

OSHA's Isocyanates National Emphasis Program

Safe Spraying and Intelligent Insulation Seminar

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- **National Emphasis Program – Occupational Exposure to Isocyanates, CPL 03-00-017**
 - Effective date June 20, 2013
 - <http://www.osha.gov/SLTC/isocyanates/index.html>





Isocyanates

Isocyanates are compounds containing the isocyanate group (-NCO). They react with compounds containing alcohol (hydroxyl) groups to produce polyurethane polymers, which are components of polyurethane foams, thermoplastic elastomers, spandex fibers, and polyurethane paints. Isocyanates are the raw materials that make up all polyurethane products. Jobs that may involve exposure to isocyanates include painting, foam-blowing, and the manufacture of many Polyurethane products, such as chemicals, polyurethane foam, insulation materials, surface coatings, car seats, furniture, foam mattresses, under-carpet padding, packaging materials, shoes, laminated fabrics, polyurethane rubber, and adhesives, and during the thermal degradation of polyurethane products.



Health effects of isocyanate exposure include irritation of skin and mucous membranes, chest tightness, and difficult breathing. Isocyanates include compounds classified as potential human carcinogens and known to cause cancer in animals. The main effects of hazardous exposures are occupational asthma and other lung problems, as well as irritation of the eyes, nose, throat, and skin.

OSHA Standards

Isocyanates hazards are addressed in specific standards for general industry, shipyard employment, and the construction industry. This section highlights OSHA standards and standard interpretations (official letters of interpretation of the standards) related to isocyanates. Twenty-five states, Puerto Rico and the Virgin Islands have [OSHA-approved State Plans](#) and have adopted their own standards and enforcement policies. For the most part, these States adopt standards that are identical to Federal OSHA. However, some States have adopted different standards applicable to this topic or may have different enforcement policies.


General Industry ([29 CFR 1910](#))

- [1910 Subpart H](#), Hazardous materials
 - [1910.119](#), Process safety management of highly hazardous chemicals [[related topic page](#)]
 - [Appendix A](#), List of highly hazardous chemicals, toxics and reactives (Mandatory)
- [1910 Subpart Z](#), Toxic and hazardous substances [[related topic page](#)]
 - [1910.1000](#), Air contaminants

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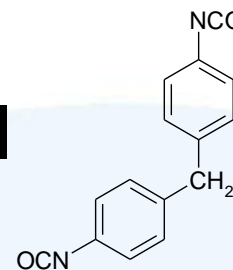
Highlights

-  [National Emphasis Program - Occupational Exposure to Isocyanates](#) [322 KB PDF, 48 pages]. OSHA Directive CPL 03-00-017, (June 20, 2013). Describes policies and procedures for implementing a National Emphasis Program to identify and reduce or eliminate the incidence of adverse health effects associated with occupational exposure to isocyanates.

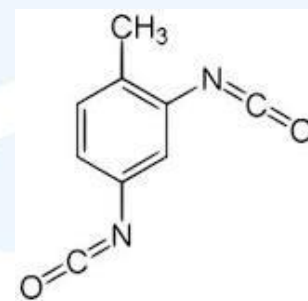
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Most Commonly Used

- Methyl isocyanate - MIC
- Methylene Bis (phenyl isocyanate) – MDI
- Toluene diisocyanate – TDI
- Hexamethylene diisocyanate – HDI
- Naphthalene diisocyanate – NDI
- Methylene bis-cyclohexylisocyanate – (HMDI)
- Isophorone diisocyanate - (IPDI)
- HDI biuret
- HDI isocyanurate



MDI



TDI

Exposure Limits

- OSHA Permissible Exposure Limits – MIC, MDI, TDI
- Other Occupational Exposure Limits – NIOSH, ACGIH

Isocyanate CAS no. OSHA IMIS no.	Synonyms	Vapor Pressure	Occupational Exposure Limits (OEL)					
			OSHA PEL		NIOSH REL ¹		ACGIH TLV ^{® 2}	
			ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³
Methyl isocyanate 624-83-9 1773	MIC; Isocyanatomethane	348 mmHg @ 68 °F	0.02 T	0.05 T	0.02 T	0.05 T	0.02 T	
Methylene bisphenyl isocyanate 101-68-8 1073	4,4-Diphenylmethane diisocyanate; MDI; 4,4-Diisocyanadiphenyl-methane; Methylene bis(4- phenylisocyanate); Methylene Bis(Phenyl Isocyanate)	0.000005 mmHg @ 77 °F	0.02 C	0.2 C	0.005 T 0.02 C	0.050 T 0.2 C	0.005 T	
Toluene-2,4- diisocyanate (TDI) 584-84-9 2470	2,4-Diisocyanato-1- methylbenzene; TDI; 2,4-TDI; 2,4-Toluene diisocyanate	0.01 mmHg @ 77 °F	0.02 C	0.14 C		4	0.005 ⁵ T 0.02 STEL	

