

# Polyurea Development Association 2019 Safety Conference

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# Cal/OSHA's Mission

The Division of Occupational Safety and Health (DOSH), better known as Cal/OSHA, protects and improves the health and safety of working men and women in California and the safety of passengers riding on elevators, amusement rides, and tramways –through the following activities:

- Setting and enforcing standards
- Outreach, education, assistance, partnerships, and alliances
- Permits, licenses, certifications, registrations, and approvals

## Objectives:

- Review employee exposure hazards to isocyanates
- Review Industry Top 10 OSHA/Cal-OSHA Violations
- Implementation of an effective Respiratory Program



## Polyurea – the new generation of lining and coating

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**Keywords:** polyurea, coating, lining, waterproofing, polymer

### Introduction

Few seconds setting time, superior flexibility along with high mechanical strength and moisture insensitivity are only a small portion of the characteristics of the unique technology named Polyurea. This technology is on the move around the globe and recently some intriguing projects were done also in Israel. This paper is a brief introduction of the Polyurea technology.

Nearly two decades ago, a new technology was introduced to the world. It was not an innovative semi-flexible Epoxy, with a better UV stability. Nor was it a new kind of fast set Urethane, with improved chemical resistance. Rather, it was a new generation of polymers, which is free of some of the drawbacks of the old conventional coatings.

It is well known, for example, that epoxies excels in chemical resistance, high mechanical strength and hardness. However, it is also known that in spite of the great advance of recent years, epoxies still tend to be brittle and crack due to thermal stress and other causes. Chalking and yellowing caused by UV exposure is another notorious characteristic of Epoxies. Urethanes on the other hand are very flexible and have excellent weatherability. But what about hydrolytic stability, moisture sensitivity during the application and chemical resistance issues? There is much room for improvement on this regard.

Polyurea combines high mechanical strength, unusual elongation, excellent water resistance and good chemical resistance. UV stability of some Polyureas is nothing less than high quality aliphatic urethanes. Therefore, in recent years the Polyurea technology is on the move all over the world in diverse fields, such as the building, petrochemical and chemical industries, corrosion protection, flooring, water systems and wastewater treatment plants, bridges and tunnels, etc.

### What is Polyurea

Basically, Polyurea is formed by reaction of an isocyanate component with an amine component. Since this is a rapid reaction, that occurs in a matter of seconds, there is no need in catalysts. The chemical structure of polyurea differs from that of polyurethane, which is formed by the reaction of an isocyanate and a hydroxyl. Polyurea contains 100% solvents, and sets rapidly and uniformly at any thickness. Absence of VOC naturally gives Polyurea environmental and health benefits.

Due to its fast setting nature, most of Polyurea systems are applied by designated heated plural spray systems. The isocyanate and amines are mixed by impingement at a chamber located at the tip of the spray gun. However, new advancements and formulations enable Polyurea manufactures to slow the reaction and come up with products that can be applied with conventional equipment such as airless sprayer, squeegee, roller and brush. Slower gel time also allows for better self leveling and wetting of the substrate, which results in a better adhesion and a smooth and even film.



<a href="#">Structures</a>	<a href="#">Coatings</a>	<a href="#">Tools &amp; Equipment</a>	<a href="#">Health &amp; Safety</a>	<a href="#">Projects</a>	<a href="#">Process &amp; Practice</a>	<a href="#">News &amp; Trends</a>	
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## Coatings Industry News

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### OSHA to Target Key Coating Chemical

Thursday, June 27, 2013



Federal health and safety authorities have announced a new crackdown on worker exposure to a chemical commonly used in protective and marine coatings.

[Isocyanates](#), commonly used in paints, coatings, spray-on polyurethane products, and building insulation materials, are the focus of a new [National Emphasis Program](#) by the Occupational Safety and Health Administration.

The chemicals can cause occupational asthma; irritation of the skin, eyes, nose and throat; and cancer, OSHA reports. Isocyanate exposures have also caused deaths due to both asthma and hypersensitivity pneumonitis.

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Coatings Industry News

Main News Page

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More

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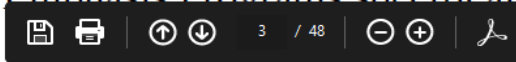
The chemicals can cause occupational asthma; irritation of the skin, eyes, nose and throat; and cancer, OSHA reports. Isocyanate exposures have also caused deaths due to both asthma and hypersensitivity pneumonitis.



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## Executive Summary

This National Emphasis Program (NEP) was developed to focus OSHA resources on the workplace health issue of occupational exposure to isocyanates. This instruction combines enforcement and outreach efforts to raise awareness of employers, workers, and safety and health professionals of the serious health effects associated with occupational exposure to isocyanates. The health effects of occupational exposure to isocyanates include occupational asthma, irritation of the skin (dermatitis) and mucous membranes (eyes, nose, and throat), hypersensitivity pneumonitis, and chest tightness. Isocyanates include compounds also classified as potential human carcinogens and known to cause cancer in animals. Workers in a wide range of industries and occupations are exposed to at least one of the numerous isocyanates known to be associated with work-related asthma. Occupational factors are associated with at least 15 percent of all adult onset asthma cases in the United States. Occupational asthma is an illness characterized by intermittent breathing difficulty including chest tightness, wheezing, cough and shortness of breath. It is frequently serious and sometimes fatal. Jobs that may involve exposure to isocyanates include painting, blowing foam insulation, and the manufacture and thermal degradation of many polyurethane products such as polyurethane foam, insulation materials, surface coatings, car seats, furniture, foam mattresses, under-carpet padding, packaging materials, shoes, laminated fabrics, polyurethane rubber, and adhesives. This instruction sets forth a site selection system that targets multiple industries and will focus on evaluating inhalation, dermal and other routes of occupational exposure to isocyanates. This instruction supersedes all Regional and Local Emphasis Programs specifically addressing occupational exposure to isocyanates.



Exposures to isocyanates can have adverse health effects for workers. Organic isocyanates are chemicals which contain one or more isocyanate groups (-NCO) attached to an organic group. The general term “isocyanates” refers to all chemicals with two or more isocyanate groups 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. and other countries for both ceiling and TWA exposures. Isocyanates include compounds classified as potential human carcinogens and known to cause cancer in animals.

