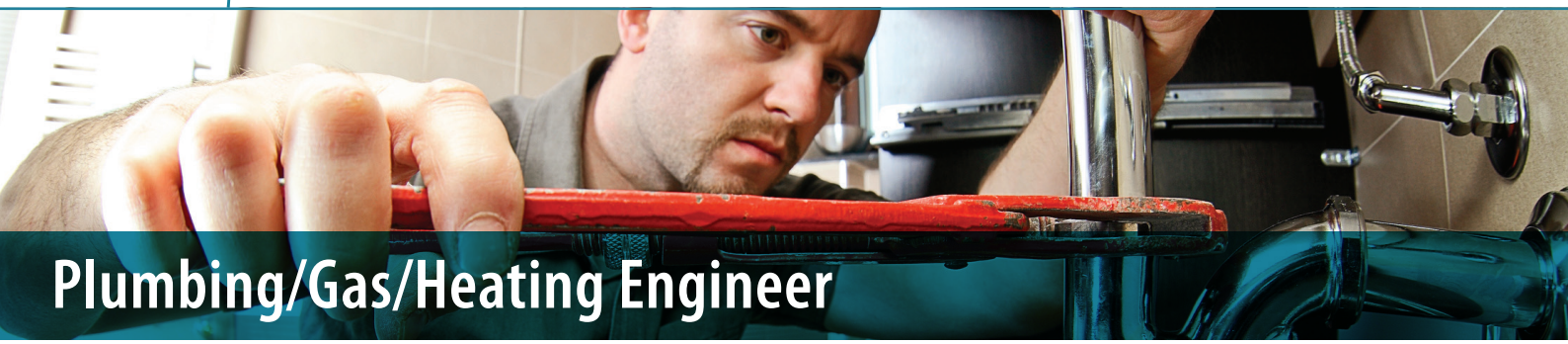
BREATHE FREELY

Controlling Exposures to prevent occupational lung disease in the construction industry



Plumbing/Gas/Heating Engineer

HAZARDS AND RISKS

There are significant health hazards associated with plumbing/heating installation, maintenance and refurbishment work. Drilling, breaking and fixing pipework and tanks; cutting, pulling and sawing insulation materials; soldering, brazing and welding pipework; and applying paints and sealants are all regular tasks which can generate airborne substances which are harmful if inhaled.

Asbestos fibres*

When working in buildings, particularly those built before 2000, heating engineers may come into contact with or disturb a number of different asbestos containing materials (ACMs). Asbestos is classified as a category 1 carcinogen and causes over 5000 work-related deaths each year in the UK. Inhalation of asbestos fibres can cause mesothelioma, asbestos-related lung cancer, asbestosis, and pleural thickening - which are fatal or serious and incurable diseases that take many years to manifest.

Man Made Mineral Fibre (MMMF)

Glass and mineral wools found in pipe, tank and loft insulation contain fibres that can be released during application or removal. Inhaling the fibres can cause acute irritation of the respiratory system and possibly a higher risk of lung cancer for particular forms of MMMF such as refractory ceramic fibres and special purpose fibres (plumbers are unlikely to come across these specialist types of fibres in their line of work).

Solder rosin fume (colophony)

When soldering, the heating of fluxes containing rosin (or derivatives) produces fume, which if inhaled is one of the most significant causes of occupational asthma, which is an irreversible condition. The fumes can also act as an irritant to the upper respiratory tract.

Welding fume**

The fume given off by welding is a mixture of airborne gases and very fine particles which can cause pneumonia, asthma, metal fume fever, throat and lung irritation and reduced lung function if inhaled. Exposure to some welding fume and gases can cause pulmonary oedema, and lung/nasal cancers.

Isocyanates

Inhaling isocyanates generated through spray foam and two-pack spray paint products can cause occupational asthma and severe respiratory irritation.

Legionella bacteria

There is a risk of exposure to legionella bacteria in droplets of airborne water which, if inhaled, can cause Legionnaires' disease, a potentially fatal pneumonia.

CONTROL OPTIONS

Elimination/prevention

Asbestos

The aim is to avoid exposure completely. Information on the presence of asbestos should come from the premises' asbestos management plan and asbestos register. For information on non-licensed work tasks involving asbestos and how to safely carry them out, refer to HSE's *HSG210: Asbestos Essentials:* *www.hse.gov.uk/asbestos/essentials/index.htm*

(In addition, NNLW requires that employers notify the relevant enforcing authority (usually the HSE), designate areas where the work is being done, ensure medical examinations take place, and maintain health records.)

MMMF, Solder fume, and Isocyanates

- Use non-fibrous insulation in place of glass/mineral wools, or use bonded and covered MMMF insulation materials if possible.
- Use push fit pipe and tank fittings to avoid soldering.
- Use rosin-free or rosin reduced solder.
- Use safer alternative products to isocyante based spray foam insulation, isocyante paints or epoxy paints; avoid excessive foam packing.

Engineering controls

- Use industrial Class H HEPA vacuums for cleaning up ACMs/MMMF materials.
- Use local exhaust ventilation (LEV) systems, such as an extracted booth or cabinet, or tip extraction on the soldering iron, during soldering operations.

