



Hazardous or combustible dusts, fumes and fibres

Introduction

WA's occupational safety and health legislation requires that all workplace hazards are identified, the risks assessed and controls put in place. Dusts, fumes and fibres can be a particular problem because health effects may become evident months or years after exposure. In addition, combustible dusts can cause catastrophic explosions.

Types of dust, fume and fibre hazards

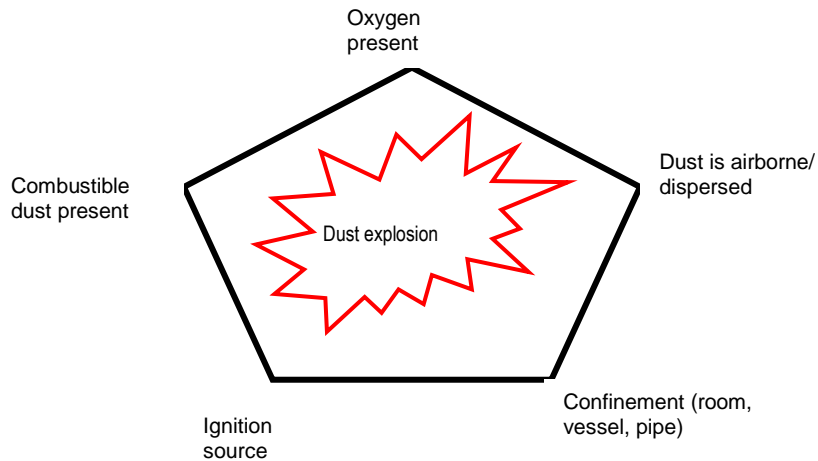
Some examples of dusts, fumes and fibres in workplaces are listed below.

Dust/fume/fibre	Industry	Hazards & Health Effects
Asbestos	Vehicle repair, construction and demolition, assay laboratories	Asbestosis, lung cancer, mesothelioma
Cleaning and laundry powders	Cleaners, laundry services	Nose/throat irritation, some are corrosive
Diesel or petrol exhaust fume	Construction, manufacturing or services	Nose/throat irritation, diesel fume is classified as a carcinogen
Fertiliser	Agriculture, fertiliser manufacture and handling	Nose/throat irritation, some are combustible
Fibreglass	Insulation, swimming pool manufacturing, boat manufacturing	Eye, skin and respiratory tract irritation
Flour dust	Food	Occupational asthma, combustible
Grain dust	Agriculture, services to agriculture, feed processing	Occupational asthma, combustible
High temperature cooking fumes	Restaurants, fast food	Irritation to respiratory tract, probably increases cancer risk
Silica	Construction, concrete, stone product manufacturing, road work, excavation, brick and tile cutting or drilling, assay labs.	Silicosis, lung cancer
Welding fumes	Construction, metal manufacturing	Metal fume fever, possible increased cancer risk
Wood dust	Milling, carpentry, cabinet making	Sensitisation, increased cancer risk, combustible
Plastics, paper, sugar, textiles, rubber, coal, & metal dust	Various manufacturing, mining and recycling industries	Combustible

Dust explosions

Dust explosions occur when combustible dust is airborne in a room or inside equipment, oxygen is present and there is an ignition source. The confinement of the room or vessel causes pressure to build up as the dust burns, leading to an explosion. These factors are illustrated as a “Dust Explosion Pentagon” below:

Dust explosion pentagon



Commonly an initial (primary) explosion raises settled or bulk dust into the air and a second, larger explosion may follow the first. Dust explosions can cause fatalities.

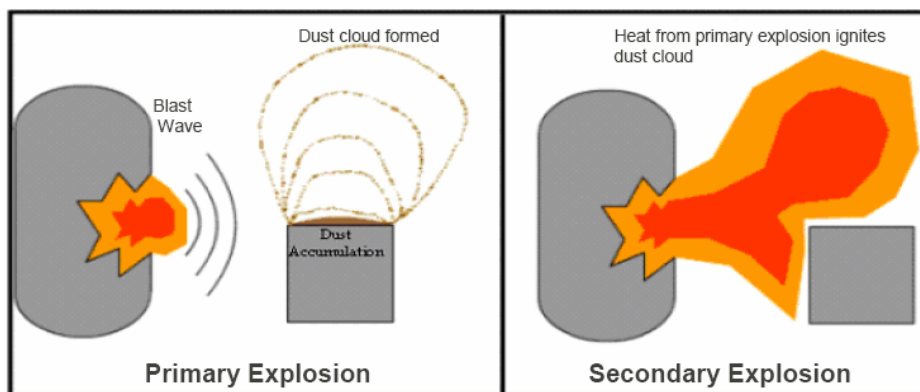


Figure from www.osha.gov

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Risk management for dusts, fumes and fibres

