3M Science. Applied to Life.™

Personal Safety Solutions for work with silica, welding and grinding in construction.

Find the information you need for construction worker safety and health when exposed to silica, welding and grinding dust. Discover how 3M can help you protect the workers that make project success possible, from groundbreaking to ribbon cutting.

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arco®

Experts in Safety

Every day, nearly one million workers globally suffer from a workplace accident, and close to 6,300 people will die due to an occupational accident or disease – including many in the construction industry.[1] Through collaboration and science, we believe that together we can help change that.

Construction safety. Backed by science.

Head impact and eye injuries. Hearing and respiratory hazards. Falls from height and dropped objects. Construction workers face all of these and more day in and day out, so they rely on integrated safety and health solutions from 3M to help keep them protected and comfortable.

Our approach goes well beyond providing quality personal protective equipment. With knowledgeable industry experts committed to developing worker-inspired innovations, our team delivers new technology and in-depth training that can make a measurable impact on worker health and safety.

300+
Technical service/application engineers and regulatory specialists worldwide

70+
Countries with local standards professionals

3,100+
Active patents on safety technologies

100+
Training professionals and 15 training centres globally[2]

Table of contents

Use the following pages to explore construction hazards related to silica, welding and grinding, best practices for these applications and suggested PPE for each of your employees. It's important to remember that PPE should be considered the last line of defence in construction safety and health, as engineering controls (physical workplace changes) and administrative work practice controls should be established first to protect workers. When the safety and health of employees who work with silica or welding hazards is a priority, everyone on your team stands to benefit.

Images are illustrative purposes only. Always ensure your PPE meets the relevant requirements for your country.

Respirable Crystalline Silica (RCS) in construction

Introduction

Respirable crystalline silica is a dangerous workplace hazard, and over the millennia has killed thousands of workers. Respiratory illnesses associated with masonry and stone working industries were recognised hundreds of years ago,[3,4] but it wasn't until the 1930s that the risks from silica were recognised in many different industries and processes[5]. Despite this, crystalline silica still presents a particular risk to workers in the construction industry today, as new materials, construction techniques and equipment change how the world is built.

Silica

Silica or silicon dioxide (SiO_2) is one of the most common naturally occurring minerals on the planet. Furthermore, forms of silica are also specifically manufactured by industry for their unique chemical (generally inert), physical (strong but brittle material with relatively high melting point) and electrical properties.
The intra-molecular polar covalent bonds results in tetrahedral ordered molecular structures, which can be grouped as follows:

Amorphous silica
Molecules are arranged with limited ordering relative to each other, resulting in a transparent solid. Occurring rarely in nature, amorphous silica is extensively used within industry – particularly as the main component in glass and more latterly in the electronics industry.[6]

Crystalline silica
Molecules are arranged with indefinite ordering relative to each other, resulting in distinct crystalline structures that are white or yellowish in appearance. Nine different crystalline structural forms (polymorphs) exist – the most common forms of which are quartz, followed by cristobalite and tridymite. Crystalline silica is a key component of soil, sand, granite and other naturally occurring minerals.[6]

Respirable crystalline silica (RCS)
RCS is commonly used to refer to the tiny particles (at least 100 times smaller than ordinary grains of sand) of crystalline silica that are too small to be seen by the human eye. They can remain in the air for extended periods of time and inhaled deeply into the lungs. These particles are created when handling, using, cutting, sanding or carving materials containing crystalline silica.[7,8]

According to the UK Health and Safety Executive (HSE), due to its presence in commonly used construction materials (see Table 2 on page 5), RCS is the second biggest health risk to construction workers, following asbestos.[9] It is believed that 500 UK construction workers die each year just from silicosis.[10]

A report published by the Institute of Occupational Safety and Health (IOSH), suggests that there are about 5 million European workers exposed to respirable crystalline dust either from direct employment in the construction industry or other related industries making products used in the construction industry such as bricks, glass or cement, for example.[11]

5 million

European workers exposed to respirable crystalline silica either directly employed in construction or in making products used in construction such as bricks, glass or cement[12]

What are the risks from repeated, excessive exposure to silica dust?

Awareness of the dangers posed by breathing RCS is increasing, but still many workers do not fully understand health risks of RCS exposure. RCS can cause irreversible fibro cardiovascular diseases such as:[8,12]

- Silicosis
- Lung cancer
- Chronic obstructive pulmonary disease (COPD)
- Bronchitis and emphysema
- Other effects including autoimmune, immunological and renal diseases have been reported. In addition, there is strong link between RCS exposure, silicosis and an increased risk of tuberculosis

Silicosis

Silicosis is a form of pneumoconiosis, with typically a long latency period between initial exposure and onset of disease symptoms. Crystalline silica particles enter the lungs, over-load the body's defence mechanisms and cause irritation and damage to the alveoli. The body reacts by forming fibrous tissue around the trapped silica particles and results in scarring of the lungs. Over time, as the extent of scarring continues, the efficiency of the lungs decreases, and symptoms of silicosis develop. Unfortunately, no specific intervention is known to halt the progression of silicosis – silicosis is incurable and can lead to significant ill health and even death.

There are 3 types of silicosis:[13]

1. **Acute silicosis**: The individual will have been typically exposed to very high levels of silica dust and symptoms will result in a matter of weeks or months.
2. **Accelerated silicosis**: A gradual onset of shortness of breath and dry cough occurs many years after exposure to medium to high levels exposure to RCS.
3. **Chronic silicosis**: This is the most common type and usually occurs after >10 years exposure to low level silica dust.

Symptoms of silicosis

Symptoms of silicosis can take many years to develop. It is important that workers are aware of what these are so they know what to look out for:[14]

- Debilitating shortness of breath
- Loud cough
- Feeling of weakness
- Weight loss
- Chest pains
- Night sweats

Construction applications that may lead to silica exposure include:[15]

- Abrasive blasting
- Tuckpointing
- Block and brick cutting
- Drilling, grinding, cutting and chipping concrete
- Stationary saw masonry
- Rock crushing and drilling
- Polishing and sanding
- Concrete mixing
- Milling
- Demolition
- Handling and shoveling dry materials
- Tunneling operations

Crystalline silica content in common construction materials[6]

Material	Approximate crystalline silica content
Sandstone	70-90%
Concrete, mortar	25-70%
Tile	30-45%
Granite	20-45%, typically 30%
Slate	20-40%
Brick	< 30%
Limestone	2%
Marble	2%

Regulatory framework

The European Framework Directive 89/391/EEC places duty on the employer to evaluate all the risks to safety and health of workers performing work related task and implement adequate control measures to mitigate against any identified risks. Carrying out an appropriate risk assessment forms a fundamental part of the process when working with materials containing RCS. An integral part of the risk assessment process is understanding the health effects when exposed to RCS, and how to safeguard and protect the worker from being exposed to this substance.

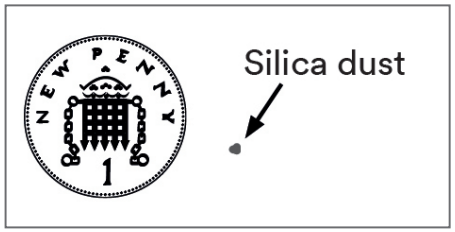
In so far as the employer has a duty of care for the worker to implement effective control measures, the worker is also duty bound to cooperate with the employer and make full and proper use of all control measures.

How bad is RCS?

In accordance with the revised publication of the European Council Directive 2017/2398/EC for Carcinogens and Mutagens at Work, RCS has been added as a carcinogen with a binding Limit Value of 0.1 mg/m³ which is applicable to all concerned industrial workplaces where RCS may be found. This includes silica-containing materials such as concrete, bricks, rocks, quarries and cement, for example.