“The most widely used compounds are diisocyanates, which contain two isocyanate groups, and polyisocyanates, which are usually derived from diisocyanates and may contain several isocyanate groups. The most commonly used diisocyanates include methylenebis(phenyl isocyanate) (MDI), toluene diisocyanate (TDI), and hexamethylene diisocyanate (HDI). Other diisocyanates include naphthalene diisocyanate (NDI), methylene bis-cyclohexylisocyanate (HMMDI) (hydrogenated MDI), and isophorone



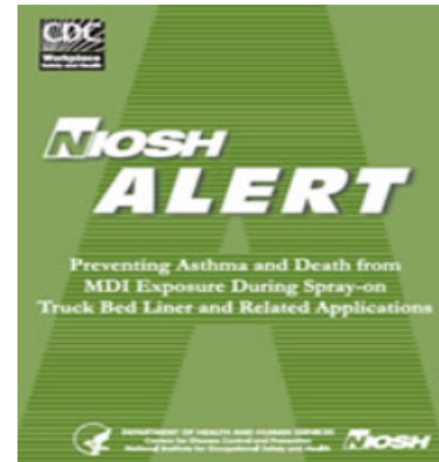
# NIOSH Alert: Preventing Asthma and Death from MDI Exposure During Spray-on Truck Bed Liner and Related Applications

[Español \(Spanish\)](#)

DHHS (NIOSH) Publication Number 2006-149

September 2006

The National Institute for Occupational Safety and Health (NIOSH) requests assistance in preventing asthma, other respiratory diseases, and death from exposure to methylenebis(phenyl isocyanate) (MDI). More than 10,000 U.S. workers are potentially exposed to MDI during spray-on truck bed lining operations. This Alert summarizes four case reports: one death and several incidents of asthma or other respiratory disease following exposure to MDI during spray-on truck bed lining operations. Information about preventing adverse health effects from exposure to MDI is urgently needed by workers, employers, small business owners, and physicians and other health care providers. *\*MDI is methylenebis(phenylisocyanate). In this fact sheet, MDI refers to all MDI-based isocyanates.*



# HOW DANGEROUS ARE POLYUREA COATINGS?

Polyurea coatings are made of isocyanates which are highly reactive, low molecular weight chemicals. According to the Centers for Disease Control and Prevention, these chemicals are powerful irritants to the mucous membranes of your eyes as well as your gastrointestinal and respiratory tracts.

Working with these materials without the proper safety material can cause the following:

- ▶ Inflammation of your skin if there is direct contact
- ▶ Eye irritation
- ▶ Nasal congestion
- ▶ Dry or a sore throat
- ▶ Cold-like symptoms
- ▶ Shortness of breath
- ▶ Wheezing
- ▶ Chest tightness

# Guidance Document on Spray-on Polyurethane/Polyurea-Based Lining Applications Containing Isocyanates

ISSUE AX405 • FEBRUARY 2013

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## Purpose

The Center for the Polyurethanes Industry (CPI) prepared this guidance document to provide information to professionals concerning important health and safety aspects when working with isocyanates during spray-on lining applications. Although isocyanates based on MDI (diphenyl methane diisocyanate) and HDI (hexamethylene diisocyanate) commonly are used in truck bed and other types of lining systems, it is not the only material in the system that may be potentially harmful to your health; therefore, it is important to read all the information contained in your supplier's Safety Data Sheets or SDSs (formally known as Material Safety Data Sheets or MSDSs) for the particular spray-on lining system that you are using. SDSs are the primary sources of extensive and specific information on isocyanates as well as on other spray-on lining system ingredients.

This guidance document is intended to help spray-on lining companies, such as truck bed liner companies, educate its workers about isocyanates and appropriate worker protection related to isocyanates. For supporting information, a complimentary video is available on CPI's website (<http://polyurethane.americanchemistry.com/Spray-Truck-Bed-Liner/Truck-Bed-Liner-Video.html>) for additional information about working safely with isocyanates-based spray-on linings. Neither CPI nor its member companies are responsible for worker protection, or worker protection programs, for spray-on lining companies.



Center for the Polyurethanes Industry



## Introduction

Isocyanate-based spray-on linings, such as truck bed lining products, have protected vehicles (e.g., trucks, trailers, and boats) from wear and tear over many years through the application of polyurethane, polyurea or polyurea hybrid systems. This document addresses important points to be considered during the application of spray-on lining systems.

### What is an Isocyanate?

Isocyanates are a family of chemical intermediates used to make polyurethane/polyurea products, and have been in use since the late 1940s. Isocyanates are one of the components used in polyurethane and polyurea coatings, which are used in spray-on lining systems. In two-component spray on lining systems, professionals generally refer to the isocyanates as the “A-side” or the “iso-side” and the resin/polyol blend as the “B-side” of the system.

### Recognizing Potential Health Hazards

Overexposure to isocyanates can have potential health effects. When isocyanates are sprayed, there is the potential for overexposure by:

- Breathing airborne concentrations
- Getting it on your skin
- Getting it in your eyes
- Swallowing it

In addition to what is identified in the product SDS, here are some examples of the effects of possible overexposure and some recommended first-aid procedures:

**Inhalation:** If isocyanates are sprayed or heated, there is an increased chance of overexposure through inhalation. Isocyanates can irritate your nose and lungs. With



In addition to what is identified in the product SDS, here are some examples of the effects of possible overexposure and some recommended first-aid procedures:

**Inhalation:** If isocyanates are sprayed or heated, there is an increased chance of overexposure through inhalation. Isocyanates can irritate your nose and lungs. With overexposure, you may feel tightness in your chest and have difficulty breathing. If you continue to be overexposed, you may become sensitized (i.e., allergic) to isocyanates. Once sensitized, the effects may start as soon as you begin to work with the product, or later on in the day after you've stopped working with the product (e.g., when you've left work). If you are sensitized, then you may experience health effects even when airborne isocyanate levels are very low and may be at risk for experiencing an asthma attack. If you are sensitized, **DO NOT CONTINUE TO WORK WITH ISOCYANATES**; asthma attacks can be life-threatening. If you start to feel any of the symptoms listed above, let your supervisor know immediately and seek medical attention. If you suspect someone has become overexposed, remove the person to an area with fresh air, and try to keep them calm and warm, but not hot. If they are having difficulty breathing, a qualified person may provide oxygen. If they stop breathing, then have trained first aid personnel perform artificial resuscitation. Seek emergency medical attention.



**Skin Contact:** Getting isocyanates on your skin may result in an irritation effect and/or allergic sensitization. In addition, animal tests have indicated that skin contact, followed by inhalation exposure, may result in lung sensitization. If lung sensitization or skin irritation occurs, seek immediate medical attention. Repeatedly getting isocyanate on your skin may cause discoloration, redness, and swelling or blistering; this also could lead to skin sensitization. Avoid unprotected skin contact, but if you get isocyanate on your skin, wash it thoroughly with soap and flowing water as soon as possible after exposure. Refer to the manufacture's SDS for information.

