Dust in the workplace
General principles of protection

Guidance Note EH44 (Fourth edition)

Contents

Introduction

1 This environmental hygiene guidance note describes how to control exposure to dust at work to avoid ill health. It will help you understand what you need to do to comply with the Control of Substances Hazardous to Health Regulations 2002 (COSHH) and gives advice on the precautions that may be needed to prevent or adequately control exposure.

2 It does not deal with the fire or explosion hazards which some dusts present. Exposure to lead and asbestos and exposure to dust in mines is also not covered in this guidance.

3 This guidance is aimed at employers and managers, but employees, health and safety representatives and health and safety professionals may also find it useful.

Where is dust likely to occur?

4 **Dust can be a problem in almost any industry.** The hazards of dusts like silica and wood are well recognised, and HSE produces specific guidance for these dusts, but there are many more substances that generate dusts which are hazardous to health. Exposure to all such dusts needs to be prevented or, where this is not reasonably practicable, adequately controlled.

Different forms of the same substance may present different hazards. A large piece of a solid may present a negligible hazard, but when ground into a dust it may become hazardous; wood and sandstone are obvious examples.

5 Many work activities can create dust. Some examples are:

- filling bags or emptying them into skips or other containers;
- weighing loose powders;
- cutting, eg paving stones;
- sieving and screening operations;
- conveying materials by mechanical means or by hand;
- stockpiling large volumes of processed materials;
- crushing and grading;
- milling, grinding, sanding down or other similar operations;
- cleaning and maintenance work;
- feeding livestock from bags or conveyor systems;
- clearing up spillages.

Do you have a problem with dust at work?

6 Some simple checks may help in identifying whether a problem exists:

- Is the material naturally dusty?
- Does the work you do create dust by mechanical or other means?
- Is dust liable to be disturbed?

Visible dust on pipes, surfaces, ledges etc may indicate the presence of airborne dust. However, many dust particles are too fine to be visible under normal lighting conditions. A dust lamp, which provides a powerful beam of light, can be used as a quick method to show whether a fine dust is present, and helps to pinpoint the sources and movements of such dust. Further information on using dust lamps is available in *The dust lamp* MDHS82.

What are the effects on health?

7 Exposure to any dust in excessive amounts can create respiratory problems.

8 The harmful effects of dust can vary, from skin irritation to lung cancer, depending on the composition of the dust and the type and degree of exposure.

9 Dust is not always an obvious hazard because the particles which cause the most damage are often invisible to the naked eye and the health effects of exposure can take years to develop.

Inhalation

10 Dust that can enter the nose and mouth during breathing is referred to as '**total inhalable dust**'. Some dust may consist of larger or heavier particles that tend to get trapped in the nose, mouth, throat or upper respiratory tract where they can cause damage.

11 Dust particles that are small enough to be breathed into the lungs are called '**respirable dusts**'; these dusts can build up in the air spaces in the lungs and can lead to lung damage.

12 The build up of any dust in the lungs could produce lung damage with inflammation and eventually fibrosis (scar tissue). This could lead to breathing impairment. These conditions usually develop slowly, so symptoms may not appear until severe irreversible changes have taken place.

13 Some dusts are well known for their ability to produce serious lung diseases of this type, eg respirable crystalline silica (RCS) can cause silicosis and also lung cancer. Chronic effects of dust in the lungs are usually permanent and may be disabling, so prevention of the onset of disease should be given the highest priority.

14 Certain dusts, eg dusts from grain, flour, wood, reactive dyes and proteolytic enzymes are respiratory sensitisers which can cause occupational asthma (attacks of coughing; wheezing and chest tightness), rhinitis (runny or stuffy nose) and extrinsic allergic alveolitis (symptoms can include fever, cough, worsening breathlessness and weight loss).

Skin contact

15 Some dusts can cause ulceration of the skin and irritation or skin sensitisation can be caused by dusts such as epoxy resins, rubber processing chemicals, wood dust and fibreglass and can lead to dermatitis.