How much is too much?

The Health and Safety Executive government agency in the UK compares the maximum daily exposure compared with the size of 1 pence coin as illustrated to the right.[9]



Exposure should be reduced as far as is reasonably practicable, and in any case well below the 0.1 mg/m³ Limit Value. This will nearly always include the use of respiratory protective equipment in addition to all other control measures within the hierarchy of controls.

Minimising exposure to RCS

There are many ways of minimising personal exposures, but one of the most important ways is to use established occupational hygiene best practises that comply with all national regulations and laws. These activities typically involve the following key elements,[8,16] but the appropriateness of each may vary by industry and applications.[17]

1. Identification of the hazards and assessment of the risks. This may include measuring total and respirable dust over a period of time to help establish common exposure pattern. Measurements may be repeated when there is a change in material, manufacturing process, routine maintenance, including local exhaust ventilation (LEV) systems, for example.
2. Implementation of appropriate hierarchy of controls to minimise worker exposures.
    a. Elimination: can materials be sourced that do not need to be cut or finished?
    b. Substitution: can alternative materials that do not contain crystalline silica be used or can alternative process be used that generates less of a hazard?
    c. Engineering controls: can controls such as local exhaust ventilation, on tool extraction, water suppression, enclosures or vacuum cleaning be used to reduce exposures?
    d. Administrative controls: can higher risk activities be conducted away from other workers?
    e. Use of PPE: select and use adequate and suitable respiratory protective equipment when the other controls do not sufficiently control exposures.
3. Education and training of workers around the effects of silica dust exposures, best practices and the use of control measures. For example, the correct training in fitting their respiratory protective equipment and necessary cleaning, maintenance and storage.
4. Ongoing review of the risks and effectiveness of the controls.
5. Health surveillance including lung function tests and chest X-rays, for example.

Personal Protective Equipment (PPE)

The use of PPE is the last line of defence in the hierarchy of controls when other controls may be either impractical, provide limited benefit or cannot control hazards to safe levels. Sometimes PPE is used along with other methods of control when the risk is still present.

Respiratory Protective Equipment (RPE) is available in many forms including filtering facepiece respirators, reusable respirators, loose-fitting powered air systems and air supplied respirators which rely on the inhalation of breathable quality air from either a fresh air hose or a self-contained breathing apparatus.

Choosing the correct RPE depends on many factors such as:

- The type of hazard – dusts, fibres, gases and vapours, for example
- The concentration of hazard present in the air
- The individual worker – their facial contours, presence of facial hair, their workrate, etc.
- The workplace environment i.e., hot/humid, sufficient oxygen to support life when using filtering respirators

The minimum protection factor for exposure to RCS is FFP3 or a half mask fitted with P3 particulate filters. In the UK for example, the Assigned Protection Factor (APF) required for exposure to RCS in the construction industry is dependent on the type of application. Check your national regulation for further guidance.

The minimum protection factor required for exposure to RCS in Europe may vary by country. In the UK, for example, the minimum Assigned Protection Factor (APF) required for exposure to RCS in the construction industry is 20. However, this protection factor can be 40 depending on the type of application (see table below).[18]

Check your national regulation for further guidance.

Operation	APF
Cutting concrete kerbs, block and paving with a cut-off saw	20
Scabbling or grinding with hand-held tools	20
Drilling holes with hand-held rotary power tools	20
Soft strip demolition	20
Removing small rubble, dust and debris	20
Wet coring and dry coring	20
Cutting roof tiles with a cut-off saw	20
Chasing concrete and raking mortar	20

Examples of the type of RPE providing APF of 20 or 40 are shown in the table below.

Type of RPE	Classification	APF
Filtering facepiece respirator	FFP3	20
Reusable half mask fitted with P3 filter	P3	20
Full face mask fitted with P3 filter	P3	40
Powered full face mask	TM3	40
Powered hood/helmet	TH3	40

Important points:

Before use, check to ensure the appropriate RPE is:

- Suitable for the job and wearer
- Not damaged
- Tested against the appropriate EN standard and CE/UKCA approved against the PPE Regulation (EU) 2016/425
- Fits correctly – as part of training, education and awareness on correct selection and usage in accordance with the European Council Directive 89/656/EEC
- Face fit tested as dictated by local regulation
- Regularly checked, cleaned and maintained (except for disposable RPE)
- Fitted with filters in accordance with manufacturer's instructions
- Supported with correct record keeping of all PPE used by the individual wearer

Facial hair and respirator face fit testing

Any tight-fitting respirators should only be worn by those who are clean shaven and must seal well to the wearer's face in order to provide expected protection. If there is a leak in the face seal region, the wearer may be exposed to harmful airborne contaminants. Fit testing may be required by law in some countries in Europe and is being increasingly adopted by companies as best practice even where there is not a mandatory requirement to fit test. Check your local regulation for further information.

Any tight-fitting facepiece should therefore be fit tested. These include filtering facepiece respirators (disposable respirators, commonly referred to as 'dust masks'), half-masks with filters and full-face masks with filters. Any tight-fitting facepiece that is connected to a powered or supplied air system should also be fit tested; this includes tight-fitting face masks used with turbos, breathable compressed air or self-contained breathing apparatus.

Face fit testing of powered respirators featuring loose fitting hoods or helmets is not required. As a result, these devices are often considered for workers with facial hair and for individuals who need to combine multiple items of PPE, for example head, face and hearing protection.

There are essentially two different methods of respiratory fit testing, qualitative or quantitative.

The qualitative method is based on the wearer's ability to sense a test agent e.g. saccharin or bitter tasting substance. The quantitative method involves measuring tiny particles outside and inside the specially adapted respirator using sophisticated equipment. Alternatively, CNP (Controllled Negative Pressure) devices may be used for half and full face respirators.

The table below shows face fit test method for different type of tight-fitting respirators.

RPE	Filter classification*	Fit test method
Filtering facepiece respirator (disposable)	FFP3	Qualitative or Quantitative (not CNP)
Reusable half mask respirator	P3	Qualitative or Quantitative
Full face mask respirator	P3	Quantitative test only
Powered air respirator system with full face mask	TM3	Quantitative test only
Powered air respirator system with hood/helmet	TH3	Not applicable

* Classification of suitable respirator for protection against respirable crystalline silica dust (RCS)

Visit the **3M™ Fit Testing page**

Respiratory protection

For applications up to 20 times Workplace Exposure Limit (WEL):

3M™ Aura™ Particulate Respirator, FFP3, Valved, 9332+Gen3

3M™ Aura™ Particulate Respirator 9332+Gen3 is the third generation of our best-selling 3M Aura respirator, offering comfortable and reliable FFP3 breathing protection combined with the original 3-panel, flat-fold design. It has practical positioning tabs, braided headbands and an embossed, sculpted upper panel that helps reduce eyewear fogging. It uses 3M Advanced Electret (filter) Media (AEM), a high-performance material that's engineered for easy breathing, and a new 3M™ Cool Flow™ Comfort Valve which allows exhaled air to escape the respirator.

3M™ Disposable Respirator, FFP3, 8833

3M™ Disposable Respirator 8833 has been designed with comfort in mind, the super soft cushioned lining provides instant yet lasting comfort. Protects against dusts and water and oil based mists found in a wide variety of industrial applications and other work situations requiring FFP3 protection.

