BREATHE FREELY IRELAND

Controlling exposures to prevent occupational lung disease in
CONSTRUCTION

Road Worker

HAZARDS AND RISKS

There are a number of significant respiratory health hazards linked to road construction, in particular, work associated with cutting/drilling/breaking paving blocks, kerbs, flags, concrete and rock; laying and repair of asphalt; and any work carried out adjacent to diesel-emitting generators and site vehicles.

Silica dust

Silica occurs in many types of stone and concrete. It will be released as a dust during drilling and cutting processes. Inhaling fine silica dust (respirable crystalline silica or RCS) can leadb serious lung diseases, including fibrosis, silicosis, chronic obstructive pulmonary disease (COPD) and lung cancer. The WHO* and the ILO* estimate that approximately 30 people die annually in Ireland from occupational exposure to respirable crystalline silica (RCS).

Bitumen/asphalt fumes

Bitumen (aka asphalt) is commonly used for road surfacing. Hot bitumen work releases fumes containing polyaromatic hygdrocarbons (PAHs)/particulate, which, when inhaled, can cause irritation of the respiratory tract, eyes and skin, burns, and possibly lung cancer.

Diesel engine exhaust emissions (DEEEs)

DEEEs contain a complex mix of gaseous components (eg. nitrogen dioxide, carbon monoxide) and various particulates. Exposure to these substances is more likely when working near to the emissions sources, such as generators and site vehicles like excavators, planers and lorries. W hen inhaled, DEEEs have been linked to a long term increased risk of lung cancer, as well as a definite risk of respiratory tract irritation causing symptoms such as coughing, breathlessness, rhinitis and wheezing.

The WHO is the World Health Organization and the ILO is the International Labour Organization. Both are agencies of the United Nations.

CONTROL OPTIONS

Elimination/prevention

Silica dust

- Buy in ready cut materials where possible.

DEEEs

- Use alternative fuels for equipment where possible. For example, substituting diesel fuel with a safer fuel or alternative technology where practicable, eg compressed natural gas, battery powered vehicles or equipment.

Bitumen/ashphalt fumes

Do not exceed the recommended operating temperature for the asphalt mix whilst road laying, as this may cause excessive fumes.

Engineering controls

Silica dust

- Use power tools with integrated or "on-tool" dust extraction.
- Use water suppression where possible.

DEEEs

- Use diesel exhaust gas 'after-treatment' systems such as catalytic converters.
- Provide mechanical ventilation to prevent accumulation of emissions.

Safe working methods

Implement job rotation for all tasks to limit one person's exposure.

Silica dust

Reduce dust generation: use non-electrical saws with water suppression; use block splitters rather than cut off saws; minimise the number of cuts/ breaks.

Bitumen/asphalt fumes

- Keep workers and others not directly involved in the task as far away from the source of the fumes as possible.
- Keep workers away from exhausts.
- Choose vehicles with low level exhausts if possible.
- Locate generators / plant in open areas and clear of confined spaces or provide mechanical ventilation to prevent accumulation of emissions.
- Keep engine idling and revving to a minimum.

PPE

Silica dust

- RPE should be compatible with any other PPE. Wearers of tight fitting RPE must be face fit tested to ensure the RPE affords each individual the anticipated level of protection.
- RPE selection should be made in line with the risk assessment and with advice from the supplier sought if needed.
- Typically, for road laying activities, this may require either FFP3 rated disposable respiratory protective equipment (RPE) or a reuseable half mask RPE with P3 filters with minimum APF20 protection rating.

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 a chemical agents risk assessment, as a periodic check on control effectiveness and to assess compliance with relevant 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.

To obtain the most accurate and up-to-date information, it is recommended to visit the Health and Safety Authority's (HSA) website or contact the HSA directly. The website may have the latest versions of the current code of practice, guidelines, and regulations.

See reverse for Occupational Exposure Limits (OELs)

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OCCUPATIONAL EXPOSURE LIMITS (OELV)

Agent or substance	Control/Exposure Limit	Exposure Levels
Silica - RCS	0.1 mg/m^3 (8 hr reference 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.
Asphalt/petroleum fumes (benzene solubles) (PAHs)	Asphalt, petroleum fumes: 0.5 mg/m^3 (8hr reference period) OELV Note: an ACGIH TLV for asphalt fume (as the solvent extractable fraction) is 0.5 mg/m^3 (8hr reference period).	There is no current OELV for total PAHs although occupational exposure limits are available for some PAHs. Biological monitoring may be carried out for PAHs; guidance value: 4 µmol 1-hydroxypyrene/mol creatinine in urine. Typical airborne levels of benzene solubles to which road workers are exposed have been shown to be 1.3mg/m3 over an 8 hour shift.
Diesel engine exhaust emissions (DEEEs)	An overall OELV is not set of DEEE. Although the European Commission is considering 0.05 mg/m³ for elemental carbon which represents the particulate fraction or 'soot' component of DEEE (which is thought to link to the ill-health effects due to PAH absorption onto the soot). The OELV for gasous components are as follows; carbon monoxide 20ppm/23mg/m3 (8hr reference period) and 100 15 / ppm/117mg/m3ppm min STEL, nitrogen monoxide 2 ppm (8hr reference period), nitrogen dioxide 0.5ppm (8hr reference period) 0.96mg/m3 (15min STEL	Concentrations of respirable particulates from bitumen fumes and DEEEs during road construction work over an 8 hour shift have shown to be typically 1.5mg/m^3.

Further Information:

Safety, Health and Welfare At Work (Carcinogens Mutagens and Reprotoxic Substances) 2024 Regulations, 2001. I. No 078/2001, as amended 2015, 2019

Safety, Health and Welfare At Work (Chemical Agents) Regulations, 2001. S.I. No. 619/2001, as amended 2015, 2021. Current Code of Practice for the Safety, Health and Welfare at Work (Chemical Agents) Regulations

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.

Control of Chemical Agents: Your Steps to chemical safety (2011). A guide for small business.

Guidelines on Occupational Asthma ,Health and Safety Authority.
Guidelines on Occupational Dermatitis ,Health and Safety Authority.

HSA Guide on Respiratory Protective Equipment

HSA guidance on isocyanates