

Abrasive blasting

In order to understand the safety requirements for abrasive blasting and your obligations for safety you must consider and understand relevant legislation and codes of practice.

What law applies?

Legal obligations, legislation, code of practice

Dust, coatings, solvents and noise

Dusts, coatings and solvents, noise and vibration, reducing the health impacts, recycling abrasive material, atmospheric testing, and fire and explosion

Particulate matter

The dangers of particulate matter

Plant, equipment and machinery

Checking and inspection, common examples plant, equipment and machinery used

General health and safety issues

Manual tasks, personal protective equipment, amenities, housekeeping, training, confined spaces, work at heights, slips, trips and falls, and heat stress

What law applies

In order to understand the workplace health and safety requirements for abrasive blasting and your obligations under the law you must consider and understand relevant legislation and codes of practice.

General health and safety obligations

To understand your obligations and safety requirements you must be familiar with the:

Workplace Health and Safety Act 1995 which imposes obligations on people at workplaces to ensure workplace health and safety. The *Workplace Health and Safety Act 1995* also helps you to meet your workplace health and safety obligations through:

- The *Workplace Health and Safety Regulation 2008* which describes what must be done to prevent or control certain hazards which cause injury, illness or death
- codes of practice, which are designed to give practical advice about ways to manage exposure to common risks. In particular, the *Risk Management Code of Practice 2007* should be read in conjunction with information on PPE.

Every Queensland employer must have **workers' compensation** insurance. Most employers insure with WorkCover Queensland, while a small number of large organisations have their own insurance. This insurance coverage ensures that employees injured at work receive financial support.

What you must do

It is a requirement of the *Workplace Health and Safety Act 1995* that risks must be assessed and control measures then implemented and reviewed to prevent or minimise exposure to the risks.

If the *Workplace Health and Safety Regulation 2008* describes how to prevent or minimise a risk at your workplace you **must** do what the regulation says. If there is a code of practice that describes how to prevent or minimise a risk at your workplace you **must** do what the code says or adopt and follow another way that gives the same level of protection against the risk.

If there is no regulation or code of practice about a risk at your workplace you **must** choose an appropriate way to manage exposure to the risk. People must, where there is no regulation or code of practice about a risk, take reasonable precautions and exercise proper diligence against the risk.

See the *Risk Management Code of Practice 2007* for further information.

Specific codes for abrasive blasting

The *Abrasive Blasting Code of Practice 2004* provides practical advice on how to manage typical risks to health and safety by abrasive blasting and protective coating work.

Please note, from 18 November 2004 the *Workplace Health and Safety Act 1995* was amended so that:

- all advisory standards that were in force on that day were continued as codes of practice and now expire 10 years after their commencement; and
- all existing industry codes of practice that were in force on that day now expire 10 years after their commencement.

Dusts, coatings, solvents, noise and vibration

Dusts

Dusts, including toxic dusts, can be a significant problem. Toxic dust can be created depending on the abrasive material being used and the surface being blasted.

Silica dust and lead dust are typical examples of toxic dust.

Silica dust can cause silicosis, a stiffening and scarring of the lungs, which is a permanent and degenerative illness which may result in death. Breathing in silica dust may also lead to the development of some forms of cancer.

Materials containing more than 2 percent (2%) crystalline silica must not be used in dry abrasive blasting.

Lead is a highly toxic cumulative poison that can be created by:

- using an abrasive material that contains lead
- blasting surfaces containing lead
- blasting surfaces covered by lead paint

If lead is present in an abrasive material or a surface to be blasted, there are certain things that must be done.

Use a less hazardous abrasive material where possible.

Coatings and solvents

Coatings and solvents can contain hazardous substances, particularly organic solvents such as:

- degreasing or cleaning agents
- paint thinners

Coatings applied by spray painting release more vapours, mists and aerosols into the workplace than coatings applied with brushes or rollers.

Employers should ask the supplier of abrasive materials, coatings and solvents used in the workplace, if the product is a hazardous substance. If it is, the employer should ask the supplier for a material safety data sheet (MSDS).

Some substances commonly encountered in the abrasive blasting industry may require health surveillance.

For information on dusts, coatings and solvents, see hazards of abrasive blasting section of the *Abrasive Blasting Industry Code of Practice 2004*.

Noise and vibration

Noise is unwanted sound that may damage a person's hearing. The amount of damage caused by noise depends on a number of things, including:

- how much noise is received over a period of time
- the noise intensity or loudness
- the noise frequency or pitch
- the duration and pattern of exposure
- each person's susceptibility to hearing damage

In the abrasive blasting industry, causes of noise include:

- release of compressed air at the blast nozzle and pot blow-down
- feed air into a protective helmet
- air compressors
- ventilations systems
- blast cabinets
- truck and crane noise

Maximum noise levels up to 137 dB(A) and peak levels up to 145 dB(A) have been measured during blasting activities at the operator position when the abrasive material runs out. In-helmet feed air noise levels up to 102dB(A) have also been measured during abrasive blasting.

