3M Science. Applied to Life.™

3M™ PPE Solutions for Painting and Coating.

Manage your workers safety.

It is the employer's responsibility to identify all hazards relating to painting and coating operations in their workplace, to explain those hazards and health effects to their workers, conduct a risk assessment and implement control measures to reduce risk and over exposures.

That protection plan needs to be specific and cover all variables that workers may encounter. Those variables can include changes to paints, solvents, thinners, powder coat materials, fillers, degreasing chemicals, application methods, engineering controls, and so on.

Identify the hazards

Make a list of all the hazards in your painting and coating environment (solvents, chemicals, fire/explosion, heat, non-ionising radiation, noise, trip hazards, falling objects, working at height, etc).

Assess the risk levels

By evaluating every risk, you can prioritise their prevention. See more details in each section of this catalogue. If there are any doubts or ambiguities, always consult a professional health and safety engineer.

Apply controls

Work through the Hierarchy of Controls systematically to eliminate or substitute the hazard, use engineering controls to contain the hazard, administrative controls to change how people work and finally consider the use of PPE.

Select the right PPE

Now that you know the levels of protection needed for a specific application, you can select the right level of PPE to protect each vulnerability: eye, face, head, hearing, and respiratory system.

Within the appropriate level of protection, and wherever possible let workers choose on matters of personal preference regarding comfort, style, and ease of maintenance. For example, tight-fitting or loose-fitting respiratory protection; earplugs, banded plugs or over the head earmuffs. These personalised comfort choices help to maximise user acceptance of PPE.

Training, motivation and maintenance

For maximum benefit from any piece of PPE, it pays to focus on user acceptance and proper use. 3M can help:

- On-site training by 3M personnel or at your premises. We'll show you equipment options based on your needs
- Other techniques, such as Toolbox Talks, educational posters for your facilities, online videos, etc.
- For additional information regarding 3M Safety training, visit www.3M.co.uk/3M/en_GB/worker-health-safety-uk/safety-training-courses/

Process steps.

Painting and coating processes can vary significantly by substrate, industry, application of the finished product and the desired finish quality. Not all processes will follow the steps shown here. Each step will present its own health and safety hazards and risks. Each step should be risk assessed and appropriate controls put in place to reduce worker exposures and to meet applicable local standards or regulations.

Spray painting

1 Chemical and/ or mechanical stripping

Chemical (solvents, alkalis) and/or mechanical (chipping, shotblasting, abrasion, etc.) removal of existing paint coatings.

3 Primer application

Application of pre-treatments, primers and sealants.

5 Base coat and paint application

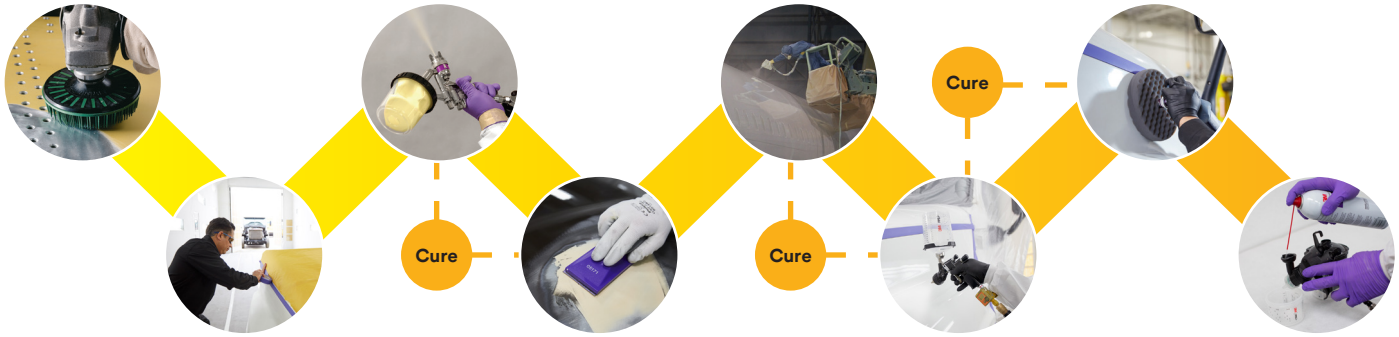
Application of base paint colour.

