BREATHE FREELY IRELAND

Controlling exposures to prevent occupational lung disease in
CONSTRUCTION

Electrical Engineer/Fitter

HAZARDS AND RISKS

Installation, maintenance, and repair of electrical wiring, equipment, and fixtures can involve tasks which generate dusts and fumes which are harmful when inhaled. Activities that might put electricians at risk of such hazardous exposures include soldering and brazing to connect wires to sockets and terminals, and drilling and riveting when assembling parts and installing or examining electrical fixtures and appliances such as fuse boxes and generators and electrical control systems.

Asbestos fibres

Engineers may come into contact with or disturb a number of asbestos containing materials (ACMs), particularly if working in buildings built before 2000. Asbestos is classified as a category 1 carcinogen. Inhalation of asbestos fibres can cause mesothelioma, asbestos-related lung cancer, abestosis, and pleural thickening - all fatal or serious and incurable diseases that take many years to manifest. In Ireland over 50 cases of mesothlelioma are reported annually whilst the WHO/ILO* estimate that approximately 400 people die annually in Ireland from occupational exposure to asbestos.

Solder fumes

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

Silica dust - respirable crystalline silica (RCS)

Silica is present in large amounts in most rocks, sand and clay, and in products such as bricks, concrete and mortar. Some of the dust created by drilling and riveting into these materials is fine enough to be breathed deeply into the lungs; this is called respirable crystalline silica (RCS) and exposure to RCS over many years or in extremely high doses can lead to serious lung diseases, including fibrosis, silicosis, chronic obstructive pulmonary disease (COPD) and lung cancer. These diseases cause permanent disability and early death. The WHO/ILO* estimate that approximately 30 people die annually in Ireland from occupational exposure to respirable crystalline silica (RCS).

Wood dust

Dust from softwood, hardwood, and wood-based products such as MDF and chipboard can cause asthma, a serious, debilitating, and sometimes life-limiting condition. Exposure comes from cutting and drilling wood and from settled dust that is later disturbed. Fine dust particles are most likely to damage the lungs. Some wood types are known to cause cancer. Wood dust exposure may also cause dermatitis. The dermatitis risk is high for softwoods.

**The WHO is the World Health Organization and the ILO is the International Labour Organization. They are both are United Nations agencies.*

CONTROL OPTIONS

Elimination/prevention

Asbestos: The aim is to avoid exposure. All premises should complete an asbestos survey, (completed by a competent asbestos surveyor) & asbestos management plan where the location and type of asbestos containing materials are registered. For information on work tasks involving asbestos refer to the HSA's Asbestos-containing Materials (ACMs) in Workplaces. Practical Guidelines on ACM Management and Abatement.

Solder Fumes: Choose methods which eliminate/minimise the use of hazardous materials ie: use rosin-free or rosin reduced solder; use soldering irons at the lowest temperature possible.

Engineering controls

- Use industrial Class H HEPA vacuums for cleaning up ACMs. All work with ACMs should be risk assessed by a competent person who has the training, knowledge, and experience of working with ACMs and can apply the required mitigating controls.
- Use LEV, such as a back-draught partial enclosure and/or on-tool extraction, for soldering irons.

Safe working methods

- Minimise dust creation: avoid or limit drilling, particularly of silica containing materials if at all possible; wet working: damp down before work and during debris removal and cleaning; use vacuums or wet cleaning, avoid dry sweeping or use of compressed air to remove dust; use hand tools in place of power tools if feasible.
- Ensure good natural ventilation of work area.
- Working with asbestos materials should be undertaken with strict precautions in place. These are outlined under Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations (2006-2010).

PPE

- PPE including RPE is the last line of defence against exposure to asbestos fibres. PPE/RPE must be provided and worn. Single use Overalls Type 5 and gloves should be worn with face-fitted RPE with an APF protection rating of 20+ or a power-assisted respirator with P3 filter. Non-laced boots are preferable to disposable overshoes.
- PPE such as RPE may be necessary whilst undertaking tasks involving wood dust, silica dust or solder fume. The PPE selection should be made in line with the risk assessment. Guidance on a suitable approach to RPE and fit-testing is given in the HSA's Guide to Respiratory Protective Equipment.

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 required as part of a Chemical Agents risk assessment, as a periodic check on control effectiveness and to assess compliance with relevant occupation exposure limit Values (OELVs), 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.

Air monitoring in relation to asbestos should be decided and undertaken in accordance with The Regulation 10 of the Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations (2006), *Measurement of asbestos in air*.

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
Asbestos (all types)	0.1 fibres/cm^3 (8 hr Reference period)	The aim is to avoid exposure. There is a high risk of exposure from particular ACMs including sprayed asbestos coatings and asbestos insulation which may be disturbed by workers during demolition or renovation of buildings built before 2000. An asbestos survey must be completed by a qualified competent asbestos consultant that will locate and identify ACMs prior to works taking place.
Construction dusts	Total Inhalable: 10mg/m^3 (8 hr Ref. period) Respirable: 4mg/m^3 (8 hr Ref. period)	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.
Silica - RCS	0.1 mg/m^3 (8 hr Ref. period)	Different types of stone contain different amounts of silica, with sandstone (70-90% silica) and concrete (anything from 25-75% silica) typically containing the most, granite, slate and brick at around 30% and limestone and marble 2% silica. All dust exposure levels are affected by the frequency and duration of the work and are likely to be higher in poorly ventilated spaces. Dry working without extraction control is likely to produce the highest levels of dust. Health risks to electricians are likely to be significant only if exposures are frequent and prolonged.
Wood dust Hardwood/Softwood	2 mg/m^3/5mg/m^3 (8 hr Ref. period)	Wood dust is capable of causing several occupationally acquired respiratory diseases including asthma and cancer. If a mix of wood dust contains both softwood and hardwood the OELV for hardwood applies to all wood dust in the mixture. All wood dust levels are affected by the frequency and duration of work. Engineering controls (LEV, on-tool extraction) should be used to minimise exposure.
Rosin Core solder pyrolysis product	0.15 mg/m^3 (15 min Ref. period) 0.05 mg/m^3 (8 hr Ref. period)	Manual soldering with a hand-held iron poses the greatest risk of fume exposure because the operator's head is likely to be near or in the fume which rises vertically. Capable of causing occupational asthma.

Further information

- Asbestos Containing Materials (ACMs) in Workplaces – Practical Guidelines on ACM Management and Abatement. Health and Safety Authority
- Safety, Health and Welfare At Work (Exposure to Asbestos) Regulations, 2006. S.I. No. 386/2006, as amended 2010.
- Safety, Health and Welfare At Work (Chemical Agents) Regulations, 2001. S.I. No. 619/2001, as amended 2015, 2021.
- Safety, Health and Welfare At Work (Carcinogens, Mutagens & Reprotoxic Substances) Regulations, 2024 replacing Safety, Health and Welfare at Work (Carcinogens) Regulations, 2001-2019.
- Current Code of Practice for the Safety, Safety, Health and Welfare at Work (Chemical Agents) Regulations and the Safety, Health and Welfare at Work (Carcinogens) Regulations (2001-2015).
- Control of Chemical Agents: Your Steps to chemical safety. A guide for small business.
- Guidelines on Occupational Asthma. Health and Safety Authority.
- Guidelines on Occupational Dermatitis. Health and Safety Authority.