

FD3

COSHH essentials for
foundries

Pouring, casting and cooling molten metal

Control approach: General ventilation and RPE

The Control of Substances Hazardous to Health Regulations 2002 (COSHH) require employers to ensure that exposure is prevented or, where this is not reasonably practicable, adequately controlled. This guidance gives practical advice on how this can be achieved by applying the principles of good practice for the control of exposure to substances hazardous to health, as required by COSHH.

It is aimed at people whose responsibilities include the management of substances hazardous to health at work, eg occupational health specialists, anyone undertaking COSHH assessments and supervisors. It is also useful for trade union and employee safety representatives. It will help you carry out COSHH assessments, review existing assessments, deliver training and supervise activities involving substances hazardous to health.

This guidance is issued by the Health and Safety Executive. Following the guidance is not compulsory, unless specifically stated, and you are free to take other action. But if you do follow the guidance you will normally be doing enough to comply with the law. Health and safety inspectors seek to secure compliance with the law and may refer to this guidance.

See Essential information near the end of the sheet.

What this sheet covers

This sheet describes good practice for the control of fume during furnace work, including pouring, casting and cooling.

It covers the key points you need to follow to help reduce exposure to an adequate level.

This is achieved by following good control practice (ie follow all points described in this sheet or use equally effective measures), and by reducing exposure to below the relevant workplace exposure limits (WELs).

Hazards

Health hazards in foundries include dusts (foundry sands, fettlings and kiln linings contain silica), metal fumes, products of combustion and thermal decomposition, and substances associated with binder systems.

Metals found in fume can include nickel, chromium, manganese, cobalt and lead. If inhaled, ferrous foundry fume can cause cancer; other foundry fume can cause asthma. Some metals such as nickel and cobalt can cause dermatitis and skin allergies.

Substances found in binder systems can include furfuryl alcohol, phenol-formaldehyde, benzene and isocyanates. Some of these substances or their decomposition products can cause asthma, dermatitis and skin allergies, and some can cause cancer.

Gases, such as carbon monoxide, can be formed from furnace combustion processes and the thermal decomposition of organic binder systems. A brief exposure to small amounts of carbon monoxide may cause headache, skin reddening, nausea, dizziness, vertigo, muscle pain or personality changes. Exposure to higher amounts may cause movement problems, weakness, confusion, lung and heart problems, loss of consciousness and death.

Access to work area

- ✓ Allow access to authorised and appropriately trained people only.
- ✓ Make sure other workers stand well clear of moving ladles (cranks or bogeys) and casting operations.
- ✓ Minimise the use of sand as a floor covering (often used as a safety measure in pouring areas). The area where the sand is used should be clearly defined. There must be no reuse of contaminated sands and there should be adequate procedures for cleaning up and replenishing the sand.

Equipment and procedures

- ✓ Organise work so pouring and casting is done in a designated area with effective fume removal.
- ✓ Reduce fume by keeping the ladle covered during transport, where reasonably practicable.
- ✓ If you have an overhead travelling crane, the driver's cabin needs a clean air supply.
- ✓ Ensure castings are left to cool in a well-ventilated area.
- ✓ Provide high-level air vents or extraction fans so hot fume (that tends to rise) leaves the building.
- ✓ Provide low-level air inlets. Inlet air may need warming in winter. See Figure 1.
- ✓ Ensure a good through draught, and that the flow of air into and out of the building is not obstructed.
- ✓ Confirm that any fan extractors are switched on. Link them with lighting where practicable.

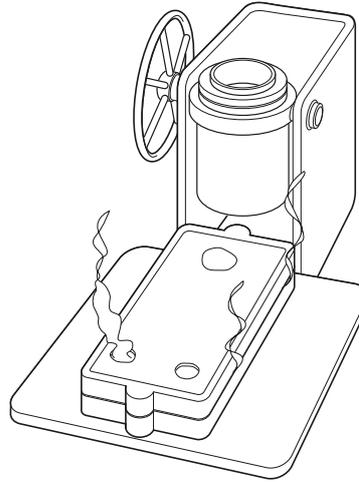


Figure 1 General ventilation while casting cools

Respiratory protective equipment (RPE)

