BREATHE FREELY IRELAND

Controlling exposures to prevent occupational lung disease in
CONSTRUCTION

Pipe Fitter

HAZARDS AND RISKS

The assembly, installation and maintenance of pipe systems and related hydraulic and pneumatic equipment can expose pipe fitters to many different harmful substances through activities such as welding and soldering, using hand and power tools during pipe installation and cleaning and maintenance of pipe systems. The biggest respiratory health risks to pipe fitters are likely to be from inhaling silica and general construction dust and soldering fume. In certain situations these workers may also be at risk of exposure to asbestos fibres* and welding fume**.

Construction dust

Construction dust is a general term and includes dust from soil and building materials. Breathing in any dust over time can cause serious lung diseases such as chronic obstructive pulmonary disease (COPD), which includes conditions such as chronic bronchitis and emphysema.

Silica dust - respirable crystalline silica (RCS)

Silica occurs naturally in many types of stone and in concrete. It will be released as airborne dust during cutting or drilling. Inhaling fine silica dust (RCS) can lead to serious lung diseases, including fibrosis, silicosis, chronic obstructive pulmonary disease (COPD) and lung cancer:

Solder rosin fume (colophony)

During soldering, the heating of the flux containing rosin (or derivatives) produces fume, which is one of the most significant causes of occupational asthma. Once the asthma has developed, even small exposures to fume can lead to asthma attacks, and the condition is irreversible. The fumes can also act as an irritant to the upper respiratory tract.

Asbestos

Pipe fitters may come into contact with or disturb a number asbestos containing materials (ACMs) particularly if the premises were built before 2000. Asbestos is classified as a category 1 carcinogen nhalation of asbestos fibres can cause mesothelioma, asbestos-related lung cancer, asbestosis, and pleural thickening - all fatal or serious and incurable diseases which take many years to manifest.

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. Certain metal gases can cause pulmonary oedema and lung/nasal cancers.

CONTROL OPTIONS

Elimination/prevention

Asbestos:

The aim is to avoid exposure completely. For any work involving disturbance of asbestos for example, surveying, encapsulation, removal work, specific documented practical training is required.

The sampling and analysis of materials suspected to contain asbestos must only be undertaken by a competent person or company.

Regulation 11 of the Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006 requires an employer to prepare a written notification to the Health & Safety Authority at least 14 days prior to the commencement of works.

Solder fume

- Use mechanical jointing, rosin-free or rosin reduced solder whenever possible.
- Use local exhaust ventilation (LEV) systems for soldering, such as an extraction booth or cabinet, or tip extraction on the soldering iron; a qualified occupational hygienist can advise on the best solution.
- Use soldering irons at the lowest temperature possible for an acceptable joint.
- Locate the work away from draughts to avoid them interfering with any extraction.

Dust

- Choose work methods that avoid or limit drilling and cutting of stone or concrete.
- Use water spray to damp down dust in the work area.
- Use vacuuming or wet cleaning techniques; avoid dry sweeping or compressed air to remove dust from clothes or work areas.

Welding fume

- Seek alternative joining methods such as cold jointing techniques, use of mechanical fasteners or newer adhesive technologies.
- Use LEV systems for welding such as an extraction booth or bench, a back-draught partial enclosure, or on-tool extraction.
- Locate the work away from draughts to avoid this interfering with the LEV.

PPE

Where solder fume exposure cannot be controlled effectively using the methods above, disposable respiratory protective equipment (RPE), with protection rating FFP3 or re-usable half mask RPE with P3 filter and protection rating APF20 should be used.

All staff required to use RPE should be subject to face fit testing to ensure the RPE selected provides each individual with the anticipated level of protection.

A FF3 mask may be used for various tasks ie: site pre-clean whilst a full face power-assisted respirator with a P3 filter is required for entry into a live enclosure.

Refer to the HSA's A Guide to Respiratory Protective Equipment for further information.

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.