Eye contact

16 Dust particles produced during the cutting, grinding and drilling of materials can cause eye damage/irritation, and some dusts may cause eye damage/irritation due to their chemical nature.

Ingestion

17 Some inhaled dusts can become trapped in the mucus that lines the respiratory tract. This mucus tends to be either spat out or swallowed. Inhaled dusts can get into the digestive tract, where they can cause local effects such as gastrointestinal tract irritation. Alternatively, they can enter the bloodstream and produce effects in other organs and tissues.

Dusts may also find their way into the digestive tract via hand-to-mouth contact so ensure that employees maintain good standards of personal hygiene, and consider whether eating and drinking should be prohibited in the workplace.

What the law says

18 Dust will be a 'substance hazardous to health' for the purposes of COSHH if it is a substance:

- which is listed in Table 3.2 of part 3 of Annex VI of the CLP Regulation; and
- for which an indication of danger specified for the substance is very toxic, toxic, harmful, corrosive or irritant; or
- if it is a substance to which a workplace exposure limit (WEL) applies.

19 If not falling within any of the above categories, paragraph (d) of the definition of 'substance hazardous to health' in regulation 2 of COSHH states that any dust when present in the workplace at a concentration in air equal to or greater than 10 mg/m^3 of inhalable dust or 4 mg/m^3 of respirable (as a time-weighted average over an 8-hour period) is considered to be a substance hazardous to health.

20 If the dust falls within the definition of 'substance hazardous to health' then the requirements of COSHH will apply, including the need to assess the risk to workers and to ensure exposure is prevented or adequately controlled.

Workplace exposure limits (WELs)

21 Many substances that can create dust have been given a WEL under COSHH.

22 Not all dusty materials have a WEL; however, the lack of a limit does not mean that the substance is safe. Where dusts do not have a WEL but there is evidence of potential hazards to health, employers should consider setting their own in-house standards, taking into account good control practice.

23 Where dust contains components which have their own WELs, compliance with all of the relevant individual limits is required.

COSHH assessment

24 The COSHH Regulations require employers to assess the risk to their employees, and to prevent or adequately control the exposure of employees to substances hazardous to health. You should:

- make a suitable and sufficient assessment of the risks to health from the dust(s) concerned and of the steps that need to be taken to meet the requirements of COSHH; and
- implement those steps before the work begins.

25 Sometimes air sampling may be needed to find out the level of exposure. These measurements should be made under normal working conditions and may be supported by the observation of light scatter by using a dust lamp to detect any less obvious escapes of very fine dust.

26 A risk assessment should include:

- an assessment of the risks to health from dust which should include:
  - information on the hazardous nature of the dust;
  - the type of exposure (inhalation, dermal or ingestion);
  - how the exposure occurs;
- details of the controls to be used; and
- if appropriate, arrangements for emergency procedures.

27 If you employ five or more people, the significant findings of the assessment must be written down, along with the steps you are taking to prevent or control exposure.

28 Further information on risk assessment, sampling and emergency procedures can be found in *Control of substances hazardous to health: Approved Code of Practice* L5.

Remember to review the assessment regularly to check that it is still valid, particularly if the task, processes or workers change.

Prevention and control of exposure

29 Never assume that any dust is safe. All uncontrolled dusts are potentially hazardous. In particular, any uncontrolled dry process or dusty work activity, especially in an enclosed environment, is likely to create a dust problem.

30 However, dusts are not all equally hazardous. Different dusts or even the same type of dust in different work situations may create different risks to health and require different precautions to be taken. For example, different exposures are likely to arise if the work activity takes place indoors or in the open air.

Employers have a duty under COSHH to ensure that the exposure of employees to substances hazardous to health is prevented or, if this is not reasonably practicable, adequately controlled.

Prevention

31 Prevention of exposure to dust should be the first objective. Many forms of dust can be eliminated from the workplace. Examples of how this can be done include:

- eliminating dust by using special cutting techniques rather than by grinding or sawing, or by using wet-cutting processes;
- using less toxic materials, eg powdered alumina instead of flint or quartz as in the pottery industry;
- using pellets rather than dusty powder;
- using dust-suppressed materials and emulsions or pastes rather than mixing dry constituents.