3M™ Aura™ Particulate Respirator, FFP3, Unvalved, 9330+

3M™ Aura™ Particulate Respirator 9330+ provides FFP3 breathing protection with a flat-fold, 3-panel design, low breathing resistance and an embossed, sculpted top panel that can help reduce eyewear fogging. It features an innovative chin tab for easy adjustments, and the headbands are colour-coded for quick and easy identification.

Respiratory protection continued

For applications up to 20 times the Workplace Exposure Limit (WEL):

3M™ Reusable Half Mask 6500QL Series

The 6500QL is durable and resilient with a strong body construction and stable silicone face seal that's soft yet firm. The low-profile, half-facepiece design offers a wider field of view and better compatibility with welding and grinding shields The bayonet-style connection fits a broad range of filters, offering protection against gases, vapours and particulates. The 3M™ Cool Flow™ Valve provides easier breathing by helping reduce heat build up, and an exhalation valve cover helps direct exhaled breath and moisture downward to reduce fogging in your eyewear, grinding or welding shields. The 6500QL Series features the Quick Latch Drop Down mechanism, which makes it easy to put on or take off the masks with one hand. That means you won't need to remove your safety helmet or face shield when lowering or raising your respirator.

Pair with 3M™ Particulate Filters 6000 Series or 3M™ Particulate Filter 2135

3M™ Secure Click™ Reusable Half Mask HF-800 Series

Designed with smart and intuitive features 3M™ Secure Click™ Half Mask Reusable Respirator HF-800 Series is simple, comfortable and reliable. Available in three sizes: small, medium, and large, our respirators all come with an optional speaking diaphragm.

Pair with 3M™ Secure Click™ Replaceable Particulate Filter P3 R, D7935 or **3M™ Secure Click™ Hard Case P3 R Particulate Filter, D9035**

For applications up to 40 times the Workplace Exposure Limit (WEL)

3M™ Reusable Full Face Mask 6000 Series

3M™ Reusable Full Face Mask 6000 Series has a large polycarbonate lens and soft, hypo-allergenic, elastomeric facepiece. The 3M™ Bayonet Connection System enables you to connect to a broad range of 3M twin lightweight 3M filters. Our lightweight full-face masks feature a 3M™ Cool Flow™ Valve and four-strap suspension. They're available in three sizes.

Pair with 3M™ Particulate Filter 2135, P3 for 6000 and 6500 series or **3M™ Particulate Filters 6000 Series**

3M™ Versaflo™ Powered Air Turbo Starter Kit, TR-315

The Versaflo powered air system combines performance, protection and functionality with modern, stylish, lightweight design and unrivalled comfort. Powered Air Starter Kit TR-315+ contains TR-302E+ Turbo Unit, Particle Filter, Pre-Filter, Spark Arrestors, Standard Belt, High Capacity Battery, Battery Charger Kit and length adjusting Breathing Tube.

Note: The 3M™ Versaflo™ Powered Air Turbo Kit, TR-615 is also available. This can be used with combined particulate and gas/vapour filters and can also be combined with certain 3M™ Reusable Face Masks.

3M™ Versaflo™ M-Series Helmet with comfort faceseal, M-306

When used with compatible powered or supplied air respiratory protection, the 3M™ Versaflo™ M-306 Helmet offers respiratory, eye and face protection (EN 166 Medium energy impact) as well as head protection (EN397), essential for areas where hard hats are mandatory. M-306 features a general purpose faceseal for construction, chemical applications and heavy industry.

Head, eye and face protection:

3M™ SecureFit™ Safety Glasses 200 Series
3M™ SecureFit™ 200 Series are lightweight safety glasses with 3M™ Pressure Diffusion Temple Technology. Our glasses feature a wraparound design that's secure and comfortable. They are available in various lens tints.

3M™ Solus™ 1000 Series Safety Glasses
3M™ Solus™ Safety Glasses 1000 Series feature a strong polycarbonate lens in a slim, stylish frame. Our safety glasses have 3M™ Scotchgard™ Anti-Fog / Anti-Scratch Coating, and can be configured in different ways because of the headband and gasket options. They are available in various lens tints.

3M™ Faceshield Holder for Safety Helmets
Designed to be compatible with 3M™ Hard Hats, the 3M™ Hard Hat Faceshield Holders help securely mount a faceshield to your hard hat. Compatible with a variety of 3M™ W-Series Faceshields that help protect against impact, splash and/or radiant heat. Consider pairing with the 3M™ WP Series Clear Visors.

3M™ U5B Faceshield Holder for SecureFit™ Safety Helmet
Can be connected with the 3M™ WP Series Clear Visors.

3M™ G3000 Safety Helmet with Uvicator™
Designed to help protect a worker's head from impact, these adjustable safety helmets feature a four-point ratchet or pinlock suspension system to deliver a comfortable, secure fit that helps reduce slippage. A UVicator™ sensor lets the wearer know when to replace hard hat due to UV exposure and integrated vents help release heat buildup and allow air circulation for enhanced comfort.

Suggested PPE options

Hearing protection:

3M™ E-A-R™ Push-Ins™ Earplugs
3M™ E-A-R™ Push-Ins™ Earplugs feature a soft foam eartip made from 3M™ E-A-Rfoam™ with a smooth skin surface for improved comfort and a semi-flexible stem that helps easy insertion and removal in the ear canal. This product can be fitted using one hand fitting method with an SNR of 31dB or two hand fitting method with an SNR of 35dB.

3M™ PELTOR™ X Series Earmuffs
Lightweight and low-profile hearing protectors with innovative foam insert and spacers which helps improve attenuation, particularly at lower frequencies. SNR 33dB.

Communication solutions:

3M™ PELTOR™ WS™ ALERT™ X Headsets
3M™ PELTOR™ WS™ ALERT™ X Headset is a Bluetooth® headset with noise-cancelling boom microphone that connects to your mobile phone for hands free calls and streaming in noisy environments. The headset has a level-dependent function for ambient listening and it synchs to a mobile app so users can easily set-up and adjust the headset.

3M™ PELTOR™ WS™ LiteCom Plus Headsets
3M™ PELTOR™ WS™ LiteCom Plus Headset features integrated pre-programmed PMR two-way radios, Bluetooth® Multipoint connectivity, noise-cancelling microphones, and a level-dependent function for ambient listening.

3M™ PELTOR™ Electronic Earplug EEP-100
3M™ PELTOR™ Electronic Earplug EEP-100 helps protect against harmful noise, whilst allowing ambient sounds to be heard. It increases the ability to communicate with nearby colleagues, as well as hearing warning signals, approaching vehicles or sounds in machines and processes.

Fall protection:

3M™ Protecta® E200 Comfort Belt Style Fall Arrest Harness
Features a fixed back D-ring to minimise workday readjustment and breathable shoulder/hip padding for added comfort during long periods of wear. Includes a durable and sturdy belt, a choice of pass-through or quick connect buckles, back and side D-rings.

Body protection:

3M™ Disposable Protective Coverall, 4520
Built for protection and designed for comfort, it features breathable back panels and an anatomical fit for enhanced wear, coverage and comfort while working.

