



MIOSHA Fact Sheet

Construction Safety & Health Division

Cadmium Exposure in Construction, General Industry, & Agriculture

MIOSHA, Part 309, Cadmium applies to construction, and general industry/ agricultural operations. Some of the rules and sub rules apply only to one area or the other. *Therefore, a careful review of the standard is necessary.* The following requirements apply to both areas unless otherwise designated.

Cadmium is a toxic metal commonly found in both manufacturing and construction workplaces. In its elemental form, cadmium is either a blue-white metal or a grayish-white powder found in lead, copper, and zinc sulfide ores. Due to its low permissible exposure limit (PEL), overexposures may occur even in situations where only trace quantities of cadmium are found.

Cadmium is found in some industrial paints and may represent a hazard when sprayed. Operations involving removal of cadmium paints by scraping or abrasive blasting may also pose a significant hazard. Cadmium emits a characteristic brown fume (CdO) upon heating, which is relatively non-irritating, and thus does not alarm the exposed individual.

A primary use of cadmium is as an anti-corrosive. It may be found in anti-fouling or anti-rust paints and is sometimes electroplated onto steel, nuts, bolts and rivets. Cadmium may also serve as an electrode component in alkaline batteries and may be used in alloys, silver solders and welding. Welding on cadmium-containing alloys or working with silver solders containing cadmium can unsuspectingly cause acute illness.

When paint chip samples are submitted to the MIOSHA laboratory for lead analysis, a multiple metal-scan that includes analysis for cadmium is performed. If cadmium is detectable, the applicable rules of Part 309, Cadmium must be addressed.

Health Effects:

Acute (short term)— Metal fume fever may result from acute exposure with flu-like symptoms of weakness, fever, headache, chills, sweating and muscular pain. Acute pulmonary edema usually develops within 24 hours and reaches a maximum by three days. If death from asphyxia does not occur, symptoms may resolve within a week.

Chronic (long term) — the most serious consequence of chronic cadmium poisoning is cancer (lung and prostate). The first observed chronic effect is generally kidney damage, manifested by excretion of excessive (low molecular weight) protein in the urine. Cadmium also is believed to cause pulmonary emphysema and bone disease (osteomalacia and osteoporosis). Cadmium exposure may also cause anemia, teeth discoloration and loss of smell (anosmia).

Employer Responsibilities:

Manufacturing operations that use or produce materials or products containing cadmium must assess exposure to cadmium. Construction or maintenance activities that may result in exposure to cadmium include, but are not

limited to, demolition, renovation and salvaging structures where cadmium or cadmium-containing materials are present; cutting, brazing, grinding, or welding on surfaces that are painted or coated with cadmium-containing compounds; and transporting, storing, and disposing of cadmium or cadmium-containing materials on site or location at which construction activities are performed.

Following are requirements of Part 309; many are triggered by the level of employee exposure to cadmium:

- An employer whose workplace or work operation involves cadmium in any way must determine if any employee may be exposed to cadmium at or above the Action Level (AL) of 2.5 micrograms per cubic meter of air ($\mu\text{g}/\text{m}^3$). An employer must identify which employees potentially are exposed to cadmium at or above the AL and must conduct exposure monitoring to determine what the exposure levels are.
- *In construction*, before performing work where employees may be exposed to cadmium, an employer must establish the applicability of the rules by determining whether cadmium is present in the workplace. The employer must designate a competent person to make this determination. A “competent person” means a person who is designated by an employer to act on the employer’s behalf, who is capable of identifying existing and potential cadmium hazards in the workplace and the proper methods to control the hazards to protect workers, and who has the authority necessary to take prompt corrective measures to eliminate or control such hazards.
- All employees who may be exposed to cadmium must be provided training in accordance with the standard.
- When employee exposures are determined to be at or in excess of the AL, the employer must implement periodic air monitoring [see Part 309, Rule 5 (5) & (6)].
- Employee exposures in excess of the PEL of 5 $\mu\text{g}/\text{m}^3$ require additional actions including, the establishment of regulated areas with warning signs, the application of engineering and work practice controls, the implementation of a written compliance program, the use of respiratory protection, the use of protective work clothing and equipment, and the use of hygiene facilities (i.e., change areas, shower and hand washing facilities, and eating facilities).
- Medical surveillance is required for employees exposed above the AL for 30 or more days per year.
- *In construction*, Part 309, Rule 18 delineates additional requirements for medical monitoring for employees who perform any of the tasks specified in Rule 18(2)(b)(i-ix) for 30 or more days during a 12 consecutive month period.

How to Avoid Hazards

When employees are exposed above the PEL, the employer must develop a compliance program that includes engineering and work practice controls. The best way to prevent over-exposure to cadmium is to install and maintain engineering controls to eliminate or reduce the hazard. Examples of engineering and other controls include:

- Conduct bulk material analysis to determine if cadmium is present.
- Provide interim protection (i.e., respirator and protective equipment, gloves, coveralls, etc.) until air monitoring determines exposure levels.
- Use exhaust ventilation and dust collection systems. For example, power tools used for grinding surfaces coated with cadmium containing paint can be equipped with localized exhaust ventilation dust collection systems.
- Do not dry sweep or use compressed air to clean work areas contaminated with cadmium materials; use wet methods or a vacuum equipped with a high efficiency particulate (HEPA) filter.

- Comply with all requirements of Part 309 with regard to air monitoring, regulated areas, compliance program, use of protective work clothing and equipment, housekeeping, hygiene facilities, medical surveillance and medical removal protection, employee information and training, warning signs, and record keeping.
- If engineering and work practice controls are not effective in reducing exposure to an acceptable level, then the employer must provide respiratory protection. The type of respiratory protection required is based on the level of exposure determined by air monitoring. The minimum respirator required is a half mask, air-purifying respirator with HEPA filters. When respirators are used, the employer must then implement a respiratory protection program as required by **MIOSHA Part 451, Respiratory Protection**.

For additional information regarding the hazards of Cadmium, please contact the Construction Safety and Health Division at 517-284-7680, the General Industry Safety & Health Division at 517-284-7750, or the Consultation Education and Training Division at 517-284-7720. MIOSHA Standards can be viewed on the MIOSHA website at www.michigan.gov/mioshastandards.

Additional information regarding the hazards of cadmium and measures that can be implemented to protect employees is available on the following websites:

<https://www.osha.gov/SLTC/cadmium/index.html>

<http://www.cdc.gov/niosh/topics/cadmium>

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