Application of additional colours.

7 Detailing, finishing, inspection and repair

Removal of masking, detailing, application of graphics.

Inspection, spot-repair or reworking.



2 Surface prep and masking

Paint, rust, scale removal and deburring.

Removal or burrs, weld splatter, filling and sanding, masking.

4 Filling, sanding and degreasing

Application of fillers and sanding to smooth finish.

Cleaning, degreasing and surface preparation before paint application.

6 Top coat / cear coat

As required, clear top coat.

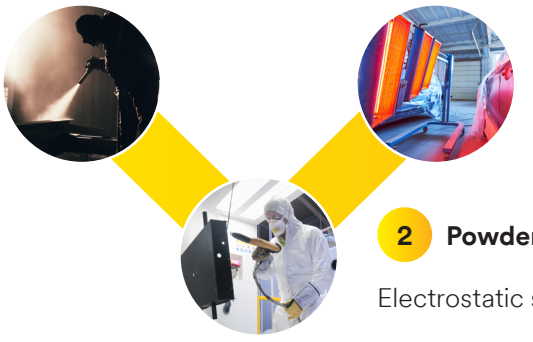
8 Clean-down

Cleaning of paint dispensing and spray equipment as required. Area clean down.

Powder coating

1 Preparation

Surface preparation of the metal surface (degreasing, shotblasting, etching, hanging on rotatory conveyor, masking as required, etc.)



3 Bake to cure

Melting and cure of the coating.

2 Powder spray application

Electrostatic spray application of powder coating.

Hazards.

 **Airborne and chemical hazards**	▸ Particulates from filling and sanding ▸ Powder coat materials ▸ Isocyanates, organic solvents ▸ Lead and chromates
 **Dermal hazards**	▸ Powder coat materials ▸ Isocyanates, organic solvents ▸ Lead and chromates
 **Eye hazards and radiation**	▸ Flying particles, liquid splash, mists, over-spray and gases/vapours ▸ Ultra-violet light from curing lamps ▸ Hot metal sparks/weld splatter
 **Noise and communication**	▸ Noise from handheld power tools, extraction and ventilation systems, background noise
 **Falling objects and head impacts**	▸ Falling objects from above ▸ Head impacts on workpieces
 **Falls from height, slips and trips**	▸ Slips and trips: loose flooring, trailing hoses and wires ▸ Working from ladders, scaffolds and MEWPs
 **Confined spaces**	▸ Entry into storage tanks; chemical storage rooms; ventilation and extraction systems; pits and machine spaces; inside large objects being painted (e.g. ships, trains, etc.)
 **Vibration**	▸ Vibration from handheld power tools
 **Machinery and equipment**	▸ Operation of power tools and fixed tools ▸ Pressurised spray equipment ▸ Mixing machinery
 **Electricity, electrostatic discharge**	▸ Electrical equipment ▸ Electrostatic shock from unearthed workpieces
 **Heat stress, burns, fire and explosion**	▸ Heat stress from working environment ▸ Burns from hot surfaces, ovens and workpieces ▸ Flammable materials, e.g. solvent soaked cloths ▸ Flammable and explosive atmospheres
 **Musculoskeletal and other hazards**	▸ Working in awkward positions, or performing repetitive physical tasks ▸ Standing for long periods of time ▸ Lifting heavy or awkward objects ▸ Lone working