- ✓ RPE is normally needed for pouring and casting.
- ✓ RPE is needed for cleaning and maintenance.
- ✓ Provide RPE with an assigned protection factor (APF) of at least 20 (eg powered TH2). See sheet R3 in Essential information.
- ✓ If workers also need RPE to protect them from vapours and gases (eg benzene) provide RPE with an additional or combination gas/organic vapour filter.
- ✓ Powered respirators with hoods/helmets may be more suitable to wear in hot environments.
- ✓ Provide powered respirators which should be used if the RPE needs to be worn continuously for more than one hour.
- ✓ Face fit testing is required for RPE with a tight-fitting face seal (see INDG479 in Essential information).
- ✓ Workers wearing tight fitting RPE must be clean shaven.
- ✓ Ensure RPE is compatible with other PPE worn.
- ✓ Workers should be trained how to check RPE is working properly before every use, how to fit it properly and how to look after it.
- ✓ Ensure workers discard disposable RPE at the end of the shift, or sooner if their RPE becomes clogged with dust.
- ✓ Change the filters on respirators in accordance with manufacturer's recommendations and if:
 - the shelf-life expiry date has passed
 - they are damaged or visibly contaminated
 - they become harder to breathe through; or,
 - they have reached their break-through time for vapours or gases.

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- ✓ Keep RPE clean and store it in a clean place.
 - ✓ For reusable RPE, a thorough maintenance, examination and test should be carried out at least once a month. However, if the RPE is used only occasionally, an examination and test should be carried out before use and, in any event, the interval should not exceed three months.

Personal protective equipment (PPE)

- ✓ Ask your supplier to advise on suitable PPE for work with molten metal.
- ✓ Consult workers to ensure PPE will be suitable for them.
- ✓ Make suitable arrangements for maintenance, storage and replacement of PPE. Provide separate storage for clean and contaminated PPE.
- ✓ Keep any PPE clean and replace at recommended intervals.
- ✓ Do not allow workers to wear their own outer clothing in contaminated areas.
- ✓ Use a contract laundry or a suitable equivalent to wash work clothing. Warn them of any hazardous substances on the clothing.

Personal decontamination and skin care

- ✓ Prohibit eating, drinking and smoking in contaminated areas; however, drinking fluids from covered containers, eg water bottles, may be necessary in hot environments.
- ✓ Provide warm water, mild skin cleansers, and soft paper or fabric towels for drying. Avoid abrasive cleansers.
- ✓ Provide pre-work skin creams, which will make it easier to wash dirt from the skin.
- ✓ Provide after-work creams to replenish skin oils.
- ✓ Barrier creams are not 'liquid gloves' and do not provide a full barrier.

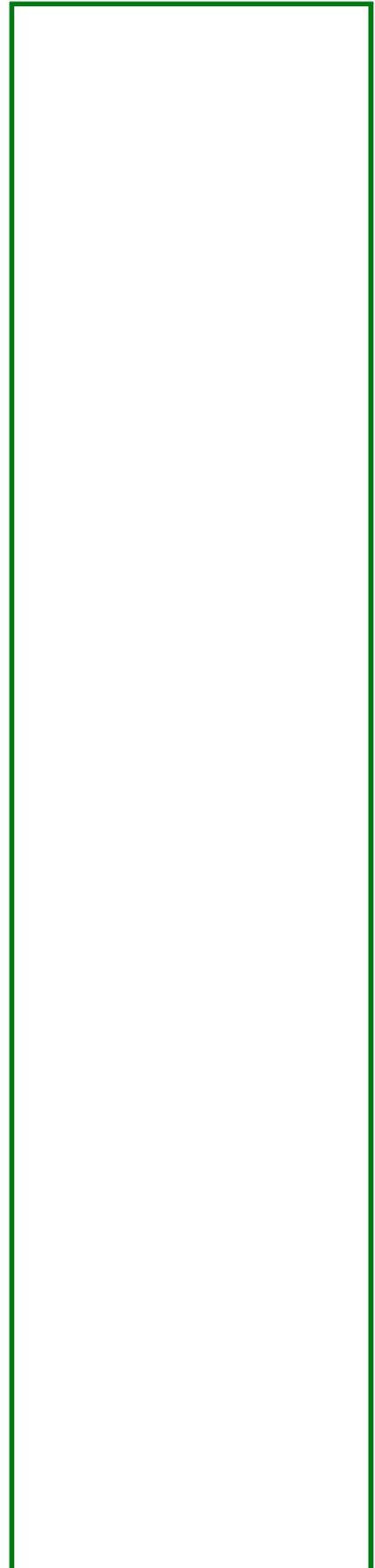
Maintenance, examination and testing

- ✓ Keep all equipment used for the task in effective working order. Maintain it as advised by the supplier or installer.
- ✓ Check for signs of damage to control equipment before starting work. If extractor fans stop, or are faulty, get them repaired. Noisy or vibrating fans can indicate a problem.
- ✓ Several measures are available to check effectiveness of controls ranging from simple qualitative (eg use of dust lamp) to complex quantitative techniques (eg air sampling and/or biological monitoring) usually for higher risk scenarios. See sheet G409 in Essential information.

