

Spraying of Polyurethane Foam Insulation on Construction Projects

Hazard Summary

Background

Polyurethane foam is being used more and more as an insulation material in residential construction. Recent experience indicates that some contractors may not be providing workers who handle it with adequate respiratory protection or training in proper work and hygiene practices.

Polyurethane foam is usually prepared on site in a closed system. The following materials are mixed in a 1:1 ratio:

- **base resin**, comprising polyols, amines (often tertiary amines) to act as catalyst and plasticizers; and
- **isocyanate** (both monomeric and polymeric), usually methylene bisphenyl isocyanate (MDI).

Normally, two workers are involved in spraying the foam: a sprayer and a helper who cuts off excess foam and cleans it up.

To clean the spray gun, the workers use an organic solvent such as glycol ether (ethylene glycol monoethyl ether).

Health Hazards:

Isocyanates: When sprayed, materials that contain isocyanates can cause primary irritation, sensitization and allergic reactions. The main organs affected are the respiratory system, the eyes and the skin. Long-term effects include chronic bronchitis and asthma.

Amines: Exposure to the vapour of the tertiary amine, which is normally a component of the catalyst in producing the foam, may cause eye irritation. This may result in temporary blurred vision or the appearance of a blue haze or halo around lights.

There is a safety hazard if a worker's vision is severely affected. Tertiary amines may also cause allergic asthmatic reactions.

Cleaning Solvents: Repeated or prolonged skin contact with the organic solvents used in cleaning may result in skin irritation or rashes. Glycol ether may be absorbed in significant amounts through intact skin.

Precautionary Measures for Spraying Polyurethane Foam

- Both the sprayer and the helper must use the appropriate class of air-supplying respirator in pressure-demand or other positive-pressure mode while polyurethane is being sprayed. If compressed air is used for respirators, it must meet applicable CSA Standards.
- A roped-off safety area should be established around the spraying operation for the protection of other workers. The boundary should be three metres (10 ft.) from the operation for outdoor spraying and eight metres (25 ft.) for indoor spraying.
- Anyone working within three metres (10 ft.) of the operation must wear full protective clothing and respiratory protective equipment.
- Ensure that:
 - polyurethane components are properly labelled, the proper Material Safety Data Sheets are available on site, and
 - workers have been trained as required by the WHMIS Regulation.
- In particular, workers must be trained by a competent person in:
 - the hazards of exposure to isocyanates, organic solvents and tertiary amines,
 - proper work and hygiene practices, and
 - proper use, maintenance and cleaning of respiratory

protective equipment.
spill kit use.

- Work and hygiene practices should include the following:
Provide adequate ventilation to the outdoors from the work area. If mechanical ventilation is used, fans must be non-sparking.
Prohibit any potential source of ignition in the work area.
Clean and decontaminate equipment used in handling isocyanates promptly after using it.
Prohibit eating, drinking and smoking in the work area.
Avoid skin contact with isocyanates and organic solvents: for example, wear polyvinyl alcohol gloves for protection against isocyanates, or chlorinated polyethylene gloves for isocyanates and ethers. Chemical resistance may vary among different products made of the same material, so the resistance of protective clothing should be evaluated under conditions of use.
Wash hands and face before eating, drinking, smoking and going to the washroom and upon completion of work involving isocyanates.
Clean up and dispose of spilled components promptly. Each mobile spraying unit should carry a spill kit. This should contain decontaminants for the isocyanate components (these decontaminants form more stable compounds that can be disposed of safely) and absorbent materials for the polyol/amine catalyst mixture.

Occupational Health & Safety
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