

Home Roof Insulation Materials



March 2002

Introduction

Home roof insulation materials manufactured from Synthetic Mineral Fibres (SMFs) have been the primary substitutes for asbestos based insulation products. Also called Man-Made Vitreous Fibres and Man-Made Mineral Fibres, SMFs is a generic expression used for fibrous inorganic substances that are made primarily from rock, clay, slag or sand. Home roof insulation material is usually made from rock (rockwool) and sand (glasswool). However, other home roof insulation materials, such as sheepswool, cellulose, and polyester are available. Home roof insulation products are generally available in batt, blanket or loose-fill form.

Occupational Exposure

Since the initial development of rockwool in the late 1800s and fibre glass in the 1930s, workers in various occupational settings have been exposed to these materials. Improved engineering controls in the manufacture of SMFs and the imposition of occupational exposure standards provide some assurance that significant occupational exposure to SMFs should not occur. Airborne-fibre concentrations in the rockwool industry have been estimated to be 1.5 to 10 fibres/mL prior to 1945, 0.3 fibres/mL for 1945-1960, and 0.03 fibres/mL post-1960.

The national occupational exposure standard for airborne respirable¹ SMFs (includes rock- and glasswools) as set by the National

Occupational Health and Safety Commission (NOHSC) is a time-weighted average (TWA) of 0.5 f/mL.²

For non-respirable SMFs, in situations where almost all the airborne material is fibrous, a secondary, yet complementary, TWA exposure standard of 2 mg/m³ (inspirable dust) has been proposed. The TWA exposure standard set for cellulose (paper fibre) is 10 mg/m³.

Environmental Exposure

Indoor air quality can be adversely affected by insulation material in roof spaces and wall cavities. However, if left undisturbed, indoor air exposure levels would normally be extremely low or below the level of detection. Levels of rockwool and glasswool detected in the living area of homes may range up to 0.04 fibres/mL (as determined by transmission electron microscopy). No information is available for other insulation material.

Health Effects

The health effects associated with insulation materials will clearly depend on the route, duration and level of exposure, and in the case of materials manufactured from SMFs the physical characteristics of the fibre.

1. Only part of the total quantity of dust which is present in the worker's breathing zone is inhaled; this fraction is designated the inspirable fraction. The inspirable fraction is generally divided into the respirable and non-respirable fractions. The respirable fraction is composed of very fine particulate which is able to reach the lower bronchioles and alveolar regions of the lung.
2. Atmospheric concentrations of fibres are measured in fibres per millilitre of air (f/mL) or fibres per cubic centimetre of air (f/cc).

However, other factors, such as age, pre-existing medical conditions, and sensitivity may also influence an individual's reaction to the insulation material.

Synthetic Mineral Fibres

The skin, eye and respiratory tract are the principle routes of exposure to SMFs. The potential for SMFs to cause skin and eye irritation as well as irritation to the respiratory tract as a result of occupational exposure is well documented.

While asbestos has been shown to cause a number of pulmonary diseases including asbestosis, mesothelioma, and lung cancer, the evidence that SMFs are carcinogenic is not conclusive. The International Agency for the Research on Cancer (IARC) classifies glasswool and rockwool as Group 2B carcinogens (possibly carcinogenic to humans) on the basis of animal studies in which rats developed tumours after intraperitoneal injections with high concentrations of glass wool.

However, the significance of this exposure pathway to man is not known. While there is some evidence of a slightly increased risk of lung cancer in the early rockwool and slagwool manufacturing industry, results from more recent studies do not confirm earlier findings. In addition, with respect to lung cancer, the interpretation of limited epidemiological evidence has been hampered by the potential for confounding (particularly that by smoking) and by insufficient evidence of exposure-response relationships. At present, there is no indication of an association between exposure to SMFs and mesothelioma.

Experimental evidence suggests that SMFs are more readily cleared from the lung than asbestos fibres, and it has been suggested that this may decrease the likelihood for chronic lung disease and/or cancer to develop. Respirable asbestos fibres are not readily broken down or cleared from the lung and consequently they tend to persist in lung tissue.

Sheeps wool

No dermal irritation from exposure to sheepswool has been noted. Rhinitis and conjunctivitis have been described among workers in the wool textile industry.

Quaternary ammonium salts are used in the production of sheepswool insulation as moth anti-feedants. These compounds are stable and relatively non-toxic.

Cellulose

Cellulose is not irritating to the skin, and its potential to cause eye irritation is not known. Although animal studies suggest that inhalational exposure to high concentrations of cellulose may have potential to adversely effect the lung (eg. pulmonary fibrosis), the use of cellulose as a home roof insulation material is unlikely to produce the levels of exposure required to cause lung disease.

Cellulose insulation is protected from combustion by the use of boric acid. Borax (sodium borate) is used to prevent infestation by pests. If cellulose insulation is insufficiently treated with borax, a habitat for pests such as rats, mice and silverfish will be provided. Exposure to dusts of sodium borate can cause irritation to the eye and respiratory tract.

Polyester

Polyester is not a skin irritant or sensitiser and the large diameter of the polyester fibres renders them non-respirable. However, upon combustion, carbon monoxide and flaming droplets of molten material can be produced

Conclusion

If left undisturbed in the roof space, the SMF based insulation materials, rockwool and glasswool, and the insulation materials, sheepswool, cellulose, and polyester are unlikely to adversely affect the health of building occupants. Levels of SMFs detected in indoor air have been shown to be extremely low, and given that there is a large margin of safety between the levels of SMFs in indoor air and those required to produce adverse effects in animals, the use of SMF based insulation material does not present a significant risk to human health.

Inhalational occupational exposure standards have been established for SMFs and cellulose, and accordingly, any prolonged exposure to insulation products manufactured from these materials should meet the exposure standards specified.

To reduce the potential for adverse health effects to be experienced during the installation of home roof insulation products, the following safe handling procedures should be observed;

- product should be handled with care to minimise the release of dust,

- a half face (Class P1 or P2) disposable dust respirator should be worn in accordance with Australian Standard 1715-1991,
- a head covering and goggles should be worn to avoid eye irritation during overhead work,
- long-sleeved, loose-fitting clothing and gloves should be worn to minimise skin contact,
- hands, face, neck and hair should be washed with soap and water immediately after completing installation,
- cleaning of surface dust should be carried out using an industrial vacuum cleaner fitted with high efficiency particulate filters or by wet mopping (domestic vacuum cleaners are inappropriate and dry brushing should be avoided),
- waste should be placed in plastic bags or other packages capable of containing dust,
- people not involved in installation should keep away from the work area.

Once installed, the insulation materials should have relatively no effect on human health. However, to ensure suitable indoor air quality, it is advisable that adequate natural or mechanical ventilation of the residence be established. In addition, barriers should be installed to stop loose-fill insulation from falling down through exhaust fans, wall cavities, ceiling vents and light fittings.

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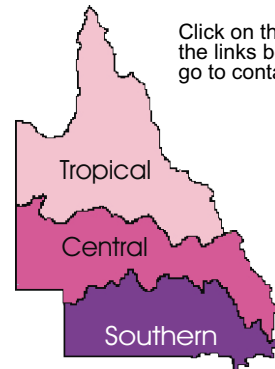
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