Cleaning and housekeeping

- ✓ Keep work area clean.
- ✓ Vacuum dry dust.
- ✓ Use vacuum equipment that meets at least the dust Class M (medium hazard) classification.
- ✓ Avoid the use of brushes or compressed air for removing dust from clothing, surfaces and machinery.

✓



Health surveillance

- ✓ Provide health surveillance when workers are regularly exposed to asthmagens (eg in foundry fume or binder systems) and there is a reasonable likelihood that asthma may develop. See sheet G402 in Essential information.
- ✓ Provide health surveillance for dermatitis where there is a reasonable likelihood that dermatitis may occur in your workplace. See sheet G403 in Essential information.
- ✓ Workers undertaking the task described in this sheet will normally need health surveillance.
- ✓ You will need to take advice from a competent occupational health professional (a doctor or nurse) when setting up a health surveillance programme.
- ✓ If workers are exposed to lead, you must comply with the Control of Lead at Work Regulations.

Training and supervision

- ✓ Tell workers about the hazards associated with their work and how to prevent and recognise early signs of lung damage and dermatitis.
- ✓ Provide workers with training on:
 - working safely with hazardous substances;
 - when and how to use controls;
 - how to check they are working;
 - what to do if something goes wrong.
- ✓ Provide supervision – ensure that safe work procedures are followed.
- ✓ Involve managers and supervisors in health and safety training.
- ✓ Training records are helpful to demonstrate what information, instruction and training has been provided.

Essential Information

- G402 – Health surveillance for occupational asthma.
<https://www.hse.gov.uk/pubns/guidance/g402.pdf>
- G403 – Health surveillance for occupational dermatitis.
<https://www.hse.gov.uk/pubns/guidance/g403.pdf>
- G409 – Exposure measurement: Air sampling.
<https://www.hse.gov.uk/pubns/guidance/g409.pdf>
- R3 – UK Standard Assigned Protection Factor 20 (APF 20).
<https://www.hse.gov.uk/pubns/guidance/rpe3.pdf>
- Guidance on respiratory protective equipment (RPE) fit testing Leaflet INDG479(rev1) HSE 2019 www.hse.gov.uk/pubns/indg479.htm
- L132 - Control of Lead at Work Regulations 2002 Approved Code of Practice and guidance (Third edition). HSE 2002.
<https://www.hse.gov.uk/pubns/priced/l132.pdf>

Further information

You can find the full COSHH essentials series at Foundry - COSHH e-tool (hse.gov.uk)

Respiratory protective equipment at work - A practical guide, HSG53.
www.hse.gov.uk/pubns/books/hsg53.htm

The dust lamp: A simple tool for observing the presence of airborne particles MDHS82.

<https://www.hse.gov.uk/pubns/mdhs/pdfs/mdhs82-2.pdf>

Control of substances hazardous to health: The Control of Substances Hazardous to Health Regulations 2002. Approved Code of Practice and guidance L5 (Sixth edition) HSE 2013
<https://www.hse.gov.uk/pubns/books/l5.htm>

EH40/2005 Workplace exposure limits HSE 2020
www.hse.gov.uk/pubns/books/eh40.htm

BOHS Directory of Occupational Hygiene Consultants:
www.bohs.org/find-expertise/

Institute of Local Exhaust Ventilation Engineers Accredited members
Institute of Local Exhaust Ventilation Engineers (ILEVE) | CIBSE

For information about health and safety visit <https://books.hse.gov.uk>
or <http://www.hse.gov.uk>

You can view HSE guidance online and order priced publications from the website. HSE priced publications are also available from bookshops.

To report inconsistencies or inaccuracies in this guidance email:
commissioning@williamslea.com

Employee checklist

- Do you understand the health hazards associated with your work?
- Are you sure about safe work procedures?
- Are you sure how to use all controls?
- If you find any problems, tell your supervisor, don't just carry on working.
- Co-operate with health surveillance.
- Use, maintain and store your PPE in accordance with instructions.
- Check that any RPE works properly every time you use it. Look for signs of leaks, wear and damage.
- Wash hands before eating, drinking, smoking, using the lavatory and after work.
- Follow any skin care programme provided. Never use solvents to clean your skin.