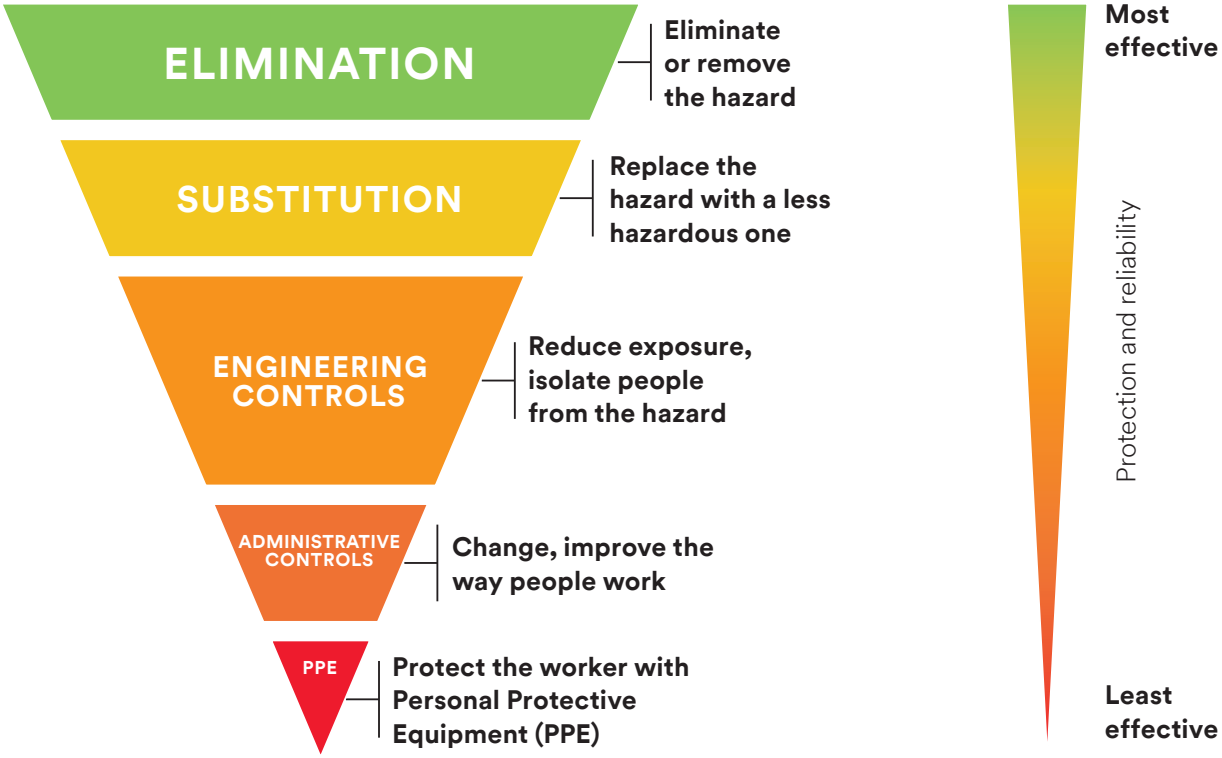
References

CCOHS – OSH Answers Fact Sheets, Painter. www.ccohs.ca/oshanswers/occup_workplace/painter
Hong Kong Labour Department – Guidance Notes on Paint Spraying and Related Coating Processes. labour.gov.hk/eng/public/os/C/B123.pdf
3M Technical Bulletin – Industrial Paint Hazards (release 1, May 2018).

Apply controls – reducing exposure and risk.

Painting and coating operations create respirable and inhalable dusts, mists, gases and vapours. Other hazards may include flying particles; liquid splash; overspray; noise; fire and explosion; being struck by objects; slips and trips working at height; etc. To address these hazards and risks, it is best practice to use the hierarchy of controls.The idea is that the highest priority items on the hierarchy not only do the most to reduce risk and worker exposure, but that they also put the least burden of responsibility on the worker.

Hierarchy of controls.



Respiratory Protective Equipment (RPE) selection.

The choice of the right respiratory depends on your particular working environment and individual requirements. 3M can assist you to choose the protection that helps you achieve optimum results. Start by identifying the hazards in the workplace and then assess the risk by completing a risk assessment. This guide you towards the right type of respirator, but good respirator selection will consider the following:

Is the PPE adequate?	Is the PPE suitable?	Will the PPE be worn?
Does the RPE provide sufficient and correct protection from the hazard so that exposures or risks are at a safe level?	Is the RPE suitable for use by your workers (size, fit, facial hair), the environment (temperature, humidity, other hazards), and the task (work rate, wear time, compatibility) without creating other hazards or issues?	Will your workers wear the RPE correctly during all periods of exposure and will it provide the stated level of protection (considering training, care and maintenance, filter change out)?