**Eye Contact:** Getting isocyanate in your eyes can be painful and could cause tearing and irritation. If you get isocyanate in your eyes, wash them immediately with a continuous flow of lukewarm, low pressure water, preferably from a well-maintained eyewash fountain, for at least 15 minutes.

Seek immediate medical attention.

**Ingestion:** Irritation can result from swallowing isocyanates. If you accidentally swallow isocyanates, do not induce vomiting. Wash out the mouth with water and then seek rest and immediate medical attention.

Additional information about potential health hazards is available through the product's SDS and on the CPI website at [www.polyurethane.org](http://www.polyurethane.org).

## Ways to Avoid Isocyanate Overexposure

With proper precautions and the use of personal protective equipment (PPE), you can avoid overexposure to isocyanates during the application of your spray-on lining system.

For tasks that do not involve spraying (such as cleaning equipment), but where you may have direct contact with isocyanate liquid (at room temperature), use PPE including:

- Safety glasses with eye shields or chemical goggles,
- Isocyanate-resistant chemical gloves (e.g., nitrile),
- Isocyanate-resistant clothing (e.g., apron or coveralls), and
- Safety shoes or boots.

When applying a spray-on lining system, use PPE, including the following:

- An approved supplied air respirator (as outlined in your company's Respiratory Protection Program)\*,
- Chemical goggles,
- Isocyanate-resistant chemical gloves (e.g., nitrile),
- Isocyanate-resistant long-sleeve coveralls or full body suit with hood, and
- Isocyanate-resistant fitted boots/booties.

\*The level of respiratory protection provided by the supplied air system is dependent upon the facepiece that is chosen; therefore, consult your company's respiratory protection program and the manufacture's SDS for guidance.

For other tasks where there is the potential for exposure to isocyanate vapor/mist, follow the guidelines suggested for activities involving spraying. Workers not wearing the correct PPE must not enter the spray enclosure until the airborne levels are below the allowable limits.

Additional information is available through the product's SDS and on the CPI website at [www.polyurethane.org](http://www.polyurethane.org).

# 2018 Top 10 Violations by Title 8 Section

- 1) § 3203 Injury and Illness Prevention Program (IIPP) - GISO
- 2) § 3395 Heat Illness Prevention
- 3) § 1509 Injury and Illness Prevention Program (IIPP) – Const.
- 4) § 3314 Control of Hazardous Energy (Lockout Blockout Tagout)
- 5) § 5194 Hazard Communication
- 6) § 342 Reporting Fatalities and Serious Injuries
- 7) § 5162 Emergency Eyewash/Shower
- 8) § 5144 Respiratory Protection
- 9) § 6151 Fire Extinguishers
- 10) § 3276 Portable Ladders



## NAICS Code: 325510 *Paint and Coating Manufacturing*

Listed below are the standards which were cited by **Federal OSHA** for the specified NAICS Code during the period October 2018 through September 2019. Penalties shown reflect current rather than initial amounts. For more information, see [definitions](#).

Standard	Citations	Inspections	Penalty	Description
Total	112	27	\$181,853	<i>All Standards cited for Paint and Coating Manufacturing</i>
19100134	24	10	\$22,834	Respiratory Protection.
19101200	13	7	\$5,955	Hazard Communication.
19101026	12	1	\$32,506	<i>--- No Description Found ---</i>
19100212	6	6	\$29,412	General requirements for all machines.
19101052	6	1	\$9,800	Methylene Chloride.
19100107	5	3	\$6,726	Spray finishing using flammable and combustible materials.
19100178	5	3	\$7,247	Powered industrial trucks.
19100029	3	2	\$3,652	Manually propelled mobile ladder stands and scaffolds (towers).
19100106	3	3	\$5,723	Flammable and combustible liquids.
19100184	3	1	\$3,004	Slings.
19100303	3	3	\$3,731	General requirements.

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Standard	Citations	Inspections	Penalty	Description
Total	14	1	\$5,455	<i>All Standards cited for Paint and Coating Manufacturing</i>
5144(I)(	2	1	\$260	<i>--- No Description Found ---</i>
5096(B)	1	1	\$350	<i>--- No Description Found ---</i>
5097(A)	1	1	\$0	<i>--- No Description Found ---</i>
5143(A)(	1	1	\$260	<i>--- No Description Found ---</i>
5144(F)	1	1	\$0	<i>--- No Description Found ---</i>
4(D)	1	1	\$0	<i>--- No Description Found ---</i>
5204(E)(	1	1	\$0	<i>--- No Description Found ---</i>
5204(F)	1	1	\$3,935	<i>--- No Description Found ---</i>
5204(F)(	1	1	\$0	<i>--- No Description Found ---</i>
5204(G)(	1	1	\$260	<i>--- No Description Found ---</i>
5204(H)(	1	1	\$390	<i>--- No Description Found ---</i>
5204(I)(	1	1	\$0	<i>--- No Description Found ---</i>



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Standard	Citations	Inspections	Penalty	Description
Total	3	1	\$1,310	<i>All Standards cited for Paint and Coating Manufacturing</i>
3328(A)(	1	1	\$375	<i>--- No Description Found ---</i>
3650(T)(	1	1	\$560	<i>--- No Description Found ---</i>
43000032	1	1	\$375	<i>--- No Description Found ---</i>

# Industry SIC Search Results

SIC	NAICS	Date Range	Office	State	Other Options
All	325510	07/01/2016 to 06/30/2018	All	CA	None

Please note that inspections which are known to be incomplete will have the Identifying Activity Nr shown in *italic*. Information for these open cases is especially dynamic, e.g., violations may be added or deleted.

Sort By: [Date](#) | [Name](#) | [Office](#) | [State](#)

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By Date

Results 1 - 8 of 8

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#	Activity	Opened	RID	St	Type	Sc	SIC	NAICS	Vio	Establishment Name
<input type="checkbox"/>	1	<i>1318205.015</i>	05/24/2018	0950644	CA	Complaint	Partial	325510	14	Force Powder Coating, Inc
<input type="checkbox"/>	2	<i>1265102.015</i>	09/20/2017	0950623	CA	Complaint	Partial	325510	1	Environmental Technology Inc.
<input type="checkbox"/>	3	<i>1260972.015</i>	08/29/2017	0950644	CA	Accident	Partial	325510	1	Cardinal Paint And Powder, Inc.
<input type="checkbox"/>	4	<i>1255744.015</i>	08/16/2017	0950621	CA	Complaint	Partial	325510	2	Freedom Industrial Coatings Inc.
<input type="checkbox"/>	5	<i>1251281.015</i>	07/31/2017	0950613	CA	Complaint	Partial	325510	9	Srs Industrial Coatings
<input type="checkbox"/>	6	<i>1240957.015</i>	06/19/2017	0950631	CA	Accident	Partial	325510	5	International Polymer Solutions Inc
<input type="checkbox"/>	7	<i>1233857.015</i>	05/18/2017	0950644	CA	Accident	Partial	325510		Dunn Edwards Corporation
<input type="checkbox"/>	8	<i>1181038.015</i>	09/30/2016	0950672	CA	Planned	Partial	325510	1	Engineered Polymer Solutions, Inc.



