



Technical Bulletin

TDB #220 OSHA's National Emphasis Program - Isocyanates

July 2013

The following, with the exception of the **PPE Suggestions** section, is an extract from OSHA Instruction *NEP – Occupational Exposure to Isocyanates* Directive Number CPL 03-00-017 published June 20, 2013. The full document can be found at https://www.osha.gov/OshDoc/Directive_pdf/CPL_03-00-017.pdf

Introduction

On June 20, 2013, the Occupational Safety and Health Administration (OSHA) initiated a National Emphasis Program (NEP) regarding worker exposure to isocyanates. This NEP applies to all workplaces (General Industry, Construction, and Maritime) under the jurisdiction of Federal OSHA and state plan programs

Background

Exposures to isocyanates can cause adverse health effects for workers. The general term “isocyanates” refers to all chemicals with two or more isocyanate groups (-NCO) such as diisocyanates or polyisocyanates. Respiratory disease among workers exposed to isocyanates has been recognized since the 1950s. Exposure limits have been established in the U.S. for both ceiling and time weighted average (TWA) exposures. Isocyanates include compounds classified as potential human carcinogens. The most commonly used isocyanates include methylenebisphenyl isocyanate) (MDI), toluene diisocyanate (TDI), and hexamethylene diisocyanate (HDI).

Isocyanates are powerful irritants to the eyes, nose and throat, gastrointestinal and respiratory tracts. Irritation may be severe enough to produce bronchitis. Hypersensitivity pneumonitis (inflammation in the lungs caused by exposure to an allergen) has been reported in isocyanate-exposed workers. Symptoms can continue for months or years after exposure has ceased. Some isocyanates are also allergic sensitizers. Workers with skin contact to isocyanates may develop sensitivity, resulting in asthma attacks with subsequent exposures. Sensitization can occur at very low levels of exposure. Dermal sensitization may also result in rash, itching, hives and swelling of the extremities. Because isocyanates are not readily water soluble, they cannot be easily washed off skin or clothing.



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Isocyanates are widely used in the manufacture of flexible and rigid foams, fibers, coatings such as paints and varnishes, and elastomers, and are increasingly used in the automobile industry, auto body repair, and building insulation materials. In addition, spray-on polyurethane products containing isocyanates have been developed for a wide range of retail, commercial, and industrial uses to protect cement, wood, fiberglass, steel, and aluminum, including protective coatings for truck beds, trailers, boats, foundations, and decks. A list of relevant industries where isocyanate exposure can occur is in Appendix A of the OSHA Instruction *NEP – Occupational Exposure to Isocyanates* Directive Number CPL 03-00-017.

OSHA Inspection

During the inspection, the compliance safety and health officer (CSHO) will review:

- **OSHA 300 Log** - for illness/injury log for entries related to a possible occupational isocyanate illness
- **PPE Hazard Assessment** – to determine compliance with the applicable PPE regulations, including 29 CFR 1910 Subpart I (General Industry), 1926 Subpart E (Construction), 1915 Subpart I (Shipyards)
- **Hazard Communications** - to ensure appropriate Safety Data Sheets (SDS) are available and isocyanate training has been conducted.
- **Air Monitoring** – to determine if air monitoring will be done as part of the inspection or possibly just review employer air monitoring (to determine adequacy of exposure assessment).
- **Wipe sampling** - to determine potential dermal exposure. There is no OSHA dermal PEL, but if isocyanates are detected on a work surface, a citation could be issued under the PPE standard 29 CFR 1910 Subpart I (General Industry), 1926 Subpart E (Construction), 1915 Subpart I (Shipyards) or housekeeping 29 CFR 1910.141 (General Industry), 1926.25 (Construction), 1915.81 (Shipyards).

Several isocyanates do not have OSHA Permissible Exposure Limits, but do have other organization's OELs (e.g. ACGIH, NIOSH). It is possible OSHA may issue a general duty clause citation if exposure exceeds the OEL and there is no PEL.

Personal Protective Equipment (PPE)

The CSHO shall evaluate whether the employer has ensured the use of appropriate PPE during operations using isocyanates. The CSHO shall evaluate the effectiveness of the PPE being used in the establishment:

- The use of appropriate eye and/or face protection. Isocyanate vapors are corrosive and severely damaging to the eyes. Contact may cause permanent eye damage. If a half-mask respirator is selected, an employer would also be required under 29 CFR 1910.133(a) (1) to ensure that the employee uses appropriate eye and face protection.
- The use of appropriate respiratory protection.
- The use of appropriate, chemical-resistant gloves (e.g., butyl, nitrile). Employers shall select and require the use of gloves that are adequate to protect the employees from dermal exposure to isocyanates (e.g., by checking the manufacturer's information about the glove type or the Safety Data Sheet (formally MSDS)).



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Housekeeping Evaluation The employer's methods for ensuring adequate housekeeping shall be evaluated and documented

PPE Suggestions

Respirators Negative pressure air purifying respirators (reusable and powered air) equipped with a combination organic vapor/ N95 or better (HEPA for PAPRs) particle filter may be used to control inhalation exposure. Isocyanates do not have any noticeable odor at OEL concentration levels and per OSHA regulations a site specific cartridge change out schedule must be developed. Supplied air respirators may also be used to control inhalation exposure. Examples of air purifying respirators include:

- 6000 series full face respirator with 60921 cartridge
- GVP PAPR with GVP-441 cartridge and S-443 hood

NIOSH-approved respirators must be used in accordance with the NIOSH cautions and limitations specified on the NIOSH approval label and comply with OSHA's respiratory protection regulations (29 CFR 1910.134). The respirator manufacturer or a health and safety professional should be consulted if there is any question regarding respirator selection and use. Users must understand the respirator capabilities, as well as limitations, and follow the respirator manufacturer's user instructions in order to receive the assigned level of protection. Misuse of any respiratory protection device may result in sickness, injury or death.

Eye Protection As noted above, eyes must be protected from any contact with isocyanates. Employers should consider either a full face respirator or a ½ face piece respirator with tight fitting goggles (e.g. Lexa Splash Goggle Gear). Tight fitting eye protection helps minimize the risk of accidental eye rubbing with contaminated hands.

Skin Protection Skin contact must be prevented to reduce the risk of dermal exposure. 3M coverall 4565 can be used to minimize isocyanate contamination of skin and clothing. In addition, chemical protective gloves should be worn to protect the hands. Refer to glove manufacturers recommendations for specific products.



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