Choose between different respiratory protective types.

Loose fitting

- Low breathing burden
- No need for face fit test
- Can accommodate certain limited facial hair
- Relies on air flow – powered or air-supplied

Powered or supplied air

- Loose and tight-fitting options
- Suitable for longer tasks (>1 hour)
- Higher levels of respiratory protection
- Enhanced wear comfort + cooling/ warming supplied air options

Powered air

- High mobility
- Loose and tight-fitting options
- ATEX approved options

Tight-fitting

- Relies on good fit to the wearer's face
- Wearer must be clean-shaven
- In some countries should be face fit tested
- Can be used with filters or with powered and supplied air

Negative pressure

- Simpler, cheaper option for shorter tasks (<1 hour)
- Must use a tight-fitting mask and relies on good fit to the wearer's face
- Wearer must be clean-shaven and should be fit-tested

Supplied air

- Reduced mobility due to compressed air supply tubes that must connect to a source of breathable air
- Loose and tight-fitting options
- No filter to clog in high overspray applications
- Cooling/warming air options

Other RPE considerations.

Overspray

Overspray is the application of primer, paint, varnish, topcoat, etc., to anywhere other than the intended substrate.

Overspray can occur in any painting and coating operation, but particularly when there is limited or no extraction, multiple sprayers are operating within the same workplace and when high pressure spray systems are being used.

70% of UK spray painters interviewed stated that they lifted the visor of their air-fed respirator during spraying to inspect the quality of their work, or due to issues with seeing through their visor due to overspray.

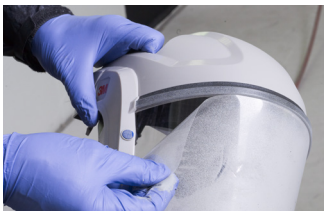
To protect workers from respiratory hazards, spray painters need to be able to see and inspect their work, without having to raise the visor of their powered or supplied air respirator.

Excessive over-spray can cause numerous issues with PPE including:

- Filter clogging of air-purifying respirators
- Visor clarity
- Overspray
- Cleaning and maintenance – removal of overspray on PPE outer surfaces

Numerous PPE solutions are available to help you manage overspray in your workplace:

V-500E Supplied Air System



M-928 and 6885 Peel-off visor covers

M-976 head, neck and shoulder cover for M-200

S-200+

BT-922 disposable breathing tube cover

TR-681 belt, turbo and breathing tube cover

TR-6600 pre-filter

TR-627 - Easy-clean belt for the TR-600

References

UK HSE Research Report Reference: HSE RR1064 'Effect of visor lift on exposure' – November 2015.

*contact 3M for availability

Build your system.

The 3M™ Versaflo™ team has developed a wide range of Personal Protection Equipment (PPE), so workers can select the right equipment for each job.

3M™ Versaflo™ respiratory helmet with comfort faceseal M-206

3M™ Versaflo™ head, neck and shoulder cover M-976 (accessory for M-206)

3M™ Versaflo™ integrated suspension hood S-433

3M™ Versaflo™ premium hoods with reusable suspensions S-757 (Painter's Hood)

3M™ Versaflo™ breathing tube, lightweight, BT-20S/L (available in two lengths)

3M™ Versaflo™ breathing tube, self-adjusting, BT-30

3M™ Versaflo™ disposable breathing tube cover, BT-922

3M™ Versaflo™ IS powered air respirator TR-800 series

Turbo cover*

- TR-681 belt, turbo and breathing tube cover

TR-600

3M™ Versaflo™ supplied air regulators

V-100E

V-200E

Filter

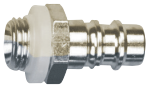
- Spark arrestor
- Prefilter
- P Filter
- P/Nuisance level
- Organic vapour/acid gas
- A1P filter
- A2P filter
- ABE1P filter
- ABE2K1HgP filter