Welding and grinding operations in construction

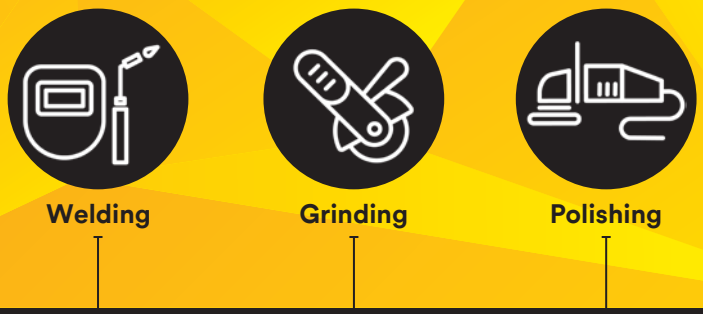
Welding generates an enormous amount of heat to melt metal and join workpieces together. As part of this melting process, some metal is vaporised, producing metal fume – microscopic particles of hot metal and gases that are small and buoyant enough to be released from the welding arc and rise in a cloud into the workplace air. This fume is potentially inhaled by the welder or others close to the source. Without effective controls in place, welders may have significant exposures potentially leading to significant short- and long-term health effects.[19]

Visible fume clouds are likely to contain metal particles, metal oxides and flux if it is used. Researchers are continually learning more about the science behind welding fumes, and the worksite hazards they present.

Every construction project is different, and so are the welding fume hazards. Specific toxic effects depend on the metals being used, their concentration levels and total time of exposure.

Metals that may create welding fumes include:[20]

- Manganese
- Chromium (including hexavalent chromium Cr VI)
- Iron
- Aluminium
- Cadmium
- Nickel
- Copper
- Lead
- Zinc
- and others



Inhaling metal fume has the potential to lead to adverse health effects, so it's important to effectively control worker exposure. On construction sites without effective engineering controls, work practice controls or respiratory protection in place, workers may face significant exposure to hazardous welding fumes. An example of this potential health impact is the possibility for workers to develop flu-like symptoms for 24–48 hours following certain welding activities. Known as metal fume fever, this ailment leads to eye, nose and throat irritation, dizziness and nausea.[20] If workers have overexposure to welding fumes over long time periods, it may lead to lung damage and other serious health outcomes.[21]

Potential immediate health effects of certain* welding fumes:

Eye, nose and throat irritation

Dizziness

Nausea

Headaches

Metal fume fever.
Notably, it is more likely to occur after time away from the job (weekends, holidays, etc.)[22]

*Metals such as cadmium oxides, copper, iron oxides, manganese, molybdenum, nickel, zinc and others[23]

Potential long-term health effects of certain welding fumes:

- Chronic lung diseases and lung cancer[24]
- Fumes such as cadmium and lead may cause kidney damage. Fumes such as manganese may lead to central nervous system damage[23]

It's important to remember that welding fumes affect not just the welder, but may affect adjacent workers. As health and safety should be the top priority for all of these stakeholders, each should be considered in the welding exposure assessment plan.

An evolving body of knowledge

Research into the effects of welding continues to change, so it's essential to consistently reevaluate your respiratory protection choices. All welding fume (including mild steel) is now classed as a group 1 carcinogen which can cause lung cancer and has the potential to cause kidney cancer. This is based on the outcome of recently published research by the International Agency for Research on Cancer (IARC).[25] Two common metals found in construction welding fumes are manganese and hexavalent chromium. See the "What are Manganese, Hexavalent Chromium, and Beryllium?" infographic for more information.

In accordance with the European Council Directive 2019/130/EU – Amendment of Directive 2004/37/EU on the protection of workers from the risks related to exposure to carcinogens or mutagens at work, the permitted exposure limit to Chromium and Chromium (VI) have been lowered to 0.005 mg/m^3 based on 8 hour time weighted average (TWA). This exposure limit is being phased in with transitional limit value of 0.01 mg/m^3 until 17 January 2025.

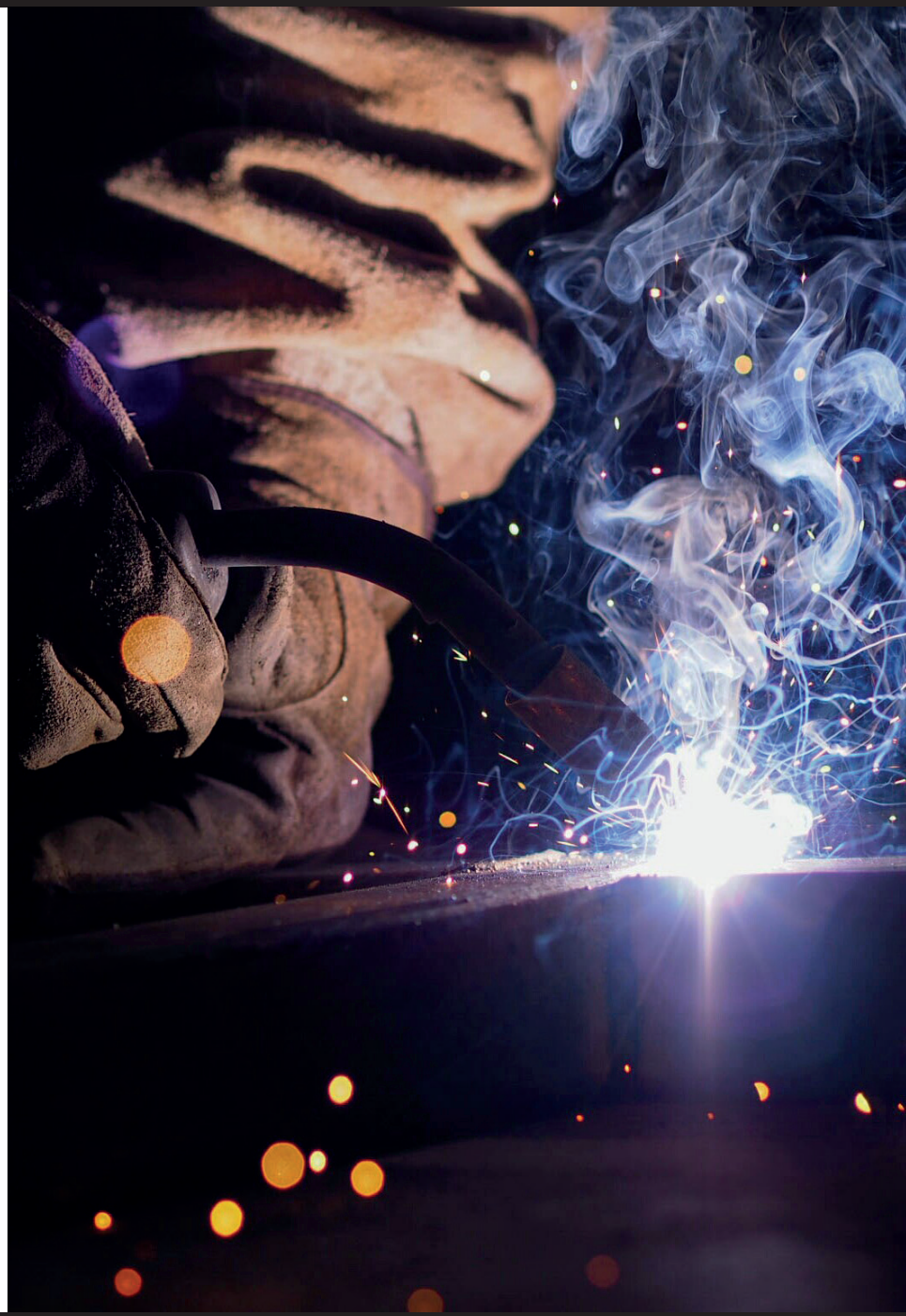
Similarly, the European Council Directive 2017/164/EU has a recommended indicative occupational exposure limit value for manganese of 0.2 mg/m^3 total inhalable dust and 0.05 mg/m^3 for respirable dust based on 8 hour TWA.