UNITED STATES  
DEPARTMENT OF LABOR



**Inspection: 1318205.015 - Force Powder Coating, Inc**

**Inspection Information - Office: Ca Monrovia District Office**

Nr: 1318205.015	Report ID: 0950644	Open Date: 05/24/2018		
Force Powder Coating, Inc 12228 Barringer St. South El Monte, CA 91733		Union Status: NonUnion		
SIC:				
NAICS: 325510/Paint and Coating Manufacturing				
Mailing: 12228 Barringer St., South El Monte, CA 91733				
Inspection Type:	Complaint			
Scope:	Partial	Advanced Notice:	N	
Ownership:	Private			
Safety/Health:	Health	Close Conference:	11/30/2018	
		Close Case:		
Related Activity:	Type	ID	Safety	Health
	Complaint	1336290		Yes

**Case Status: OPEN**



### Violation Summary

	Serious	Willful	Repeat	Other	Unclass	Total
Initial Violations	2			12		14
Current Violations	2			12		14
Initial Penalty	\$15,750	\$0	\$0	\$2,800	\$0	\$18,550
Current Penalty	\$4,325	\$0	\$0	\$1,130	\$0	\$5,455
FTA Amount	\$0	\$0	\$0	\$0	\$0	\$0

# Spary Polyurea Surface Preparation

Concrete Surface Preparation Grinding/shot blasting  
Clean poor layer on the concrete Reveal small  
holes and pores

Filling holes and repairing poor surfaces In order to have a  
minimum Polyurea consumption Fill all bug-holes and  
pores with the appropriate filler Enabling smooth surface  
for application Reduce bubble formation

### Violation Items

#	ID	Type	Standard	Issuance	Abate	Curr\$	Init\$	Fta\$	Contest	LastEvent
1.	<b>01001</b>	Other	5097(A)	11/21/2018	12/28/2018	\$0	\$175	\$0	01/22/2019	J - ALJ Decision
2.	<b>01002</b>	Other	5143(A)(5)	11/21/2018	12/28/2018	\$260	\$260	\$0	01/22/2019	J - ALJ Decision
3.	<b>01003</b>	Other	5144(F)	11/21/2018		\$0	\$195	\$0	01/22/2019	J - ALJ Decision
4.	<b>01004</b>	Other	5144(I)(5)	11/21/2018	12/28/2018	\$260	\$260	\$0	01/22/2019	J - ALJ Decision
5.	<b>01005</b>	Other	5144(I)(7)	11/21/2018	12/28/2018	\$0	\$260	\$0	01/22/2019	J - ALJ Decision
6.	<b>01006</b>	Other	5204(D)	11/21/2018	12/28/2018	\$0	\$195	\$0	01/22/2019	J - ALJ Decision
7.	<b>01007</b>	Other	5204(E)(2)	11/21/2018	12/28/2018	\$0	\$195	\$0	01/22/2019	J - ALJ Decision
8.	<b>01008</b>	Other	5204(F)(2)	11/21/2018	12/28/2018	\$0	\$130	\$0	01/22/2019	J - ALJ Decision
9.	<b>01009</b>	Other	5204(G)(2)	11/21/2018	12/28/2018	\$260	\$260	\$0	01/22/2019	J - ALJ Decision
10.	<b>01010</b>	Other	5204(I)(2)	11/21/2018	12/28/2018	\$0	\$260	\$0	01/22/2019	J - ALJ Decision
11.	<b>01011</b>	Other	5204(J)	11/21/2018	12/28/2018	\$0	\$260	\$0	01/22/2019	J - ALJ Decision
12.	<b>01012</b>	Other	5096(B)	11/30/2018	01/04/2019	\$350	\$350	\$0	01/22/2019	J - ALJ Decision
13.	<b>02001</b>	Serious	5204(F)	11/30/2018	12/12/2018	\$3,935	\$7,875	\$0	01/22/2019	J - ALJ Decision
14.	<b>03001</b>	Serious	5204(H)(1)	11/30/2018	12/12/2018	\$390	\$7,875	\$0	01/22/2019	J - ALJ Decision



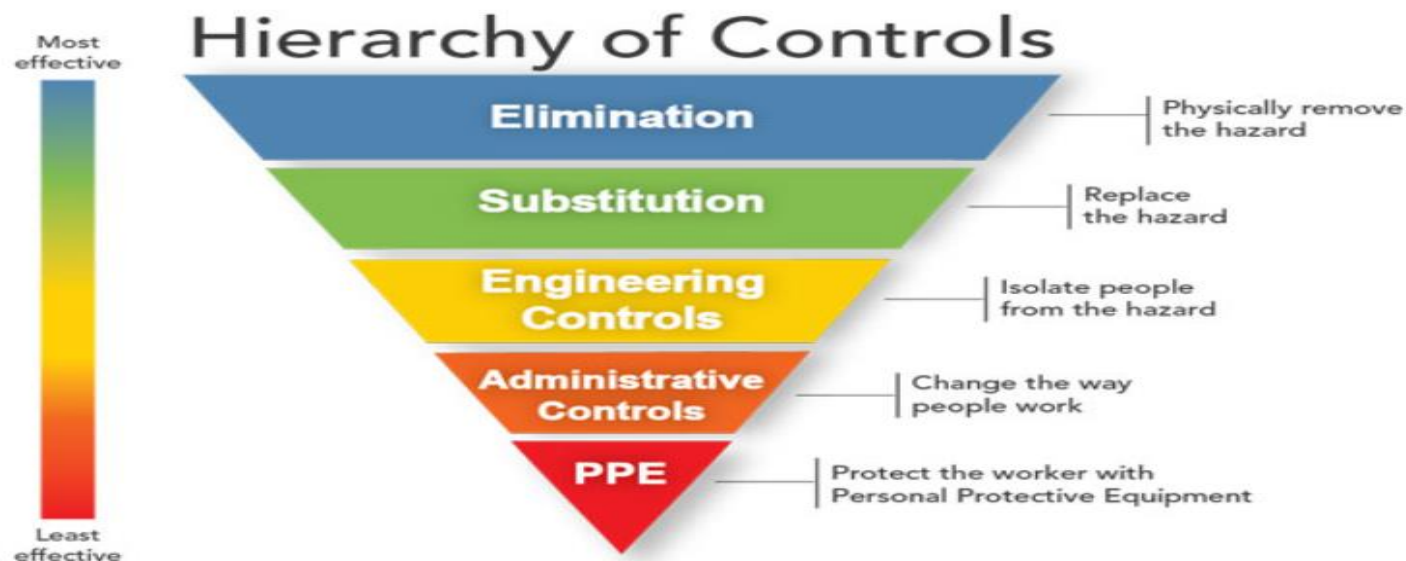
UNITED STATES

# HIERARCHY OF CONTROLS

## Overview

Controlling exposures to occupational hazards is the fundamental method of protecting workers. Traditionally, a hierarchy of controls has been used as a means of determining how to implement feasible and effective control solutions.