Where substitute materials are used, employers need to ensure that these pose less of a health risk and that exposure is controlled in accordance with the provisions of COSHH.

Choosing control measures

32 Control measures usually involve a combination of equipment and ways of working to reduce exposure. The right combination is crucial. No measures, however practical, can work unless they are used properly.

33 In order of priority the right combination of control measures could include:

(a) Eliminate the use of a harmful product or substance and use a safer one.
(b) Use a safer form of the product, eg paste rather than powder.
(c) Change the process to emit less of the substance.
(d) Enclose the process so that dust does not escape.
(e) Extract dust emissions near the source.
(f) Minimise the number of workers that are at risk.
(g) Apply suitable administrative controls, such as reducing the length of time that workers are exposed to dust.
(h) Provide personal protective equipment (PPE) such as gloves, coveralls and a respirator. PPE must fit the wearer. The provision of PPE, if required, should be in addition to the measures above, not instead of.

34 If your control measures include some combination of, (a) to (h) above, make sure that the controls all work together.

Remember that PPE should only be considered as a control measure as a last resort. Other control measures, such as reducing the emissions of dust at source, enclosing the source and removing the dust by effective local exhaust ventilation (LEV) should always be given first priority.

Control of exposure

35 Where it is not reasonably practicable to prevent exposure to dust, a combination of engineering and process controls may be appropriate. These include:

- segregating or totally enclosing the potentially dusty processes to reduce the number of people exposed by:
  - either making the process automatic; or
  - providing means for remote operation or manipulation (eg a glove box). Some enclosures can be quite large (eg a shot blast enclosure), but it is usually necessary to allow access to the enclosure for essential maintenance work, in which case PPE may be required;
- providing extraction by LEV where total enclosure is not possible – examples may include:
  - storage bins and hoppers;
  - bucket elevators;
  - conveyors;
  - grinding mills;
  - bag emptying operations;
  - mixing machines;
  - powder handling and packing processes;
  - drum filling operations;
- using mechanical handling systems and closed containers;
- damping down materials where the process permits it, although such a technique can itself generate dust if it is not used properly (however, wetting cannot be an effective method of controlling dust that is already airborne and damp materials will become dusty again when the liquid evaporates);
- minimising the height that material is allowed to fall;
- enclosing materials storage areas, eg stockpiles – where this is not possible, wind erosion should be minimised by measures such as locating the stockpiles behind natural windbreaks;
- encouraging workers to work with care and instructing them how to control the dust produced by their work activities;
- maintaining a high standard of cleanliness;
- providing a good standard of ventilation;
- using a vacuum cleaner or a wet method to keep floors and surfaces clean and to remove any spillages. Avoid using a compressed air line or dry sweeping.

Local exhaust ventilation (LEV)

36 Local exhaust ventilation (LEV) systems should be built into, and specially designed for, the machine or process that creates the dust. Remember that cross draughts and general air movements can all detract from their efficiency.

37 If you use LEV to control exposure, it needs regular checking and thorough examination and testing at least once every 14 months. Many people, eg engineers or insurance companies, can carry out thorough examination and testing of LEV. Whoever does the work must be competent, ie have the necessary skills, knowledge and experience. More information on LEV can be found in *Controlling airborne contaminants at work* HSG258.

Protective clothing

38 Protective clothing may be needed to prevent contamination of skin, hair or personal clothing. Work overalls should be kept separately from personal clothing and whenever possible these should be left at work, where arrangements should be made for laundering them.

Personal protective equipment (PPE) and respiratory protective equipment (RPE)

39 Personal protective equipment (PPE), which includes protective clothing and respiratory protective equipment (RPE), may be provided for welfare purposes or to protect other clothing. But its use as part of a strategy for controlling exposure should only be considered when all other reasonably practicable measures have been taken and these have not, in themselves, achieved adequate control. RPE should not be used as a substitute for good control. Further information on the selection and use of RPE can be found in the HSE publication *Respiratory protective equipment at work: A practical guide* HSG53.

