to protect workers from

hazardous incidents and potentially detrimental consequences to their health.

A dust explosion can only occur when the following five factors are present:

1. Combustible dust (fuel)
2. Ignition source (heat)
3. Oxygen in the air (oxidizer)
4. Dispersion of dust particles in sufficient quantity and concentration
5. Confinement of the dust cloud

There are several ways dispersion can occur, such as a dry filter being pulse-cleaned or from an initial (primary) explosion in processing equipment, causing a blast wave that disturbs accumulated dust that, if ignited, causes a secondary explosion. The latter is often far more destructive than a primary explosion, due to the increased quantity of dispersed dust.

Monitoring Dust

Employers have been reminded of the importance of efficiently monitoring dust levels from the severity of combustible dust explosions over the last few years. In February 2003, a Kentucky acoustics insulation manufacturing plant suffered several dust explosions because of a small fire from an unattended oven, igniting a dust cloud nearby that resulted in a cascade of explosions throughout the plant. Seven people were killed in the accident; 38 were badly injured.

The following are all contributors to ineffective dust control in an environment:

- Hazard assessment
- Hazard communication
- Maintenance procedures



Photo courtesy Casella

- Building design
- Investigation of previous fires

What can employers and managers do to protect their workers, and what can workers do to protect themselves from combustible dust explosions?

The Hazard Communication Guidance for Combustible Dusts, 2009, as set out by OSHA, names the requirements needed to improve and safeguard the health and safety of those working

¹ Combustible Dust in Industry: Preventing and Mitigating the Effects of Fire and Explosions (osha.gov)

around and with dangerous substances. Employers need to identify where explosive atmosphere conditions occur; assess the risk; and record what actions are being taken to prevent an explosion and fire.²

One of the most important, life-saving measures that an individual can take to protect themselves is through high-quality dust monitoring equipment. Undertaking a walk-through survey using a hand-held, real-time sampler would give an instantaneous indication of concentration. It could also be

used to check the effectiveness of control measures such as local exhaust ventilation, for example, both pre- and post-filter.

Industrial hygienists may already be undertaking personal monitoring for toxic or sensitizing dust. The same air-sampling pump could be used in combination with a real-time sampler when housed in a robust, portable case on an unattended, short-term basis. Such a system can provide concentration using a gravimetric filter but also a time-history profile, which could help identify the source of the problem.



All employees should have a basic awareness of the hazards of dust explosions and the best way to mitigate those risks. (Photo courtesy Adobe Stock)

Fixed, AC-powered solutions could also be used continuously for high-risk areas. These have the advantage that the data can be made available remotely using a web-based interface. These systems provide real-time alerts via text message or email should limits be exceeded. Reports can easily be automated and sent to multiple users, which allows early intervention to avoid a potential problem.

Great care should be taken in hazardous atmospheres that may require instrumentation to be intrinsically safe or require a hot-work permit, and action thresholds should always be set at a fraction of the Lower Explosion Limit (LEL) for the dust in question. However, if there is any doubt whatsoever, businesses must speak to the relevant site manager or supervisor that has responsibility for risk assessment and permitting—and who can advise accordingly.



Dust is created when materials are transported, handled, processed, polished, ground or shaped. Dust can also form from abrasive blasting, cutting, crushing, mixing, sifting or screening dry materials. (Photo courtesy Adobe Stock)

Dust explosions continue to be a persistent problem for many industries, resulting in loss of life, injuries and destruction of property. Even those individuals most highly trained, including government enforcement officials, insurance underwriters and company safety professionals often lack awareness of combustible dust hazards. Material Safety Data Sheets (MSDS) are also ineffective in communicating to employers and workers the hazards of combustible dust explosions and ways to prevent them. This is further reasoning for all employees to have a basic awareness of the hazards of dust explosions and the best way to mitigate those risks. **IHW**

About the Author

Tim Turney is a Technical Product Manager at Casella and graduated as an engineer from Queen Mary and Westfield in London. Since starting at Casella in 1998, Tim has been involved in the acoustics and air sampling industry, specializing in measurement and instrumentation technologies. To find out more about Casella, please visit www.casellasolutions.com or follow @CasellaHQ on Twitter or @Casella on LinkedIn.

² Hazard Communication Guidance for Combustible Dusts | Occupational Safety and Health Administration (osha.gov)

THANKS TO OUR SPONSORS

The logo for CASELLA features the word "CASELLA" in a bold, dark green, sans-serif font. To the right of the text are three horizontal green bars of increasing length, creating a stylized arrow or motion effect.

**Industrial
Hygiene**
in the **Workplace**

An RDG Media Inc. Publication
PO Box 80915 Rochester, MI 48308
www.IndustrialHygienePub.com