One representation of this hierarchy is as follows:



## §5144. Respiratory Protection.

### [Guide to Respiratory Protection at Work](#)

#### (a) Permissible practice.

(1) In the control of those occupational diseases caused by breathing air contaminated with harmful dusts, fogs, fumes, mists, gases, smokes, sprays, or vapors, the primary objective shall be to prevent atmospheric contamination. This shall be accomplished as far as feasible by accepted engineering control measures (for example, enclosure or confinement of the operation, general and local ventilation, and substitution of less toxic materials). When effective engineering controls are not feasible, or while they are being instituted, appropriate respirators shall be used pursuant to this section.

(2) Respirators shall be provided by the employer when such equipment is necessary to protect the health of the employee. The employer shall provide the respirators which are applicable and suitable for the purpose intended. The employer shall be responsible for the establishment and maintenance of a respiratory protection program which shall include the requirements outlined in subsection (c).



(c) Respiratory protection program. This subsection requires the employer to develop and implement a written respiratory protection program with required worksite-specific procedures and elements for required respirator use. The program must be administered by a suitably trained program administrator. In addition, certain program elements may be required for voluntary use to prevent potential hazards associated with the use of the respirator. The Small Entity Compliance Guide contains criteria for the selection of a program administrator and a sample program that meets the requirements of this subsection. Copies of the Small Entity Compliance Guide will be available from the Occupational Safety and Health Administration's Office of Publications, Room N 3101, 200 Constitution Avenue, NW, Washington, DC, 20210 (202-219-4667).

(1) In any workplace where respirators are necessary to protect the health of the employee or whenever respirators are required by the employer, the employer shall establish and implement a written respiratory protection program with worksite-specific procedures. The program shall be updated as necessary to reflect those changes in workplace conditions that affect respirator use. The employer shall include in the program the following provisions, as applicable:

- (A) Procedures for selecting respirators for use in the workplace;
- (B) Medical evaluations of employees required to use respirators;
- (C) Fit testing procedures for tight-fitting respirators;
- (D) Procedures for proper use of respirators in routine and reasonably foreseeable emergency situations;
- (E) Procedures and schedules for cleaning, disinfecting, storing, inspecting, repairing, discarding, and otherwise maintaining respirators;
- (F) Procedures to ensure adequate air quality, quantity, and flow of breathing air for atmosphere-supplying respirators;
- (G) Training of employees in the respiratory hazards to which they are potentially exposed during routine and emergency situations;
- (H) Training of employees in the proper use of respirators, including putting on and removing them, any limitations on their use, and their maintenance; and
- (I) Procedures for regularly evaluating the effectiveness of the program.



More images

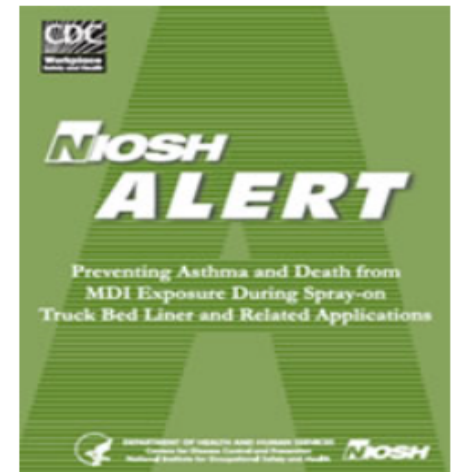
# NIOSH Alert: Preventing Asthma and Death from MDI Exposure During Spray-on Truck Bed Liner and Related Applications

[Español \(Spanish\)](#)

DHHS (NIOSH) Publication Number 2006-149

September 2006

The National Institute for Occupational Safety and Health (NIOSH) requests assistance in preventing asthma, other respiratory diseases, and death from exposure to methylenebis(phenyl isocyanate) (MDI). More than 10,000 U.S. workers are potentially exposed to MDI during spray-on truck bed lining operations. This Alert summarizes four case reports: one death and several incidents of asthma or other respiratory disease following exposure to MDI during spray-on truck bed lining operations. Information about preventing adverse health effects from exposure to MDI is urgently needed by workers, employers, small business owners, and physicians and other health care providers. *\*MDI is methylenebis(phenylisocyanate). In this fact sheet, MDI refers to all MDI-based isocyanates.*





















(d) Selection of respirators. This subsection requires the employer to evaluate respiratory hazard(s) in the workplace, identify relevant workplace and user factors, and base respirator selection on these factors. The subsection also specifies appropriately protective respirators for use in IDLH atmospheres, and limits the selection and use of air-purifying respirators.

(1) General requirements.

(A) The employer shall select and provide an appropriate respirator based on the respiratory hazard(s) to which the worker is exposed and workplace and user factors that affect respirator performance and reliability.

(B) The employer shall select a NIOSH-certified respirator. The respirator shall be used in compliance with the conditions of its certification.

(C) The employer shall identify and evaluate the respiratory hazard(s) in the workplace; this evaluation shall include a reasonable estimate of employee exposures to respiratory hazard (s) and an identification of the contaminant's chemical state and physical form. Where the employer cannot identify or reasonably estimate the employee exposure, the employer shall consider the atmosphere to be IDLH.

(D) The employer shall select respirators from a sufficient number of respirator models and sizes so that the respirator is acceptable to, and correctly fits, the user.





(3) Respirators for atmospheres that are not IDLH.

(A) The employer shall provide a respirator that is adequate to protect the health of the employee and ensure compliance with all other OSHA statutory and regulatory requirements, under routine and reasonably foreseeable emergency situations.

1. Assigned Protection Factors (APFs) Employers must use the assigned protection factors listed in Table 1 to select a respirator that meets or exceeds the required level of employee protection. When using a combination respirator (e.g., airline respirators with an air-purifying filter), employers must ensure that the assigned protection factor is appropriate to the mode of operation in which the respirator is being used.