Air monitoring* Air monitoring is a specialist activity. It may be needed as part of chemical risk assessment, as a periodic check on control effectiveness and to assess compliance with relevant Occupational Exposure Limit Values, 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.

Refer to the HSA's current Code of Practice for up to date information on Occupational Exposure Limit Values (OELVs).

See reverse for Occupational Exposure Limit Values (OELVs)

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OCCUPATIONAL EXPOSURE LIMIT VALUES (OELVs) & EXPOSURE LEVELS

Agent or substance	Control/Exposure Limit	Exposure Levels
Silica - RCS	0.1 mg/m^3 (8 hr reference period)	Exposure is dependent on the silica content of the material being worked, which varies – with sandstone (70-90%) and concrete (anything from 25-75%) typically containing the most, granite, slate and brick at around 30%, and limestone and marble (2%) the least. Grinding and cutting without water suppression is likely to produce the highest levels of stone dust. Risk of exposure to RCS is also affected by the frequency and duration of the work
Asbestos (all types)	0.1 fibres/cm^3 (8 hr reference period)	The aim should be to avoid any exposure. There is a high risk of exposure from particular ACMs, including sprayed asbestos coatings and asbestos insulation, which may be disturbed by workers when demolishing or renovating buildings built before 2000. An asbestos survey must be completed by a qualified independent Asbestos consultant prior to any construction work taking place.
Welding fume	**Iron oxide fume (as Fe):** 5 mg/m3 (8 hr RP), 10 mg/m3 (15 min Ref. period) **Chromium (VI) Compounds:** 0.025 mg/m3 (Process generated welding fume) **Ozone** 0.2 ppm to 0.05 ppm (heavy work) **Carbon monoxide:** 20 ppm (8hr ref. period) 100ppm 15-min ref period **Nitrogen monoxide:** 2ppm (8hr ref. period) **Nitrogen dioxide:** 0.5 ppm (8hr ref. period), 1 ppm 15-min ref period **Manganese and its inorganic compounds (**as Mn): 0.2mg/m3 8hr ref. period (inhalable fraction) 0.05 mg/m3 (8hr ref. period) (respirable fraction) **Chromium** (III): 2mg/m3 (8hr ref. period)	There is no single welding fume exposure limit. As the composition of welding fume varies each of the constituents of welding fume would need to be identified and measured individually. The closest to a general welding fume OELV is the iron oxide OELV and the worst-case scenario (chromium OELV) is applied when welding stainless steel. Occupational exposure limits for known welding fume constituents are under constant review. See the HSA's current Chemical Agents Code of Practice. Chromium (VI) OELV is decreasing from 0.025 mg/m3 to 0.005mg/m3 from 17th January 2025. Chromium (VI) compounds are capable of causing cancer and occupational asthma. The risk to health depends on the composition of the fume as well as the 'arcing time'. Much of the welding work carried out by pipe fitters is likely to be sporadic, and lower arcing time means lower fume exposure.
Solder rosin fume (colophony)	0.05 mg/m^3 (8 hour reference period) 0.15 mg/m^3 (15 min reference period).	Manual soldering with a hand-held iron poses the greatest risk of exposure as the operator's head is likely to be near or in the fume which rises vertically. Risk is greater if work is prolonged, frequent or in enclosed spaces.
Construction Dust		These levels are advisory occupational limits only and the level which the dust becomes defined as a 'hazardous substance' and is then subject to the Safety, Health and Welfare at Work (Chemical Agents) Regulations, 2001, as amended 2015, 2021.

Further information

- Current Code of Practice for the Safety, Health and Welfare at Work (Chemical Agents) Regulations, 2001 as amended, and the Safety Health and Welfare at Work (Carcinogens, Mutagens and Reprotoxic substances) Regulations, 2024.
- Welding Fume. Health and Safety Authority.
- Asbestos Containing Materials in the Workplace - Practical Guidelines on ACM Management and Abatement. Health and Safety Authority.