Hexavalent chromium hazards

Found naturally in the earth's crust, chromium is an element that poses a significant health hazard in welding. While it has many forms, its hexavalent form presents the greatest health risk to workers. Stainless steel welding can lead to hexavalent chromium fumes, which can become airborne during welding activities. Workers may also encounter this metal in certain paints, pigments, dyes and plastics. In the UK, the Control of Substances Hazardous to Health (COSHH) Regulation 2002 requires employers to reduce workplace exposure limit (WEL) of Chromium VI to a level below 0.05mg/m^3 averaged over an 8 hour period. Workers should take precautions to account for hexavalent chromium when welding, spray painting, sanding, grinding or abrasive blasting.

Manganese hazards

Manganese, a naturally occurring metal, is often used with steel to improve hardness and durability. Workers typically interact with manganese when using welding rods or filler metals. This type of metal can lead to harmful health effects during welding. When it's heated, it reacts with oxygen in the air and creates manganese oxide fumes – a dangerous compound that poses a real hazard to workers if too much is inhaled. Cutting, welding, grinding and polishing metal containing manganese can all lead to potential manganese exposures. Over long periods of time, overexposure to this metal can lead to serious health concerns. In 2018, the Workplace Exposure Limit (WEL) for Manganese was lowered to 0.05 mg/m^3 in the UK. This is a significant change as much of the manganese in the welding fume is respirable. Report published by the BOHS suggests that exposure to even low levels of manganese can damage the nervous system.[26]



Eye hazards

Electric arc welding can lead to unique hazards for workers' eyes, faces and respiratory systems. Some welding and cutting work create ultraviolet/infrared (UV/IR) radiation and intense visible light, which may lead to permanent eye damage. What's more, welding spatter and grinding particles can cause physical eye damage.

Burns on the retina or cornea are some of the most common eye injuries associated with welding work. Additionally, arc-eye can occur when a worker's eyes are exposed to UV radiation. These injuries typically occur when a worker is not wearing proper eye protection, or their welding helmet is in the up position as they accidentally strike an arc. Years of overexposure to these hazards may lead to retinal degeneration, cataracts and skin cancer. These optical radiation injuries are preventable when the proper protection is worn and used accordingly. As the intensity of light exposure varies with welding application, it is critical to choose welding PPE that provides the appropriate level of protection. Consult your local regulation or refer to ISO 19734:2021 guidance document on selection, use and maintenance of eye and face protectors for information.

Physical eye damage, also known as foreign body eye injuries, can happen when dust, grinding swarf or weld spatter get into a welder's eyes. Penetrating foreign body injuries occur when metal particles travelling at a high rate of speed penetrate the outer layer of the eye. This type of injury may occur in the white membrane of the eye called the sclera, or in the dome-shaped tissue at front of the eye called the cornea. If a penetrating eye injury is not treated promptly, infections may occur which could lead to blindness.[27]

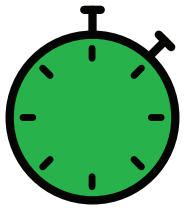
Noise hazards

Welders have the highest prevalence of noise-induced hearing impairment among construction trades.[7] Pulsed and high-current welding processes, in addition to other sources, can lead to excessive noise exposure during welding operations. Activities such as carbon arc welding and gouging, TIG (pulsed), grinding and sanding may all lead to hazardous noise levels on a construction site.[28] Hearing and communication issues may arise when workers use hearing protection that is not appropriate for the exposures either below or above required levels. Hearing protection that doesn't reduce hazardous noise to appropriate action values can lead to hearing damage, while over-attenuating hearing protectors can reduce the worker's ability to hear vital communication and important sounds such as fire alarms or vehicles reversing.

Minutes of carelessness per day significantly reduces the effect of hearing protection.

If you're in a harmful loud workplace environment at or above 85 decibels and not wearing your hearing protection just 10% of the time significantly reduces your effective protection.[29] Noise-induced hearing loss (NIHL) is caused by the damage and eventual death of the sensory cells in your ears, called hair cells. Unlike some other cells, human ear hair cells never grow back.

Minutes matter: Use hearing protection 100% of time to achieve effective protection

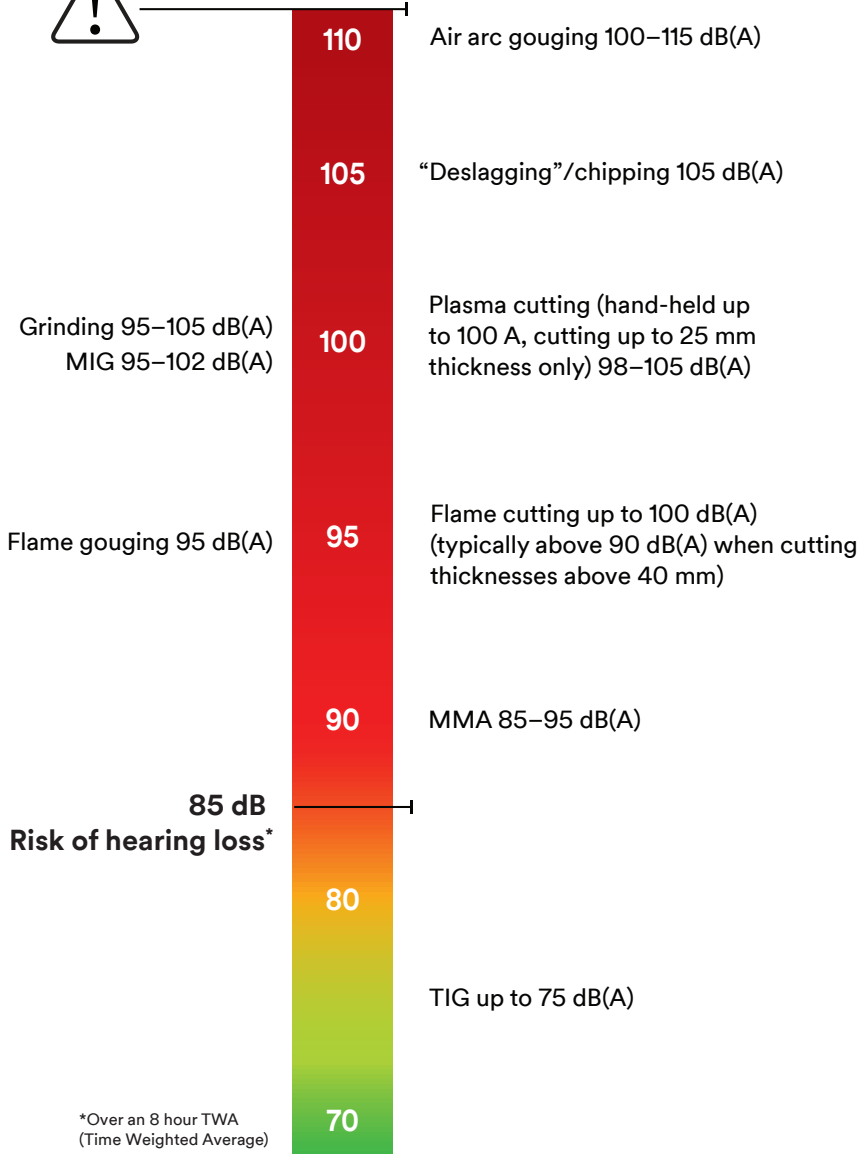


100% usage
Gives the expected protection

99% usage
Reduces protection

90% usage
Significantly reduces protection

Process typical noise levels



For more information visit the 3M Center for Hearing Conservation: www.3M.com/chc

How to reduce welding fumes

Welding can lead to an airborne mixture of gases and fumes (particles).[19,20] Using a hierarchy of controls is the best approach to address these hazards and risks. The highest priority items on the hierarchy are the most effective in reducing fumes and worker exposure. They also place the least burden of responsibility on the welder. Remember that every welding fume control has specific limitations.