Table 1. - Assigned Protection Factors<sup>5</sup>

					<i>Loose-</i>
	<i>Quarter</i>		<i>Full</i>		<i>fitting</i>
<i>Type of respirator</i> <sup>1,2</sup>	<i>mask</i>	<i>Half mask</i>	<i>facepiece</i>	<i>Helmet/hood</i>	<i>facepiece</i>
1. Air-Purifying Respirator	5	<sup>3</sup> 10	50	.....	.....
2. Powered Air-Purifying Respirator (PAPR)		50	1,000	<sup>4</sup> 25/1,000	25
3. Supplied-Air Respirator (SAR) or Airline Respirator					
Demand mode	.....	10	50	.....	.....
Continuous flow mode	.....	50	1,000	<sup>4</sup> 25/1,000	25
Pressure-demand or other positive-pressure mode	.....	50	1000	.....	.....
4. Self-Contained Breathing Apparatus (SCBA)					
Demand mode	.....	10	50	50	.....
Pressure-demand or other positive-pressure mode (e.g., open/closed circuit).	.....		10,000	10,000	.....

# POLYUREA 70

## MATERIAL SAFETY DATA SHEET

Color Crown Corporation  
928 Sligh Ave  
Seffner, FL 33584  
813-655-4880

**24 HOUR EMERGENCY: CHEMTREC 800-424-9300**

### Section 1: COMPOSITION/INFORMATION ON INGREDIENTS

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Component No	Weight	CAS-
Aspartic Ester	30% to 80%	Trade Secret
Monoaspartate	5% to 30%	Trade Secret
Aliphatic Carboxylic Ester	1% to 5%	623-91-6
Hexamethylene Diisocyanate	15% to 50%	28182-81-2
Hexamethylene 1,6 Dissocyanate	0.1% to 0.5%	822-06-0
BENZENE, 1-CHLORO-4-(TRIFLUOROMETHYL)	0% to 50%	98-56-6
PCBTF	0% to 50%	98566

TABLE AC-1 ([printable .pdf file 611K](#))  
 PERMISSIBLE EXPOSURE LIMITS FOR CHEMICAL CONTAMINANTS

Chemical Abstracts Registry Number <sup>(a)</sup>	Skin <sup>(b)</sup>	Name <sup>(c)</sup>	PEL <sup>(d)</sup>			STEL <sup>(o)</sup>	
			ppm <sup>(e)</sup>	mg/M <sup>3(f)</sup>	Ceiling <sup>(g)</sup>	ppm <sup>(e)</sup>	mg/M <sup>3(f)</sup>
7440586		Hafnium	--	0.5			
151677		Halothane	2	16			
822060		HDI; see Hexamethylene diisocyanate					
7440597		Helium	(h)	--			
76448	S	Heptachlor; 1,4,5,6,7,8,8-hepta-chloro- 3a,4,7,7a-tetrahydro-4,7-methanoindene	--	0.05			
142825		n-Heptane	400	1,600		500	2000
118741	S	Hexachlorobenzene	--	0.002			
87683	S	Hexachlorobutadiene	0.02	0.24			
77474		Hexachlorocyclopentadiene	0.01	0.11			
67721	S	Hexachloroethane; perchloroethane	1	10			
1335871	S	Hexachloronaphthalene	--	0.2			
684162	S	Hexafluoroacetone; 1,1,1,3,3,3-hexafluoro- 2-propanone	0.1	0.7			
822060		Hexamethylene diisocyanate; HDI	0.005	0.034			
110543	S	n-Hexane	50	180			
		Hexane, other isomers	500	1800		1000	3600

(c) Employee Exposure Limits.

(1) Permissible Exposure Limit (PEL). The employer shall assure that no employee is exposed to an 8-hour time-weighted average concentration of airborne benzene in excess of one part benzene per million parts of air (1 ppm).

(2) Short Term Exposure Limit (STEL). The employer shall assure that no employee is exposed to a concentration of airborne benzene in excess of five (5) ppm as averaged over a sampling period of fifteen (15) minutes.

## Industrial Hygiene and Workplace Monitoring - Diisocyanates

<https://dii.americanchemistry.com/Environment...> ▼

Considerations for Modifications to OSHA Method 47, Air Monitoring Method: Diphenylmethane Diisocyanate (MDI) This guidance document provides considerations for modifications to the Occupational Safety and Health Administration (OSHA) air sampling method for MDI: OSHA Method 47. These modifications can help improve the ability of the method to sample and derivatize MDI.

## [PDF] Review Of Worker Exposure Assessment Methods - US EPA

<https://archive.epa.gov/osa/hsrb/web/pdf/reviewof...>

**occupational handler exposure assessment** by the Agency, and identification of the types of **exposure** scenarios considered by the Agency and the calculations used. Finally, this section contains a case study that presents the data and detailed **methods** used in PHED to **calculate exposures** for 6 common **occupational pesticide handler** tasks.

## [PDF] Isocyanate Interim Guidance - Navy Medicine

[www.med.navy.mil/.../isocyanate-guidance-12-17-12.pdf](http://www.med.navy.mil/.../isocyanate-guidance-12-17-12.pdf)

What sampling technique and analysis **method** should be used to assess **worker** . airborne exposures?  
6. Field Evaluation/**Worker** Protection Recommendations ... **Polyurea** is a high performance brushed or sprayed elastomer. It provides an extremely ... Isocyanate **exposure** can cause skin, eye, nose, throat, and lung irritation. It can also lead to skin

## Corrosionpedia - 8 Things to Know About Polyurea Coatings

<https://www.corrosionpedia.com/8-things-to-know...> ▼

Oct 11, 2018 - The global **polyurea** coating consumption in 2014 was 114.3 kilotons. The global market size in 2017 for **polyurea** coatings rose to USD \$684 million. **Polyurea's** market size is growing rapidly,





(e) Medical evaluation. Using a respirator may place a physiological burden on employees that varies with the type of respirator worn, the job and workplace conditions in which the respirator is used, and the medical status of the employee. Accordingly, this subsection specifies the minimum requirements for medical evaluation that employers must implement to determine the employee's ability to use a respirator.

(1) General. The employer shall provide a medical evaluation to determine the employee's ability to use a respirator, before the employee is fit tested or required to use the respirator in the workplace. The employer may discontinue an employee's medical evaluations when the employee is no longer required to use a respirator.

(2) Medical evaluation procedures.

(A) The employer shall identify a physician or other licensed health care professional (PLHCP) to perform medical evaluations using a medical questionnaire or an initial medical examination that obtains the same information as the medical questionnaire.

(B) The medical evaluation shall obtain the information requested by the questionnaire in Sections 1 and 2, Part A of Appendix C.