Safe working methods

- Choose work methods that avoid or limit cutting, drilling and sawing of MMMF materials.
- Minimise dust creation eg. use water suppression for dusty tasks; use vacuum or wet cleaning techniques, avoid dry sweeping or compressed air to remove dust; use hand tools in place of power tools if feasible.
- Ensure good general ventilation when painting and implement job rotation where feasible.
- Refer to the owner/landlord's legionella risk assessment where appropriate (refer to Exposure Levels table overleaf).

PPE

- For ACMs/MMMFs, disposable overalls (type 5 (BS EN ISO 13982-1) and single-use disposable gloves should be worn and disposed of as asbestos waste. Non-laced boots are preferable to disposable overshoes. Use respiratory protective equipment (RPE) with an APF protection rating of at least 20. Disposable RPE (rated FFP3), or reusable half mask RPE with P3 filter or semi-disposable RPE with P3 filter are suitable.
- Tight fitting RPE users should be subject to face fit tests to ensure the RPE affords each individual the anticipated level of protection.

MANAGING THE RISK

Training & communication, supervision, maintenance & testing of controls and **air monitoring*** are all vital aspects of managing the risk, in addition to health surveillance which can be a requirement in certain circumstances.

See our introductory *Respiratory Health Hazards in Construction Fact Sheet Series:* ***Overview*** for more information about what things to consider and implement.

Air monitoring*

Air monitoring is a specialist activity. It may be needed as part of a COSHH assessment, as a periodic check on control effectiveness and to assess compliance with relevant WELs, or where there has been a failure in a control (for example if a worker reports respiratory symptoms). A qualified Occupational Hygienist can ensure it is carried out in a way that provides meaningful and helpful results.

The decision to undertake exposure monitoring should be made in accordance with HSE's monitoring strategies outlined in HSG173. In some situation, qualitative or semi-quantitative methods may be suitable. See also COSHH regulation 10 ACOP which details when exposure monitoring is necessary or unnecessary.

Also, see HSE leaflet G409,
Exposure measurement: Air sampling.
www.hse.gov.uk/pubns/guidance/g409.pdf

See reverse for Workplace Exposure Limits (WELs) →

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WORKPLACE EXPOSURE LIMITS (WELs) & EXPOSURE LEVELS

Agent or substance	Control/Exposure Limit	Exposure Levels
Asbestos (all types)*	0.1 fibres/ml (4 hour TWA) 0.6 fibres/ml (10 min TWA)	It is important to know whether the planned work is licensed, Notifiable Non-Licensed Work (NNLW) or non-licensed. High risk from particular ACMS - pipe and tank lagging, sprayed insulation, wall boards and ceiling tiles, loose packing/insulation in heating equipment/loft spaces/under floors. All such work, as well as any at exposures above the control and short-term exposure limits, must be carried out by an HSE licensed contractor.
MMMFs	5mg/m^3 and 2 f/ml (8 hour TWA)	Cutting and laying of dry un-bonded insulation is likely to lead to exposure levels at or near to the WEL. Exposure to Refractory Ceramic Fibres (RCFs) – typically through furnace wrecking activities – is not covered here.
Rosin (colophony) based solder flux fume	0.15mg/m^3 (15 min TWA) 0.05mg/m^3 (8 hr TWA)	Manual soldering with a hand-held iron poses the greatest risk of exposure because the operator's head is likely to be near, or actually in the fume. Exposures will be significant if work is prolonged, frequent or in enclosed spaces.
Isocyanates	0.02mg/m^3 (8 hour TWA) 0.07mg/m^3 (15 min TWA)	Exposure levels are affected by the frequency and duration of the work and are likely to be higher in poorly ventilated spaces. Lower exposures occur from roller and brush application.
Legionella bacteria	N/A	Domestic sites are usually at lower risk. Where the water is stagnant and at temperatures of between 20-45 °C, bacteria growth is promoted with increased risk of exposure. Risk is also higher when working near or with spray equipment, or in sprays from cooling towers, showers & spa pools etc
Welding fume**: Copper, Zinc, Lead, Cadmium, Beryllium, Chromium, Nickel, Vanadium, Iron, Managanese.	Limits are set for individual metals; refer to material safety data sheets (MSDS) for metals present and to HSE guidance note Workplace Exposure Limits EH40/2005: *www.hse.gov.uk/pubns/-priced/eh40.pdf*	The risk to health depends on the 'arcing time' as well as composition of the fume. Much of the welding work carried out by heating engineers is likely to be sporadic, and lower arcing time means lower fume exposure. The risk of exposure from prolonged, frequent or enclosed work is significant.

Further information

- Asbestos essentials: A task manual for building, maintenance and allied trades on how to safely carry out non-licensed work: *www.hse.gov.uk/asbestos/essentials/index.htm*
- Offshore COSHH Essentials: Insulation removal: *www.hse.gov.uk/pubns/guidance/oce5.pdf*
- Controlling health risks from rosin based solder fluxes: *www.hse.gov.uk/pubns/indg249.pdf*
- Legionella and Legionnaires' disease: *www.hse.gov.uk/legionnaires/*
- COSHH Essentials: Welding: *www.hse.gov.uk/coshh/essentials/direct-advice/welding.htm*
- Electronics Soldering and Lung Disease: *www.hse.gov.uk/lung-disease/electronics-soldering.htm*