Charger

- Single station Bat. charger
- 4-station Bat. charger kit

TR-627 Easy-clean belt

Coupling plug



3M™ C-231

Air supply tube coupling set

Air supply tube

3M™ Aircare™ filtration units

*contact 3M for availability

3M™ Versaflo™ Powered Air Purifying Respirator Painters Kit TR-800E-PSK

Includes:

- **M-207** Respiratory Helmet
- **BT-30**
- **TR-6310E** (A2P) filter
- **TR-640** single station battery charger (country specific)
- **BT-922** breathing tube cover
- **TR-802E** intrinsically safe powered air turbo
- **TR-830** intrinsically safe battery
- **TR-838** battery attachment tool
- **TR-627** easy clean belt
- **TR-6300** filter cover
- **TR-971** airflow indicator
- **TR-6600** pre-filter (x10)
- **TR-653** storage and cleaning kit

Intrinsically Safe (IS) powered air turbo and battery TR-800 series are ATEX Certified for use in potentially explosive atmospheres whilst offering the comfort, modularity, control and ease of use expected from the 3M™ Versaflo™ platform.

Non-mining gas atmospheres (Group II), EN 60079-11 Ex ia IIB T4 Ga

Non-mining dust atmospheres (Group III), EN 60079-11 Ex ia IIIC 135˚C Da

3M™ Versaflo™ Supplied Air System V-Series

The balanced, belt-worn, 3M™ Versaflo™ V–500E regulator consistently delivers the airflow level you set (170-305 l/min). An integrated silencer keeps the noise level equivalent to a typical conversation.

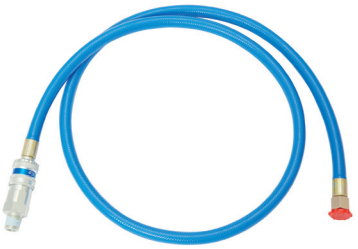
There are two alternative regulators to either cool (V-100E) or heat (V-200E) the airflow by as much as 28°C. These regulators are excellent choices for workers exposed to uncomfortable temperature ranges.

- V-500E regulatory can be used to additionally supply air to a spray gun (using 3M™ C-231 accessory)

3M™ Versaflo™ V-500E regulator

3M™ Versaflo™ V-100E air cooling

3M™ Versaflo™ V-200E air heating



3M™ C-231

3M™ Disposable Respirators

May be used for paint preparation work and some water-based paint applications.

3M™ Aura™ Particulate Respirator 9300+ Gen 3 Series

- Clearer Vision - Embossed top panel, helps re-direct exhaled air, reducing fogging of eyewear
- Curved, Low Profile Design - Conforms well to nose and eye contours, designed to be compatible with eyewear
- Ease of Positioning - Upper and lower tabs, grip feature on the valve, nose clip for customisation
- 3M™ Cool Flow™ Comfort valve - Opens 37% easier, allows more than 36% extra air flow

3M™ Reusable Respirators

May be used for most painting and coating processes depending on local regulations.

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

- Unique filter and cartridge connection, push until you hear a click
- Speaking diaphragm designed to help provide easier communication while working
- Exhalation valve directs exhaled breath and moisture downward

Particulate Filter P3 R, D9035

P3 R Particulate Filter, D3135

Cartridge with Dual Flow A1B1E1K1P3R,D8094

A2P3 R cartridge with Dual Flow, D8095

3M™ Maintenance-Free Reusable Respirator 4000+ Series

- Maintenance-free: save time with integrated filters
- Less heat and moisture build-up due to the central exhalation valve
- Reusable until damaged, clogged with particulates, or saturated with gas
- Optional Overspray Guard (400+) available

FFA2P3 R D Organic Vapour + Particulate, 4255+

FFABEK1P3 R D Organic Vapour / Inorganic Vapours and Acid Gas / Ammonia / Particulates, 4279+