Identify the hazards

Ways to identify dust, fume and fibre hazards include:

- review of information such as material safety data sheets (MSDS) or product information sheets
- workplace inspections
- consultation with employees
- review of past incidents, health concerns, hazard reports
- industry association information, eg newsletter, website
- incident reports from WorkSafe or other work health and safety regulator
- specialist audits, e.g. occupational hygienist
- look out for combustible dust thicker than a paperclip over more than 5% of surfaces (Occupational Safety and Health Administration (OSHA) - USA)

Assess the risk

- For health risks, refer to the *Guidance Note for the Assessment of Health Risks arising from The Use of Hazardous Substances in the Workplace, NOHSC: 3127 (1994)* available at www.worksafe.wa.gov.au. Risk assessments include a review of information and MSDS, and a review of current practices, and will help identify problem or high risk areas.
- For explosion risks, consider whether the elements of a dust fire pentagon could occur and what damage or injury would result in the event of an explosion.
- Consult with employees on risk assessments, and keep a record of the assessments.
- Complex risk assessments should be done by, or with the assistance of, a competent person such as an occupational hygienist.

Control the hazard

Use the hierarchy of controls (*listed from most to least effective*):

- elimination
- substitution
- isolation
- engineering (preferably at source)
- administrative
- personal protective equipment

Specific controls may include:

- separation of hazardous processes from other work areas
- ventilation systems (especially local exhaust ventilation near the source),
- dust collection equipment
- vents on equipment where a dust explosion could occur
- dust extraction on hand held tools
- separation of heat and ignition sources from combustible dusts
- spark detection systems
- wet or damp work methods
- cleaning program (including areas where dust may be unseen)

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Control the hazard cont...

- use an intrinsically safe vacuum (high efficiency “HEPA” filters) or wet cleaning instead of dry sweeping or compressed air cleaning
- employee training and supervision
- supply and use of appropriate personal protective equipment

All controls should be well maintained and regularly inspected to make sure they keep working well.

Systems and equipment to control an emergency should also be in place.

Monitoring and health surveillance

Air monitoring can help you work out if controls are working, or if hazardous dust/fume/fibre levels are present. Air monitoring may also be used as part of risk assessments.

In addition, health surveillance of employees is required for some hazardous dusts, fumes and fibres where there is a health risk and where it is possible to identify specific health outcomes. Health surveillance is not a control, however in some cases it can help to identify problems early and improve controls.

Further information:

- Cancer classifications: International Agency for Research on Cancer, <http://monographs.iarc.fr>
- *Code of practice for the management and control of asbestos in workplaces [NOHSC: 2018(2005)]*, available at www.worksafe.wa.gov.au under Publications.
- Controlling wood dust hazards at work http://www.commerce.wa.gov.au/WorkSafe/PDF/Guidance_notes/Guide_wood_dust.pdf
- Flour dust http://www.commerce.wa.gov.au/WorkSafe/PDF/Factsheets/flour_dust.pdf
- Grain movement and storage: http://www.commerce.wa.gov.au/WorkSafe/Content/Industries/Agriculture_forestry_and_fish/Further_information/Agriculture_workbook/Grain_movement_and_storage.html
- OSHA, 2005, ‘Combustible Dust in Industry: Preventing and Mitigating the effects of Fire and Explosions’. (*Includes description of major explosions in the US and detailed assessment and control strategies*). <http://www.osha.gov/dts/shib/shib073105.html>
- OSHA, 2008 Hazard Alert: Combustible Dust Explosions http://www.osha.gov/OshDoc/data_General_Facts/OSHAcombustibledust.pdf
- Welding: http://www.commerce.wa.gov.au/WorkSafe/Content/Safety_Topics/Plant_and_machines/Additional_information/Welding.html
- Welding Institute of Australia: *Technical Note 7: Health and Safety in Welding*; available for purchase from <http://www.wtia.com.au/catalog.htm>
- Working with fibreglass http://www.commerce.wa.gov.au/WorkSafe/Content/Safety_Topics/Hazardous_substances/Additional_resources/Working_with_fibreglass.html
- AS/NZS Code of practice for handling combustible dusts, SAI Global 4745:2012

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