

Isocyanate Hazard in Spray Finishing Operations

The use of urethane paints and coatings in spray finishing operations has increased dramatically over recent years. The materials consist of two parts: a urethane-based resin, and an isocyanate catalyst. During the spray finishing operation, the resin and isocyanate catalyst are combined to form a durable weather and moisture-resistant finish. The isocyanates most commonly found in these two-part paints and coating systems are methylene bisphenyl isocyanate (MDI) and toluene diisocyanate (TDI).

Isocyanates present both acute and chronic occupational disease exposures. Acute effects include shortness of breath, tightness of chest, nausea, eye irritation, skin irritation, dizziness, and abdominal pains. In cases of massive exposure, loss of consciousness, accumulation of water in the lungs, and asphyxiation can occur. Chronic or longterm effects include damage to the respiratory system and sensitization. Once a person becomes sensitized to isocyanate, subsequent exposure to even minute quantities can trigger asthmatic-like reactions, which make the individual unable to work with, or come in contact with, any products containing isocyanate. Workers' Compensation claim costs resulting from isocyanate sensitization are usually very high.

The primary worker exposure to isocyanate occurs during spray application, when droplets of the urethane paint or coating containing isocyanate become airborne. The paint or coating mixing operation can also add to the worker's exposure. The current Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit (PEL) for isocyanate is 0.02 parts per million (ppm).

Controls to eliminate/reduce/control exposure to isocyanate can be classified into three types: engineering, personal protective equipment, and administrative:

- Engineering controls – Spray finishing operations should be conducted in an approved or listed noncombustible spray booth that provides a cross-sectional air flow of 100 feet per minute or greater.
- Personal protective equipment – For unknown concentrations, or a concentration greater than 0.10 parts per million (ppm), a positive-pressure (continuous flow) full-facepiece supplied-air respirator should be worn. For concentrations less than 0.10 ppm, a chemical respirator with organic vapor cartridge should be utilized. The OSHA Respiratory Protection Standard(1910.134) should be complied with when respiratory protection is utilized.

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All personnel handling isocyanates in open containers, or engaged in transferring liquid isocyanate should also wear impervious gloves and clothing, and chemical-type safety goggles and face shields to protect against accidental splashes or spills.

- Administrative controls – Employees with preexisting upper respiratory diseases such as asthma, bronchitis, or allergies should not be assigned to areas where isocyanate is being handled, stored, or used. Workers who have been sensitized to isocyanate should be reassigned to jobs which do not involve the handling, storage, or use of isocyanate.

The loss prevention information and advice presented in this brochure are intended only to advise our insureds and their managers of a variety of methods and strategies based on generally accepted safe practices, for controlling potentially loss producing situations commonly occurring in business premises and/or operations. They are not intended to warrant that all potential hazards or conditions have been evaluated or can be controlled. They are not intended as an offer to write insurance coverage for such conditions or exposures, or to simply that Great American Insurance Company will write such coverage. The liability of Great American Insurance Company is limited to the specific terms, limits and conditions of the insurance policies issued.
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