Exception to subsection (e)(2)(B): For the use of filtering facepiece respirators for protection against M. Tuberculosis only, the employer may rely upon a medical evaluation completed prior to October 18, 2004, in meeting the requirement for initial medical evaluation, if that evaluation meets the following conditions:

1. The evaluation consisted of a questionnaire, medical examination, or both, evaluated or conducted by a PLHCP; and
2. The employer obtained a written statement from the evaluating PLHCP that the employee is medically able to use a respirator.

(3) Follow-up medical examination.

(A) The employer shall ensure that a follow-up medical examination is provided for an employee who gives a positive response to any question among questions 1 through 8 in Section 2, Part A of Appendix C or whose initial medical examination demonstrates the need for a follow-up medical examination.

(B) The follow-up medical examination shall include any medical tests, consultations, or diagnostic procedures that the PLHCP deems necessary to make a final determination.

(4) Administration of the medical questionnaire and examinations.

(A) The medical questionnaire and examinations shall be administered confidentially during the employee's normal working hours or at a time and place convenient to the employee. The medical questionnaire shall be administered in a manner that ensures that the employee understands its content.

(B) The employer shall provide the employee with an opportunity to discuss the questionnaire and examination results with the PLHCP.

(5) Supplemental information for the PLHCP.

(A) The following information must be provided to the PLHCP before the PLHCP makes a recommendation concerning an employee's ability to use a respirator:

1. The type and weight of the respirator to be used by the employee;
2. The duration and frequency of respirator use (including use for rescue and escape);
3. The expected physical work effort;
4. Additional protective clothing and equipment to be worn; and
5. Temperature and humidity extremes that may be encountered.

(B) Any supplemental information provided previously to the PLHCP regarding an employee need not be provided for a subsequent medical evaluation if the information and the PLHCP remain the same.

(C) The employer shall provide the PLHCP with a copy of the written respiratory protection program and a copy of this section.

(6) Medical determination. In determining the employee's ability to use a respirator, the employer shall:

(A) Obtain a written recommendation regarding the employee's ability to use the respirator from the PLHCP. The recommendation shall provide only the following information:

1. Any limitations on respirator use related to the medical condition of the employee, or relating to the workplace conditions in which the respirator will be used, including whether or not the employee is medically able to use the respirator;
2. The need, if any, for follow-up medical evaluations; and
3. A statement that the PLHCP has provided the employee with a copy of the PLHCP's written recommendation.

(B) If the respirator is a negative pressure respirator and the PLHCP finds a medical condition that may place the employee's health at increased risk if the respirator is used, the employer shall provide a PAPR if the PLHCP's medical evaluation finds that the employee can use such a respirator; if a subsequent medical evaluation finds that the employee is medically able to use a negative pressure respirator, then the employer is no longer required to provide a PAPR.

(7) Additional medical evaluations. At a minimum, the employer shall provide additional medical evaluations that comply with the requirements of this section if:

- (A) An employee reports medical signs or symptoms that are related to ability to use a respirator;
- (B) A PLHCP, supervisor, or the respirator program administrator informs the employer that an employee needs to be reevaluated;
- (C) Information from the respiratory protection program, including observations made during fit testing and program evaluation, indicates a need for employee reevaluation; or
- (D) A change occurs in workplace conditions (e.g., physical work effort, protective clothing, temperature) that may result in a substantial increase in the physiological burden placed on an employee.

(f) Fit testing. This subsection requires that, before an employee may be required to use any respirator with a negative or positive pressure tight-fitting facepiece, the employee must be fit tested with the same make, model, style, and size of respirator that will be used. This subsection specifies the kinds of fit tests allowed, the procedures for conducting them, and how the results of the fit tests must be used.

- (1) The employer shall ensure that employees using a tight-fitting facepiece respirator pass an appropriate qualitative fit test (QLFT) or quantitative fit test (QNFT) as stated in this subsection.
- (2) The employer shall ensure that an employee using a tight-fitting facepiece respirator is fit tested prior to initial use of the respirator, whenever a different respirator facepiece (size, style, model or make) is used, and at least annually thereafter.
- (3) The employer shall conduct an additional fit test whenever the employee reports, or the employer, PLHCP, supervisor, or program administrator makes visual observations of, changes in the employee's physical condition that could affect respirator fit. Such conditions include, but are not limited to, facial scarring, dental changes, cosmetic surgery, or an obvious change in body weight.
- (4) If after passing a QLFT or QNFT, the employee subsequently notifies the employer, program administrator, supervisor, or PLHCP that the fit of the respirator is unacceptable, the employee shall be given a reasonable opportunity to select a different respirator facepiece and to be retested.
- (5) The fit test shall be administered using an OSHA-accepted QLFT or QNFT protocol. The OSHA-accepted QLFT and QNFT protocols and procedures are contained in Appendix A.
- (6) QLFT may only be used to fit test negative pressure air-purifying respirators that must achieve a fit factor of 100 or less.
- (7) If the fit factor, as determined through an OSHA-accepted QNFT protocol, is equal to or greater than 100 for tight-fitting half facepieces, or equal to or greater than 500 for tight-fitting full facepieces, the QNFT has been passed with that respirator.
- (8) Fit testing of tight-fitting atmosphere-supplying respirators and tight-fitting powered air-purifying respirators shall be accomplished by performing quantitative or qualitative fit testing in the negative pressure mode, regardless of the mode of operation (negative or positive pressure) that is used for respiratory protection.



(g) Use of respirators. This subsection requires employers to establish and implement procedures for the proper use of respirators. These requirements include prohibiting conditions that may result in facepiece seal leakage, preventing employees from removing respirators in hazardous environments, taking actions to ensure continued effective respirator operation throughout the work shift, and establishing procedures for the use of respirators in IDLH atmospheres or in interior structural firefighting situations.

(1) Facepiece seal protection.

(A) The employer shall not permit respirators with tight-fitting facepieces to be worn by employees who have:

1. Facial hair that comes between the sealing surface of the facepiece and the face or that interferes with valve function; or
2. Any condition that interferes with the face-to-facepiece seal or valve function.

(B) If an employee wears corrective glasses or goggles or other personal protective equipment, the employer shall ensure that such equipment is worn in a manner that does not interfere with the seal of the facepiece to the face of the user.

(C) For all tight-fitting respirators, the employer shall ensure that employees perform a user seal check each time they put on the respirator using the procedures in Appendix B-1 or procedures recommended by the respirator manufacturer that the employer demonstrates are as effective as those in Appendix B-1.

(2) Continuing respirator effectiveness.

(A) Appropriate surveillance shall be maintained of work area conditions and degree of employee exposure or stress. When there is a change in work area conditions or degree of employee exposure or stress that may affect respirator effectiveness, the employer shall reevaluate the continued effectiveness of the respirator.