Regular exposure to high levels of noise causes hearing loss through the destruction in our inner ears. There is no cure for hearing loss and the damage done is therefore permanent! Often there is also another effect, the ringing in the ears (tinnitus) accompanying the hearing loss.

Noise exposure exceeding an average level of 85dB(A) over an 8 hour work period (LAeq.8h 85dB(A)), or an instantaneous noise such as from a sudden air release or impact, exceeding 140dB(C) presents a high risk to a persons health and safety at the workplace. A person working with or near noisy equipment or processes may be affected by high direct or ambient noise and develop noise induced hearing loss, where no control measures have been put in place.

More information on noise is provided in hazards of abrasive blasting section of the *Abrasive Blasting Industry Code of Practice 2004*.

Abrasive blasters are subject to hand-arm **vibration** from the force of the abrasive moving through the blast hose and nozzle.

Prolonged use of abrasive blasting equipment may lead to a condition known as vibration white finger (VWF) or dead finger or Raynaud's phenomenon. It

results from persistent microscopic damage to nerves and blood capillaries in the fingers and hand.

In the early stages the effects are reversible, however, chronic exposure may result in gangrenous and necrotic changes in the fingers. There is no effective treatment to reverse these effects.

More information on vibration is provided in general hazards section of the *Abrasive Blasting Industry Code of Practice 2004*.

Reducing the health impacts

Employers must take action to reduce the health impact from dusts, coatings, solvents, noise and vibration by using:

- less dangerous abrasive materials
- less dangerous surface preparation methods including sodium bicarbonate blasting, carbon dioxide (dry ice) blast cleaning and blast cleaning with reusable sponge abrasives
- a blasting cabinet which is suitable for small objects, is fully sealed and the operator works from outside viewing the object through a sealed window
- a blasting chamber for objects too large to be treated inside a blasting cabinet with operators working inside wearing personal protective equipment
- temporary enclosures used when an object is too large to be transported (a bridge or a water tank) which consists of containment screens such as woven polypropylene fabric or rubber
- exclusion or buffer zones (where personnel, not associated with the blasting activity, are excluded from the vicinity)

Although open air blasting activities is not recommended, there may be sometimes no alternative.

Employers can reduce the number of people exposed to dusts, coatings, solvents, noise and vibration by:

- relocating or enclosing noisy equipment in acoustic enclosures
- moving the abrasive blasting site away from other workers
- doing blasting work outside normal working hours
- not blasting in windy conditions
- stopping other work on a site and moving people away while blasting
- job rotation

For further information on how to reduce the health impact from dusts, coatings, solvents and noise, refer to *Abrasive Blasting Industry Code of Practice 2004* (parts A and B) or *Noise Advisory Standard 2004* (now known as a Code of Practice).

Recycling abrasive material

After abrasive blasting, the abrasive material is mixed with dust and particles of the material being removed. It is possible to collect, clean and reuse abrasive material.

This involves:

- **Collection** - which is best done by vacuum recovery as this creates least disturbance. Sweeping or compressed air blowdown should be avoided.
- **Cleaning** - The following contaminants should be removed before reuse:
 - oversize trash, for example, rust and paint flakes
 - toxic dust, for example, lead from paint material
 - nuisance dust, for example, fine shattered abrasive grains
 - respirable dust, for example, powdered material that will penetrate the lower respiratory system.
- **Reuse** - The collected material will contain various contaminants as well as the reusable abrasive grains. The contaminants must be separated from the media by passing through engineered equipment including airwashes, cyclones and screens as required, before it can be returned to the blast machine for reuse.

Atmospheric testing

Employers should carry out **atmospheric testing** of the air around an abrasive blasting site for dust, especially when a toxic or hazardous material is involved.

Testing can be done before abrasive blasting work starts and during work to monitor the extent of effectiveness of controls and any additional action needed.

The four main components of atmospheric testing are:

- collection of an air sample by a trained specialist
- laboratory analysis
- interpretation of the results and comparison with *National exposure standards for atmospheric contaminants in the occupational environment*
- taking action

Monitoring by trained personnel should be conducted in all abrasive blasting applications as part of the initial risk assessment process. This will enable the appropriate respirator to be selected and will ensure that workers and other people are not exposed to harmful dust concentrations.

The selection, use and maintenance of respiratory devices should be undertaken in accordance with *AS/NZS 1715 - Selection, Use and Maintenance of Respiratory Protective Devices*.