3M™ Reusable Full Face Mask, FF-300 Series

- Use as a negative-pressure single-filter mask or as a face piece for a powered air respirator
- Visor provides a good field of view and comes in choice of polycarbonate or high-heat material
- Sweat port helps to improve user comfort during long periods of use
- Side-fitting filter port and clear inner mask for improved forwards and downwards vision
- Filter doesn't interfere with front-mounted speech diaphragm to aid in easy communication

3M™ Supplied Air system S-200+

- The 3M™ Supplied Air Respirator System S-200+ is a comfortable and versatile supplied air respirator system for use with the 3M™ 6000 full face masks and selected other 3M™ half face masks
- The S-200+ System by 3M can be used as a standard airline respirator system (no additional filters) or in dual-mode filter back-up when air supply is disconnected (as shown above with the with 6000 Series full face mask and optionally in dual-mode with attached 6095)
- Shown above in combination with 6000 Series full face mask and optional in dual-mode with attached 6095 filters

Particulate filters P3 R, DT-1135E

3M™ Gas and Vapour Filters, CF22 A2P3 R D DT-4031E

3M™ Gas, Vapour and Particulate Filter A2P3 R, 6095

3M™ Gas, Vapour and Particulate Filter A1B1E1K1P3 R + formaldehyde, 6092

PPE selection.

The following is a general outline to the type of 3M personal protective equipment products that may be appropriate for your painting and coating applications. For further information, contact 3M.

Hazard	Particulates: Non-toxic and/or low levels of exposure	Particulates: Toxic and/or high levels of exposure	Particulates: Gases and vapours	Immediately Dangerous to Life and Health atmospheres
Application	▸ Surface preparation, e.g. sanding filler	▸ Spray application of water-based paints	▸ Spray application of water-based paints ▸ Spray application of solvent-based paints ▸ Paints containing isocyanates* or other chemicals known to cause adverse health effects	▸ Chemical or solvent spills ▸ Other applications with unknown type or level of chemical exposure ▸ Oxygen deficient atmospheres (<19.5% O_2 – 3M definition)
Coveralls	▸ 3M™ Protective Coverall 4532L			▸ Ask 3M or consult your safety engineer
Eyewear (use with filtering facepiece or reusable respirator)	▸ GG501SGAF-EU ▸ 3M™ Safety Glasses – SF400X / SF500	▸ 3M™ Goggle Gear™ 500 Safety Goggles		
Filtering facepiece	▸ 3M™ Aura™ Particulate Respirator, FFP3, valved, 9332+ Gen3	▸ n/a	▸ n/a	
Reusable respirators	▸ 3M™ Maintenance Free Half Mask, FFA2P3 R D filters, 4255+ ▸ 3M™ Maintenance Free Half Mask, FFABEK1P3 R D filters, 4279+ ▸ 3M™ Cool Flow™ Fan, 1040 series ▸ 3M™ Secure Click™ Reusable Half Mask HF-800 Series ▸ 3M™ Secure Click™ Filter A2P3 R, with Dual Flow, D8095			
Powered air-purifying respirator	▸ 3M™ Versaflo™ Powered Air Starter Kit, TR-315E with: ▸ 3M™ Versaflo™ Faceshield with Comfort Faceseal M-206 or 3M™ Versaflo™ S-Series Painters Hood S-433		▸ 3M™ Versaflo™ Powered Air Respirator Painters Kit TR-800E PSK	
Supplied air respirator	▸ 3M™ Versaflo™ Supplied Air System V-500E ▸ 3M™ Supplied Air System S-200+ with 3M™ Reusable Full Face Masks 6000 Series			

It is ultimately the responsibility of the employer to select the most appropriate PPE and level of protection required based on a full risk assessment.

*check local regulations and standards for guidance and/or mandatory requirements.

3M accepts no liability for the incorrect choice of respiratory protective equipment. This chart is only an outline. It is designed to help focus on the most appropriate respirators in the 3M range for particular applications. It should not be used as the only means of selecting a respirator. Details regarding performance and limitations are set out on the respirator packaging and user instructions.

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To learn more about
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