3M Science. Applied to Life.™

Powder Coatings

Hazard Awareness Bulletin
April 2023

Helping to reduce your exposure to Powder Coatings during metal production and fabrication.

What are Powder Coatings?

Powder coats are mixtures of pigments, resins, curing agents and other additives. The powders are sprayed with a gun which imparts a charge upon the particles. The workpiece is earthed so that the charged powder coat particles are electrostatically attracted to the workpiece, which can give a relatively thick and uniform coating. The powder coated workpiece is then typically heated within an oven to melt and in the case of thermoset coatings to cure the coating.

How can Powder Coatings affect me?

The solvent content of powder coating powders is relatively low, at least in comparison to some liquid based paint systems. Most powder coat materials are generally classified as having low toxicity. However, some powder coats may contain pigments and hardeners that may cause health effects – for example:

- TGIC (triglycidyl isocyanurate) - used in some polyester powder coat systems
- TMA (trimellitic anhydride) - used in various types of coatings and plastics.
- Lead chromate-based pigments

Potential acute health effects of powder coatings from metal production or fabrication

- Irritation of eyes, skin, nose, and throat
- Wheezing, chest tightness, breathlessness, and coughing
- Respiratory and skin sensitization

Potential chronic health effects of powder coatings from metal production or fabrication

- Occupational asthma
- Dermatitis

When do workplace exposures occur?

Inhalation

The main source of worker exposure is from the inhalation of powder coat materials, particularly during manual spray application to workpieces. Another significant source of exposure is the associated handling and dispensing powders, cleaning of paint booth, and maintenance and cleaning of spray equipment.

Dermal

Direct contact to skin and eyes during these activities is also a concern.

Other potential risks from powder coats

- Fire or explosion from suspended powder coat materials
- Electrostatic discharge from ungrounded workpieces and equipment
- Electric shock from electrical equipment
- Manual handling risks from lifting and carrying workpieces, raw materials, etc.
- Risks from the operation of pressure systems
- High temperatures and burns from ovens, hot surfaces and workpieces

Industries / Applications where workplace exposures may occur

Examples of metal production and fabrication applications, as well as other industries and processes in which individuals may be exposed to powder coatings:

Metal production, metal fabrication and related applications

- Spray application of powder coating
- Cleaning of powder coating equipment

Other applications

- Manufacture of powder coatings

What can I do to help protect my workers?

Use appropriate controls

Employers need to conduct a risk assessment, including a determination of exposure levels compared to exposure limits to understand what control measures may be needed.

If required, controls from the hierarchy of controls should be implemented and their effectiveness measured. For example, local exhaust ventilation (LEV) can be a highly effective engineering control used in welding, grinding, and many other applications.

Get the equipment that you need

In addition to implementing other control measures, Personal Protective Equipment (PPE) such as Respiratory Protective Equipment (RPE) is commonly used to reduce exposures to workers.

Respiratory Protective Equipment (RPE) – air-purifying respirators

3M has a range of RPE that can help reduce your exposure to dusts, mists, metal fume, as well as gases and vapors commonly encountered in metal production and fabrication. These include disposable particulate respirators, reusable half- and full-facepiece respirators, all the way to heavy-duty battery powered air-purifying respirators combined with a range of robust facepieces, headtops, and helmets.

Respiratory Protective Equipment (RPE) – supplied air respirators

3M also has a wide range of supplied air respirators, suitable for use in some of the most demanding work environments.

Other PPE

3M can also provide a wide range of other health and safety solutions including:

- Head, eye, and face protection
- Disposable and reusable ear plugs and ear muffs
- Protective communication solutions
- Disposable protective coveralls
- Fall protection
- Confined space solutions

Find your respirator

Use our interactive disposable respirator selector to help you find a respirator that meets your protection needs.

Find your respirator

Use our respirator selection guide to help you find a respirator that meets your protection needs.

Find your respirator

Use our interactive powered & supplied air respirator selector to help you find a respirator that meets your protection needs.

View all 3M PPE Solutions

Training

A key component of an effective PPE program is training for both workers and those responsible for health and safety in the workplace.

For example, workers wearing PPE should be trained in and understand:

- How PPE works, what it does, and its limitations
- Inspection, maintenance, and cleaning of the PPE as well as identifying defective PPE and knowing proper disposal
- Proper fitting and use of the PPE
- The nature of all hazardous substances present and the potential effects upon their health

Stay Informed

When selecting the appropriate protective equipment, local, state, provincial, or national regulations, laws, and guidelines need to be followed.

One of the tasks of the occupational safety and health specialist is to monitor constantly changing legal regulations, occupational exposure limits, etc.

Technical Help

At any time, you can get in touch with one of our PPE professionals for personalized help on the selection and use of 3M products. They can help you through the process of selecting suitable products based on your risk assessment, as well as helping you understand how to fit, use, and maintain your PPE – helping you to stay protected.

References and Resources

HSE - Reducing risks associated with using coating powders – employers. https://www.hse.gov.uk/surfaceengineering/reducing-risks-using-coating-powders-employers.htm

HSE – Specialist powders. https://www.hse.gov.uk/surfaceengineering/specialist-powders.htm

GESTIS Substance Database. https://gestis-database.dguv.de/

NIOSH Pocket Guide to Chemical Hazards - Trimellitic anhydride. https://www.cdc.gov/niosh/npg/npgd0635.html

BCF - Powder Coatings Health & Safety. https://www.coatings.org.uk/Sectors/Powder_Coatings_Health_and_Safety_.aspx

https://www.safeworkaustralia.gov.au/doc/model-code-practice-spray-painting-and-powder-coating

https://www.worksafe.govt.nz/topic-and-industry/hazardous-substances/guidance/substances/surface-coatings/

3M New Zealand Ltd
Personal Safety Division
94 Apollo Drive, Rosedale
Auckland 0632
TechAssist Helpline 0800 364 357
Customer Service 0800 252 627
Email techassist@mmm.com
Web www.3M.com.nz/ppesafety