Priority		Controls[20]	Control limitations
1	**Modify or substitute a welding process**	Look for other processes that generate less fumes or reduce exposure to airborne contaminants.	It may not be possible to substitute a process or metal. An example would be when the end product requires stainless steel (chromium).
2	**Engineering controls**	Modify enclosures around the welder, provide general ventilation of the work area (includes forced air and natural ventilation from drafts or outdoor work) or use local exhaust controls.	Ventilation can be difficult to achieve due to conflicting needs. For instance, providing enough local exhaust ventilation to remove the fumes while not disturbing shielding gases.
3	**Work practices**	Ensure that the welder keeps their head out of the plume. For example, keeping the welder's head down wind of the plume.	Space restrictions may not allow a welder to move their head away from the plume.
4	**Personal respiratory protection**	When steps one through three don't reduce exposure sufficiently, it is recommended to use appropriate respiratory protection.	Employers must establish an effective respiratory protection programme in accordance with local regulation. The programme must include correct selection procedure for respiratory protection based on the hazard, wearer and workplace environment. It must also cover necessary training on correct selection, fitting, fit testing as well as cleaning and maintenance.

Check your local regulations for further information.

Take action to protect worker safety

If the results of workplace exposure assessments identifies the presence of a respiratory hazard, construction companies must create a written control plan which may include a respiratory protection program that is aligned with the local regulatory requirements. As occupational exposure levels change over time, construction companies need to continually review and update their respiratory protection program. The 3M Respiratory Hub has a wide variety of helpful resources, including information for conducting assessments and selecting the necessary products to help protect against worksite respiratory hazards.

Any respiratory protection product used on site must be tested and CE approved against the Personal Protective Equipment Regulation (EU) 2016/425.

Welding protection

Welding helmets with filter lenses are designed to protect a worker's face and eyes from heat, spatter and radiation. When the helmet has an auto-darkening filter (ADF), even if the power is off the UV/IR bandpass filter is always in place and will provide protection from hazardous optical radiation. This protection is maintained throughout the entire welding process. There are several advantages of using ADFs, such as reducing the need to lift the welding helmet to see the work piece or arc zone, before, during and after striking the arc, resulting in less chances for eye injuries from arc rays or flying objects. Safety spectacles must be worn under the helmet. Other advantages may include the potential for reduced ergonomic injuries since the need to nod the head to lower or raise the helmet is eliminated.[30] Learn more of the benefits of a 3M Welding powered air purifying respirator (PAPR) system.

Selecting PPE

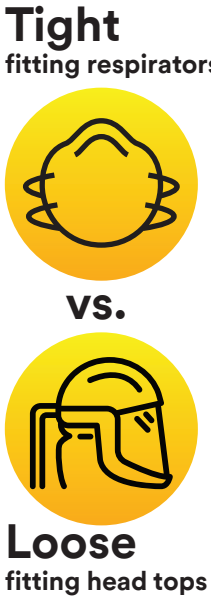
While arc/UV radiation and potential burn from welding might seem obvious, protecting workers' lungs and other vital organs is another critical consideration. Starting from an exposure assessment, analyze the various hazards that will require PPE solutions and consider the protective equipment's specific fit-testing and inspection requirements. Integrated protection solutions have the potential to provide protection for multiple hazards in the same application. For example, a welding helmet may feature ADFs, hard hat protection, integrated grinding shields and mountable earmuffs. Be aware that some solutions also integrate a PAPR or supplied air respiratory (SAR) system. See the following guides for more information on selecting and maintaining welding respiratory protection.

Advantages of a well-designed welding helmet protective equipment include:

- A welding helmet with filter can protect a worker's face and eyes from heat, spatter and optical radiation
- Integrated respiratory protection to help protect against welding fumes
- Auto-darkening welding filters allow welders to keep their welding helmets in place much more often than passive welding filters, resulting in:
  - Reduced likelihood of accidental exposure to harmful UV/IR radiation by striking an arc or exposure to arcs of nearby welders
  - A lower potential for foreign body eye injuries from grinding swarf or weld spatter

Facial hair considerations

Many employees wonder if they can grow or keep facial hair when they're required to wear a respirator for their jobs. The answer to this question largely depends on the type of respirator the worker is using. Tight-fitting respirators require workers to be clean-shaven. Loose-fitting head tops may be an option for workers who have facial hair. These types of respirators can provide a more versatile PPE solution at construction sites, as employees won't necessarily need to shave their facial hair in order to wear the equipment. Check the manufacturer's instruction to determine the amount of hair allowed for loose fitting head tops. See the 'Can Welders Grow Facial Hair' infographic for more information.



Eye protection

Proper selection of eye and face protection for welding and grinding operations is crucial to help avoid eye injuries. Protection from optical radiation requires using welding filters. As the shade of the filter increases, the amount of protection from UV/IR light increases. Consult your local regulations for guidance on selection and usage of proper shade. The newly published ISO standard 19734:2021 Eye and face protection - Guidance on selection, use and maintenance provides valuable information on correct selection of eye and face protection for welding applications as well as other optical and physical hazards.

Grinding operations may result in flying particles, sparks, dust or fragments. The ISO 19734:2021 Eye and face protection – Guidance on selection, use and maintenance provides information on protection against physical – mechanical hazards comprising flying particles of low mass and varying degree of velocity low, medium or high).

For better protection during grinding/cutting, an appropriate stand-alone face shield together with a suitable respirator or face shield integrated into a powered air respirator system should be considered.

When optical radiation (UV or IR light) is a concern, welding filters with the proper shade must also be worn.

Refer to ISO 19734:2021 for further information on appropriate protection against optical radiation from welding application. Always check to ensure the chosen product is tested and CE approved against the PPE Regulation (EU) 2016/426.

PPE backed by science

Before you determine the specific PPE your worker needs for its welding or grinding operations, consider what goes into the heart of developing such a product. It's important to source PPE from a trusted company who uses science as a starting point for every product. 3M has spent 45 years developing PPE for a variety of construction site needs, including welding and grinding applications. By applying knowledge and insights from construction worksites, 3M develops welding and grinding PPE that can help improve safety outcomes. Explore the proven, science-based PPE solutions that construction crews across the globe use for worksite safety.

For welding For grinding

3M™ Speedglas™ 100 Welding Helmet

3M™ Speedglas™ Welding Helmet 100 with 3M™ Safety Helmet G3001 and with Auto-Darkening Filter 100V is good for Stick, MIG and most TIG welding processes. User selectable dark shades 8 through 12 and viewing area of 93×44 mm. It has three user-selectable sensitivity levels for reliable arc detection and has excellent optical quality. Compatible with most 3M disposable welding particulate respirators.

3M™ Speedglas™ 9100-QR Welding Helmet

For eye, face and head protection with a welding visor that can be detached for non-weld jobs while your safety helmet stays in place, get 3M™ Speedglas™ Welding Helmet 9100-QR. The welding helmet can be used with different 9100 ADF's (autodarkening welding filters) – 9100V, X, XX or XXi with viewing areas 107mm x 73-45mm and user selectable dark shades 5,8, and 9 through 13. The included 3M™ Safety Helmet H-701 is comfortable, tough and lightweight, with a low profile for balance and stability. Compatible with most 3M disposable welding particulate respirators.