NIOSH – National Institute for Occupational Safety and Health
ACGIH – American Conference of Governmental Industrial Hygienists



Health Effects

- Occupational asthma
- Dermatitis*
- Irritation of mucus membranes
- Hypersensitivity pneumonitis
- Chest tightness
- Some are classified as potential human carcinogens

* Studies indicate that dermal exposure is a significant cause of respiratory sensitization.

Used in the Formation of Many Polyurethane Products

- Paint
- Blowing foam insulation
 - Polyurethane foam
 - Insulation materials
 - Surface coatings
 - Car seats
 - Furniture
 - Foam mattresses
 - Under-carpet padding
 - Packaging materials
 - Laminated fabrics
 - Adhesives



Workplace Health*

- Occupational Exposure Limits
 - Overexposure requires engineering or administrative controls
- Personal Protective Equipment
 - PPE hazard assessment
 - Protective clothing, eye/face protection, hand protection, respiratory protection
- Respiratory Protection
 - Medical evaluation, fit-test, training
- Hazard Communication
 - Training, labeling, safety data sheets
- Recordkeeping
 - OSHA 300 Injury and Illness logs



*not comprehensive

Personal Protective Equipment

General requirements	29 CFR 1910.132
Eye and face protection	29 CFR 1910.133
Head protection	29 CFR 1910.135
Foot protection	29 CFR 1910.136
Hand protection	29 CFR 1910.138

PPE Topics Page:

<http://www.osha.gov/SLTC/personalprotectiveequipment/index.html>

(for standards, fact sheets, eTools and other information)



Personal Protective Equipment

- Conduct a hazard assessment and select appropriate PPE to protect employees from hazards
- Must ensure PPE is used and maintained
- Must be provided at no cost to employees (some exceptions)
- Provide training on PPE

Respiratory Protection

29 CFR 1910.134

- Selection
 - Select and provide appropriate respirator based on respiratory hazards
- Medical evaluation
 - Medical questionnaire and/or physical conducted by a licensed health care professional
- Fit testing
 - Quantitative or qualitative
 - Performed on the same make, model and size of respirator to be used by employee



Respiratory Protection

29 CFR 1910.134

- Use
 - Ensure faceseal protection for tight-fitting respirators (e.g. no facial hair)
- Maintenance and care
 - Proper cleaning and disinfecting, storage, inspection, and repair
- Breathing air quality and use
 - Supplied air respirators and SCBAs
- Training
- Program Evaluation

Hazard Communication

29 CFR 1910.1200

- Revised on March 26, 2012 to align with GHS (Globally Harmonized System of Classification and Labeling of Chemicals)
- All employers with hazardous chemicals in their workplaces are still required to have a hazard communication program, and provide information to employees about their hazards and associated protective measures
- Written hazard communication program requirements, worker training, and trade secret provisions are all largely unchanged from the existing rule



Hazard Communication

29 CFR 1910.1200

Notable changes:

- Labels are more defined and will now require:
A product identifier, pictogram, signal word, hazard statement (s), precautionary statement(s), name, address and telephone number
- Using “safety data sheet” rather than “material safety data sheet”
 - 16 section format

Recordkeeping

29 CFR 1904

- Maintain records of serious workplace injury and illnesses using OSHA 300 Injury and Illness Log and 301 Injury and Illness Incident Report
- Required to post Form 300A, the Summary of Work-Related Injuries and Illnesses every year from February 1 to April 30
- Forms, Recordkeeping Handbook, standard and guidance available at:
<https://www.osha.gov/recordkeeping/index.html>



Workplace Safety*

- Fire protection and prevention
 - Fire extinguishers, storage of flammable liquids
- Electrical safety
 - Hazardous locations, intrinsically safe equipment
- Fall protection, scaffolds, ladders
- Powered hand tools



*not comprehensive

Transitioning to Safer Chemicals: A Toolkit for Employers and Workers

- Step-by-step toolkit to provide employers and workers with information, methods, tools and guidance on using informed substitution



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