Fire and explosion

The dust generated in the abrasive blasting process may be explosive and solvents and coatings used in the protective coating process can be highly volatile and flammable and may create a risk of fire and explosion.

The electrical installation associated with blasting chambers and spray booths must comply with the Australian and New Zealand Standard series *AS/NZS 2381 Electrical equipment for explosive atmospheres* and *AS/NZS 3000 Electrical installations (known as the Australian /New Zealand Wiring Rules)*.

The risk of fire and explosion in the protective coating industry may be reduced by:

- properly earthing equipment
- never spraying paint back into a container when cleaning
- not storing paint or solvent soaked rags
- not using combustion motors in a confined spray painting area
- correctly storing all flammable substances

Further information on fire and explosion is provided in *Abrasive Blasting Industry Code of Practice 2004* (parts A and B).

Particulate matter

Particulate matter can penetrate workers doing abrasive blasting. Common injuries include:

- eye damage
- severe lacerations
- skin penetrations

Particulate matter includes both small particles of the object being blasted and the abrasive material.

To reduce the possibility of workers being injured by particulate matter, **employers** should:

- fit blasting equipment with a fast acting self-actuating cut-off device, or a dead man control, under the direct control of the nozzle operator
- fit blasting equipment with hose whip checks or hose coupling safety locks
- ensure blast hoses are uncoiled when in use
- ensure workers only point the blast nozzle at the work
- ensure workers wear suitable personal protective equipment

Plant, equipment and machinery

The plant, equipment and machinery used in abrasive blasting should be checked daily for wear and damage by the operator. Owners of machinery and equipment should keep log books and inspection check sheets containing a full history of service and repairs.

Information on how to use the following plant, equipment and machinery safely can be found in abrasive blasting, plant and equipment section of the *Abrasive Blasting Code of Practice 2004*:

- air compressors and blast pots
- blasting nozzles
- dead man controls
- blast hoses, hose whips and couplings
- water blasting equipment
- blasting cabinets
- blasting chambers
- temporary enclosures
- respirators and blast helmets
- supply air for respirators and blast helmets
- spray painting equipment

Further information on machinery is provided in hazards of abrasive blasting section of the *Abrasive Blasting Code of Practice 2004* and the *Plant Code of Practice 2005*.

General health and safety issues

Abrasive blasting and the application of protective coatings can kill or cause permanent injury and illness. Lung damage, hearing loss, tinnitus, eye damage and severe lacerations are just some of the injuries people working in this industry can receive.

Abrasive blasting is used in a wide range of industries for many purposes including:

- removing rust, scale, paint, graffiti or mildew
- preparing different surfaces

Abrasive material is propelled onto a surface at high speed using air pressure, water pressure or centrifugal force.

Protective coatings are applied after a surface has been blasted. This is usually done to protect metal surfaces from corrosion or to improve the appearance of product.

Protective coatings are usually applied by spray painting but can also be applied by brush, roller or dipping.

General health and safety issues relating to abrasive blasting include:

- Manual tasks
- Personal protective equipment (PPE)
- Amenities
- Housekeeping
- Training
- Confined spaces
- Work at heights
- Slips, trips and falls
- Heat stress

Personal protective equipment (PPE)

Personal protective equipment (PPE) must protect workers against all routes of exposure. PPE can include:

- an air line positive pressure hood or helmet
- protective suits or clothing to keep out dust and abrasive grit
- respirators
- chemically resistant gloves, safety boots and aprons
- barrier cream (for short term protection)

More information on PPE is provided in hazards of abrasive blasting section of the *Abrasive Blasting Code of Practice 2004*.

Housekeeping

Drift from abrasive blasting can be harmful not only to workers but also to members of the public. Good **housekeeping** can minimise the risk of exposure.

While other control measures should prevent dust escaping from the area where blasting is being done, any dust or residue that does make its way into the workplace should be cleaned as soon as practical after blasting has finished.

Where practical, accumulated dust should be removed using wet cleaning methods, or High Efficiency Particulate Air (HEPA) filter vacuum methods.

Because workers undertaking cleaning work may be exposed to dust levels in excess of the exposure standard, they should wear personal protective equipment.

For further detail see hazards of abrasive blasting section of the *Abrasive Blasting Code of Practice 2004*.

Confined spaces

Employers must identify any hazards associated with working in a confined space. Typically they may arise when blasting or painting walls inside tanks, vessels or silos.

The primary hazards commonly found in confined spaces are:

- lack of oxygen
- toxic gases, vapours or fumes
- flammable gases, vapours or fumes
- engulfment
- mechanical equipment

Information on working in a confined space may be found in general hazards section of the *Abrasive Blasting Code of Practice 2004*.