3M™ Speedglas™ 9100MP Welding Helmet with Adflo™

The 3M™ Adflo™ Powered Air Purifying Respirator (PAPR) and 3M™ Speedglas™ Welding Helmet 9100 MP with auto-darkening filter (ADF) offers the welder compact, lightweight respiratory protection and quality filter optics all-in-one. Head, eye, face, respiratory and optional hearing protection—we have the ability to integrate five types of welder protection into one easy-to-use system. The welding helmet can be used with different 9100 ADF's (autodarkening welding filters) – 9100V, X, XX or XXi with viewing areas 107mm x 73-45mm and user selectable dark shades 5,8, and 9 through 13. The 3M Adflo PAPR features a lithium-ion battery, high efficiency particulate filter, spark arrester and wide leather belt. Audible and visual alarms signal low airflow and low battery charge.

Respiratory protection

For respiratory protection while welding in combination with a welding shield or while grinding with appropriate face protection:

3M™ Reusable Half Mask 6500QL Series
The 6500QL is durable and resilient with a strong body construction and stable silicone face seal that's soft yet firm. The low-profile, half-facepiece design offers a wider field of view and better compatibility with welding and grinding shields The bayonet-style connection fits a broad range of filters, offering protection against gases, vapours and particulates. The 3M™ Cool Flow™ Valve provides easier breathing by helping reduce heat build up, and an exhalation valve cover helps direct exhaled breath and moisture downward to reduce fogging in your eyewear, grinding or welding shields. The 6500QL Series features the Quick Latch Drop Down mechanism, which makes it easy to put on or take off the masks with one hand. That means you won't need to remove your safety helmet or face shield when lowering or raising your respirator.

Pair with 3M™ Particulate Filters 6000 Series
or **3M™ Particulate Filter 2135**

3M™ Secure Click™ Reusable Half Mask HF-800 Series
Designed with smart and intuitive features 3M™ Secure Click™ Half Mask Reusable Respirator HF-800 Series is simple, comfortable and reliable. Available in three sizes: small, medium, and large, our respirators all come with an optional speaking diaphragm.

Pair with 3M™ Secure Click™ Replaceable Particulate Filter P3 R, D7935 or **3M™ Secure Click™ Hard Case P3 R Particulate Filter, D9035**

Grinding protection

For respiratory protection while grinding:

3M™ Reusable Full Face Mask 6000 Series

3M™ Reusable Full Face Mask 6000 Series has a large polycarbonate lens and soft, hypo-allergenic, elastomeric facepiece. The 3M™ Bayonet Connection System enables you to connect to a broad range of 3M twin lightweight 3M filters. Our lightweight full-face masks feature a 3M™ Cool Flow™ Valve and four-strap suspension. They're available in three sizes.

Pair with 3M™ Particulate Filter 2135, P3 for 6000 and 6500 series or **3M™ Particulate Filters 6000 Series**

3M™ Versaflo™ Powered Air Turbo Starter Kit, TR-315

The Versaflo powered air system combines performance, protection and functionality with modern, stylish, lightweight design and unrivalled comfort. Powered Air Starter Kit TR-315+ contains TR-302E+ Turbo Unit, Particle Filter, Pre-Filter, Spark Arrestors, Standard Belt, High Capacity Battery, Battery Charger Kit and length adjusting Breathing Tube. Appropriate 3M™ Versaflo™ M-series headtop is also required, e.g. M-307.

3M™ Versaflo™ M-Series Helmet with flame resistant faceseal, M-307

When used with compatible powered or supplied air respiratory protection, the 3M™ Versaflo™ M-307 Helmet offers respiratory, eye (EN166 Medium Impact) and face protection (Medium energy impact) as well as head protection (EN397), essential for areas where hard hats are mandatory. M-307 features a flame resistant faceseal for applications with hot particles.

3M™ Adflo™ Powered Air Purifying Respiratory Systems for welding and grinding

Welding and grinding

9100 MP

57 28 00 (without welding filter)

Grinding only

M-Series Helmet

M-307

Grinding only

M-Series Helmet

M-407

83 40 16, 83 40 17

83 40 16, 83 40 17

83 77 30*, 83 77 31*

Mandatory components

1 **HE Filter:** 83 70 12, 83 70 20, 83 70 80

2 **Spark Arrestor:** 83 60 00

Optional components

Prefilter: 83 60 10, 83 60 80

OV nuisance odour filters:

83 71 10 Odour Filter Assembly

83 71 20 Odour Filter Pad

*Adflo™ parts 83 77 30 & 83 77 31 includes breathing tube 83 40 16

Nuisance Odor Pad must be used with HE filter, pre-filter and spark arrestor. Do not use alone. Do not use with the OV/AG cartridge.

3M Supplied Air Respiratory Systems for Welding and Grinding

Welding or grinding

9100 MP

57 28 00 (without welding filter)

Grinding only

Grinding only

M-Series Helmet

M-307 M-407

83 40 16, 83 40 17

BT-20S, BT-20L, BT-40

BT breathing tubes to be used when M-Series connected to V-500E

Note: remember to consult rules on connecting air lines

3M™ High Pressure Supplied Air Hoses and valves

308-00-31P, 308-00-30P, 308-00-72P

308-00-40P

V-100E, V-200E

V-500E

3M™ Aircare™ Filtration System

ACU-03, ACU-04

Head, eye and face protection:

Grinding operations may result in flying particles, sparks, dust, or fragments. The ISO 19734:2021 guidance document on selection, use and maintenance of eye and face protection provides information on appropriate personal protective equipment against specific physical, mechanical and optical hazards arising from grinding applications. The document also provides valuable information on shade numbers for different arc welding processes e.g., MMA, MIG, TIG etc. During welding or grinding applications, additional respiratory hazards may be present and an appropriate respiratory protective equipment should be considered.

3M™ SecureFit™ Safety Glasses 200 Series
3M™ SecureFit™ 200 Series are lightweight safety glasses with 3M™ Pressure Diffusion Temple Technology. Our glasses feature a wraparound design that's secure and comfortable. They are available in various lens tints.

3M™ Solus™ 1000 Series Safety Glasses
3M™ Solus™ Safety Glasses 1000 Series feature a strong polycarbonate lens in a slim, stylish frame. Our safety glasses have 3M™ Scotchgard™ Anti-Fog / Anti-Scratch Coating, and can be configured in different ways because of the headband and gasket options. They are available in various lens tints.

3M™ GoggleGear™ 6000 Series Safety Goggles
For safety goggles with indirect ventilation and a 3M™ Scotchgard™ Anti-Fog and Anti-Scratch coating, use 3M™ GoggleGear™ Safety Goggles 6000 Series. Our large profile safety goggles feature indirect ventilation to allow air to circulate and help reduce fogging. The polycarbonate lens features a 3M™ Scotchgard™ Anti-Fog and Anti-Scratch coating for superior anti-fog protection and increased durability that resists fogging for longer than traditional anti-fog coatings, even after up to 25 washings with water*. Available in a range of shroud colours and two lens options.

3M™ GoggleGear™ 500 Series Safety Goggles
Get superior anti-fog and anti-scratch properties, and protection against UV radiation with 3M™ Goggle Gear™ Safety Goggles 500 Series. Our low-profile, lightweight safety goggles have 3M™ Scotchgard™ Anti-Fog / Anti-Scratch Coating which provides superior anti-fog and superior anti-scratch properties, resisting fogging longer than traditional anti-fog coatings, even after washing multiple times; and is designed to withstand disinfection from soaking in diluted bleach or using alcohol wipes, without losing performance. Benefiting from a modern, slim-line design, these goggles feature an easy-to-adjust headband and a pivoting ratchet for convenient personal adjustment and a comfortable fit. A special 3M™ Goggle Gear 500 prescription insert is available to use with 3M™ Goggle Gear™ Safety Goggles 500 Series.