(B) The employer shall ensure that employees leave the respirator use area:

1. To wash their faces and respirator facepieces as necessary to prevent eye or skin irritation associated with respirator use; or
2. If they detect vapor or gas breakthrough, changes in breathing resistance, or leakage of the facepiece; or

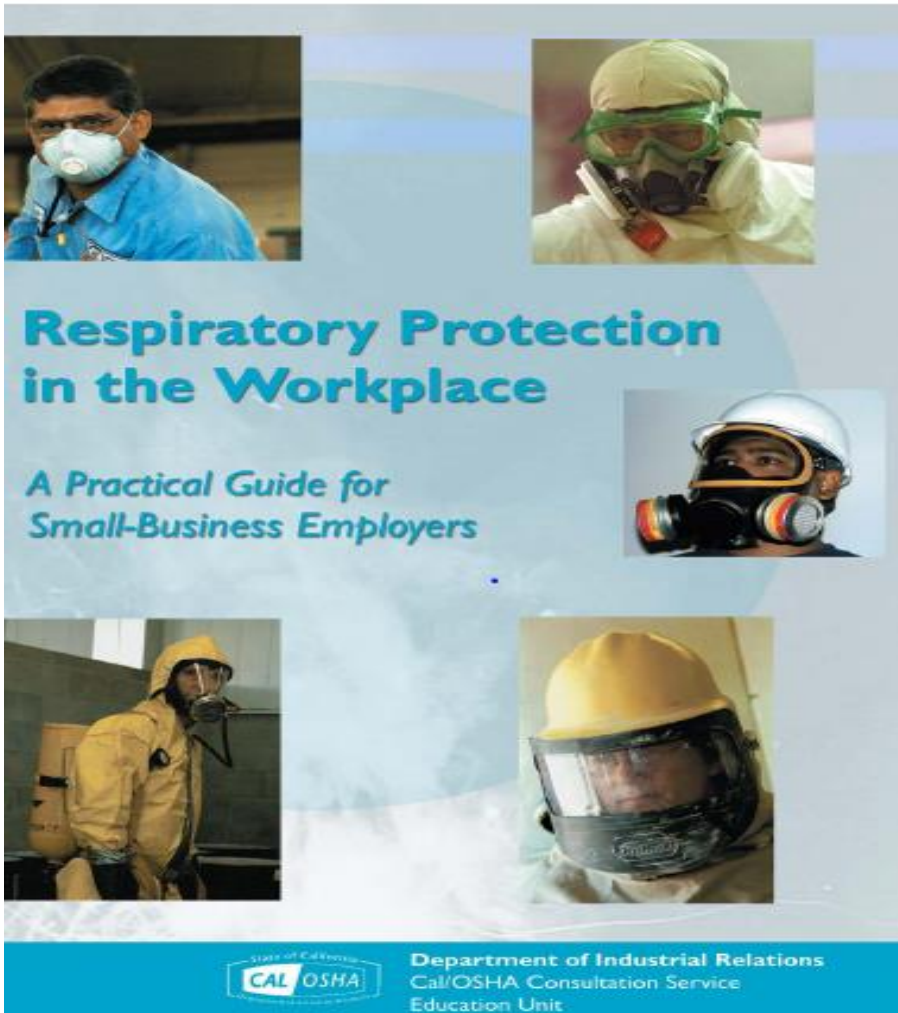
(h) Maintenance and care of respirators. This subsection requires the employer to provide for the cleaning and disinfecting, storage, inspection, and repair of respirators used by employees.

(1) Cleaning and disinfecting. The employer shall provide each respirator user with a respirator that is clean, sanitary, and in good working order. The employer shall ensure that respirators are cleaned and disinfected using the procedures in Appendix B-2, or procedures recommended by the respirator manufacturer, provided that such procedures are of equivalent effectiveness. The respirators shall be cleaned and disinfected at the following intervals:

- (A) Respirators issued for the exclusive use of an employee shall be cleaned and disinfected as often as necessary to be maintained in a sanitary condition;
- (B) Respirators issued to more than one employee shall be cleaned and disinfected before being worn by different individuals;
- (C) Respirators maintained for emergency use shall be cleaned and disinfected after each use; and
- (D) Respirators used in fit testing and training shall be cleaned and disinfected after each use.

(2) Storage. The employer shall ensure that respirators are stored as follows:

- (A) All respirators shall be stored to protect them from damage, contamination, dust, sunlight, extreme temperatures, excessive moisture, and damaging chemicals, and they shall be packed or stored to prevent deformation of the facepiece and exhalation valve.
- (B) In addition to the requirements of subsection (h)(2)(A), emergency respirators shall be:
  - 1. Kept accessible to the work area;
  - 2. Stored in compartments or in covers that are clearly marked as containing emergency respirators; and
  - 3. Stored in accordance with any applicable manufacturer instructions.



# Respiratory Protection in the Workplace

*A Practical Guide for  
Small-Business Employers*

State of California  
**CAL OSHA**  
Occupational Safety and Health Administration

**Department of Industrial Relations**  
Cal/OSHA Consultation Service  
Education Unit

# Cal/OSHA is here to help!

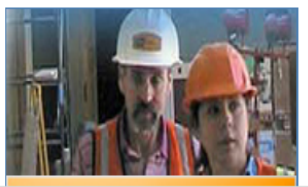
- Cal/OSHA has the following branches, programs and units:
  - Consultation Services Branch
  - Outreach Coordination Program
  - Alliance Program
- Cal/OSHA Standards Board
  - Quarterly scheduled advisory meetings
  - Employers can write petitions for new standards
  - Employers can request variances
  - Public can comment on proposed regulations at meetings

CONSULTATION CAL OSHA SERVICES

# Cal/OSHA Consultation Services Branch

Cal/OSHA provides consultative assistance to employers and employees through a variety of services including:

- [On-site Visits](#)
- [Educational Outreach](#)
- [Offsite Consultation \(Telephone Support\)](#)
- [Partnership Programs](#)
- Educational Materials:
  - [Publications](#)
  - [eTools](#)



# Resources

- Cal/OSHA <https://www.dir.ca.gov/dosh>
- Cal/OSHA Worker Safety and Health in Wildfire Regions
  - <https://www.dir.ca.gov/dosh/Worker-Health-and-Safety-in-Wildfire-Regions.html>
- Cal/OSHA Consultation
  - <http://www.dir.ca.gov/dosh/consultation.html>
- Cal/OSHA Standards Board
  - <https://www.dir.ca.gov/oshsb/oshsb.html>



# Cal/OSHA Enforcement Coordination Outreach Program

- Questions

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