40 When considering PPE, the dust characteristics of the material need to be taken into account. Where PPE is used, a programme should be established covering all aspects of its selection, use and maintenance. This includes facilities for workers to change into their ordinary clothes and for PPE to be stored on site and regularly cleaned. It is important that any changing facilities are located at or near the area of dust contamination and that the facilities are designed to prevent the spread of contamination.

41 Further information on PPE and RPE can be found on the HSE website.

To select the right RPE you will have to take account of the properties of the hazardous substances, the needs of the wearer, the work and workplace conditions.

Washing facilities

42 Dusts can stick to employees' clothing, hair and skin. Providing adequate washing facilities means that dust can be removed before the employee leaves the job. Whenever possible facilities should be easily accessible, and sited near the point of dust creation.

43 The type of facilities provided will depend on the degree of contamination and the type of dust. For many jobs a sink with warm water, liquid hand soap and disposable towels might be all that is needed.

Cleaning

44 Where processes involving dusts are carried out, the building and plant should be cleaned by a method that effectively removes accumulations of dust, but which does not in itself give rise to airborne dust. The careful design of new buildings or plant can facilitate subsequent cleaning, for example avoiding ledges and porous surfaces can make cleaning easier.

45 You should not clean plant by brushing, compressed airline or any other method which disturbs the dust, such as dry sweeping, as once the dust has become airborne the fine particles take a long time to settle.

Information, instruction and training

46 You should provide your employees and other people on the premises suitable and sufficient information, instruction and training. Don't just hand them a page of written information. Examples of instruction and training include, as appropriate:

- making sure that workers understand the risks to health;
- showing workers how to use control measures properly, and how to check that they are working;
- carrying out practice drills for cleaning up spills safely – do this before any spillages happen;
- if workers need to use RPE, they also need face fitting and appropriate training;
- if workers need to use protective gloves, they need to know how to put them on and take them off without contaminating their skin as well as correct skin care procedures including hand washing.

Emergency procedures

47 You need to plan and practice to cope with foreseeable accidents, incidents or emergencies. This means:

- the right equipment to deal with the emergency (eg a spill), including protective equipment and decontamination products;
- the right procedures to deal with a casualty;
- the right people trained to take action;
- the right arrangements to deal with the waste created.

Employers must provide suitable communication systems for warning employees who are liable to be affected by an accident, incident or emergency involving substances hazardous to health. Think about how you would make information available to the emergency services.

Health surveillance

48 Health surveillance is appropriate in certain cases, for example where:

- employees are exposed to a dust linked to a particular disease or adverse health effect; and
- there is a reasonable likelihood under the conditions of work that the disease or adverse health effect might occur; and
- it is possible to detect the disease or adverse health effect and the technique of investigation is of low risk to the employee.

49 For example, health surveillance will be appropriate where dusts may:

- produce systemic toxic effects, such as welding fume fever which affects the whole body (eg exposures to certain metal dusts including arsenic, cobalt and cadmium);
- cause occupational asthma (eg wood, castor bean, halogeno-platinum compounds);

- cause dermatitis (eg dusts of nickel and chromium);
- cause cancer (eg respirable crystalline silica and hardwood dusts);
- cause pneumoconiosis (eg respirable crystalline silica).

50 Employees should be encouraged to:

- report any symptoms of dust-induced chest or skin disease, eg tightness of breath and skin rashes;
- be alert to spotting defects in dust control equipment and reporting them;
- ask for information about dust hazards if they are unsure.

Further information on health surveillance can be found on the HSE website.

Worker involvement

51 Involve your workers in developing control measures to make sure they are suitable for the way they carry out the work. Encourage them to suggest improvements and to report anything they think might be going wrong. They must be made aware of the reasons for any health surveillance and be free to ask questions.

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Websites

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Further information

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