3M™ Faceshield Holder for Safety Helmets
Designed to be compatible with 3M™ Hard Hats, the 3M™ Hard Hat Faceshield Holders help securely mount a faceshield to your hard hat. Compatible with a variety of 3M™ W-Series Faceshields that help protect against impact, splash and/or radiant heat. Consider pairing with the **3M™ WP Series Clear Visors**.

*Based on 3M internal testing per EN 168 test method when compared with traditional anti-fog coatings.

Head protection

3M™ G3000 Safety Helmet with Uvicator™

Designed to help protect a worker's head from impact, these adjustable safety helmets feature a four-point ratchet or pinlock suspension system to deliver a comfortable, secure fit that helps reduce slippage. A UVicator™ sensor lets the wearer know when to replace hard hat due to UV exposure and integrated vents help release heat buildup and allow air circulation for enhanced comfort.

3M™ SecureFit™ X5000 Series Safety Helmets

Safety helmets are designed to help protect workers from small falling objects with the security of a chinstrap. This climbing-style helmet delivers all-day comfort without sacrificing security. Its suspension system incorporates exclusive patented Pressure Diffusion Technology to deliver comfort without compromise.

Hearing protection

3M™ E-A-R™ Push-Ins™ Earplugs

3M™ E-A-R™ Push-Ins™ Earplugs feature a soft foam eartip made from 3M™ E-A-Rfoam™ with a smooth skin surface for improved comfort and a semi-flexible stem that helps easy insertion and removal in the ear canal. This product can be fitted using one hand fitting method with an SNR of 31dB or two hand fitting method with an SNR of 35dB.

3M™ PELTOR™ Welding Earmuffs, Black, Neckband, H505B

3M™ PELTOR™ Welding Helmet Ear Muffs are designed to be used with the 3M™ Speedglas™ Welding Helmet Series 9100. These ear muffs provide moderate level of attenuation that meets the needs of most welding industry applications.

3M™ PELTOR™ X4 Series Earmuffs

3M™ PELTOR™ X4 Earmuffs are our lightweight and slim hearing protectors with innovative foam earcup inserts and spacers to help boost attenuation and protect against low frequencies up to 33 dB.

Fall protection

3M™ Protecta® Pro™ Welders Harness

Stay safe and protected when working at height with 3M™ Protecta® Pro™ Welders Harness. Our welders harness is specifically designed to resist potential heat damage experienced in welding applications.

3M™ DBI-SALA® Nano-Lok™ Edge Self Retracting Lifeline

It features a combination of innovative lifeline material, energy absorption and harness connection to reduce the impact forces on the worker, and the shear forces on the lifeline, in a fall arrest event over a leading edge.

3M™ Protecta® Pro™ Welders Shock Absorbing Lanyard

Fire and sparks are a major concern in jobs such as welding, cutting, electrical maintenance and other high temperature applications. Keeping safe requires special materials to resist these hazards. The 3M™ Protecta® Pro™ Welders Lanyard provide complete safety for your workers in high heat environments. Heat and char resistant shock pack cover that slips over shock pack is heat resistant up to 371°C and the webbing is reinforced with Nomex®/Kevlar® fibre to protect the shock pack from getting burned.

3M™ DBI-SALA® Rollgliss™ R550 Rescue System with Hub

The Rollgliss™ R550 offers the choice of controlled descent rescue, evacuation or the versatility of assisted rescue with lifting capabilities. During assisted rescue scenarios, a fallen worker can be attached to the R550 device, raised to a point that allows their fall arrest device to be disconnected, then lowered to the ground safely.

3M™ DBI-SALA® Parts Pouch

Innovative self-closure system traps objects inside, making it nearly impossible for objects to fall out once placed in the bag. It makes it easy to retrieve objects while you work at heights since no opening or closing is necessary. Compatible with most tool belts.

Body protection:

3M™ Protective Coverall 4530

Our disposable coveralls offer protection against certain light liquid splashes and hazardous dust. They feature a low-profile, three-panel hood that zips up to the chin for excellent head protection. Freedom to move. We've designed this coverall to fit almost every body while allowing for optimal movement to get the job done right. Elastic at the waist and ankles help keep the protective coverall in place, while a reinforced gusset between the legs helps enhance durability while bending and squatting. Keep cool on the job. Our work coveralls feature a robust, yet lightweight Spunbound Meltblown Spunbound (SMS) material. Breathable protective material helps to keep workers comfortable on the job.

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Hearing and PELTOR

⚠ WARNING

These hearing protectors help reduce exposure to hazardous noise and other loud sounds. Misuse or failure to wear hearing protectors at all times that you are exposed to noise may result in hearing loss or injury. For correct use, consult supervisor and User Instructions or contact your local 3M Personal Safety Division.

⚠ WARNING

Research suggests that users may receive less noise reduction than indicated by the attenuation value(s) on the packaging, due to variation in fit, fitting skill, and motivation of the user. Refer to your applicable regulations for guidance on how to adjust label values and estimate attenuation. In addition, 3M strongly recommends fit testing of hearing protectors.

Eye protection

⚠ WARNING

These eye or face protection products help provide limited eye and face protection. Misuse or failure to follow warning and instruction may result in serious potential injury, including blindness or death. For proper use, selection and applications against flying particles, optical radiation and/or splash see supervisor, read User Instructions and warning on the package or contact your local 3M Personal Safety Division. These 3M PSD products are for occupational use only.

Head protection

⚠ WARNING

3M Head and Face Products provide limited protection only. Misuse or failure to follow warnings and User Instructions may result in serious personal injury or death. For proper use, see supervisor, User Instructions, or contact your local 3M Personal Safety Division.

Fall protection

⚠ WARNING

Compliant fall protection and emergency rescue systems help prevent serious injuries associated with fall events. Users must read and understand the User Instructions provided with the product, and must be properly trained by their employers in the safe use of these systems before using them, always follow applicable local standards. Misuse or failure to follow warnings and instructions may result in serious personal injury or death. For proper use, see supervisor, User Instructions, phone +44 (0)1344 858000 or email informationfallprotection@mmm.com

Respiratory protection

⚠ WARNING

These respirators help to protect against certain airborne contaminants. Proper selection, training, use and appropriate maintenance are essential in order for the product to help protect the wearer from certain airborne contaminants. Failure to follow all instructions on the use of these respiratory protection product and/or failure to properly wear the complete product during all periods of exposure may adversely affect the wearer's health lead to severe or life threatening illness or permanent disability. For suitability and proper use follow local regulations, refer to all information supplied or contact a safety professional or your local 3M Personal Safety Division.

Welding safety

⚠ WARNING

This product is designed to help protect the wearer's eyes and face from harmful radiation including visible light, ultra-violet radiation (UV), infra-red radiation (IR), sparks and spatter resulting from welding processes. These products must be used only by qualied persons who are properly trained in their use and maintenance. Misuse may result in permanent eye injury and vision loss. Always wear an EN 166 compliant safety spectacles in addition to any welding helmet. For correct use, see supervisor and User Instructions, or contact your local 3M Personal Safety Division.

Coveralls

Proper selection, training, use and appropriate maintenance are essential in order for the product to help protect the wearer. Failure to follow all instructions on the use of these personal protection products and/or failure to properly wear the complete product during all periods of exposure may adversely affect the wearer's health, lead to severe or life threatening illness or permanent disability.

Images are illustrative purposes only. Always ensure your PPE meets the relevant requirements for your country.

3M

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