

Occupational Safety and Health Guide

Part Two: Construction Standards

Cadmium

September 2002

Applicability

29 CFR 1926.1127 applies to all occupational exposures to cadmium and cadmium compounds, in all forms, in all construction work where an employee may potentially be exposed to cadmium.

Compliance Definitions

- *Action Level (AL)* - an airborne concentration of cadmium of 2.5 micrograms per cubic meter of air (2.5 ug/m³), calculated as an 8-h time-weighted average (TWA) (29 CFR 1926.1127(b)).
- *Assistant Secretary* - the Assistant Secretary of Labor for Occupational Safety and Health, U.S. Department of Labor, or designee (29 CFR 1926.1127(b)).
- *Authorized Person* - any person authorized by the employer and required by work duties to be present in regulated areas or any person authorized by the *Occupational Safety and Health Act* or regulations issued under it to be in regulated areas (29 CFR 1926.1127(b)).
- *Competent Person* - a person designated by the 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 them in order to protect workers, and has the authority necessary to take prompt corrective measures to eliminate or control such hazards (29 CFR 1926.1127(b)).

(NOTE: The duties of a competent person include at least the following:

- a) determining prior to the performance of work whether cadmium is present in the workplace
 - b) establishing, where necessary, regulated areas and ensuring that access to and from those areas is limited to authorized employees
 - c) ensuring the adequacy of any employee exposure monitoring required by 29 CFR 1926.1127
 - d) ensuring that all employees exposed to air cadmium levels above the PEL wear appropriate personal protective equipment (PPE) and are trained in the use of appropriate methods of exposure control
 - e) ensuring that proper hygiene facilities are provided and that workers are trained to use those facilities; and assuring that the engineering controls required by 29 CFR 1926.1127 are implemented, maintained in proper operating condition, and functioning properly.)
- *Construction Work* - work involving construction, alteration and/or repair, including but not limited to the following (29 CFR 1926.1127(a)):
 - a) wrecking, demolition, or salvage of structures where cadmium or materials containing cadmium are present
 - b) use of cadmium-containing paints and cutting, brazing, burning, grinding, or welding on surfaces that were painted with cadmium-containing paints
 - c) construction, alteration, repair, maintenance, or renovation of structures, substrates, or portions thereof, that contain cadmium, or materials containing cadmium
 - d) cadmium welding; cutting and welding cadmium-plated steel; brazing or welding with cadmium alloys
 - e) installation of products containing cadmium
 - f) electrical grounding with cadmium welding, or electrical work using cadmium-coated conduit
 - g) maintaining or retrofitting cadmium-coated equipment

- h) cadmium contamination/emergency cleanup; and
 - i) transportation, disposal, storage, or containment of cadmium or materials containing cadmium on the site or location at which construction activities are performed.
- *Director* - the Director of the National Institute for Occupational Safety and Health (NIOSH), U.S. Department of Health and Human Services, or designee (29 CFR 1926.1127(b)).
 - *Employee Exposure* - the exposure to airborne cadmium that would occur if the employee were not using respiratory protective equipment (29 CFR 1926.1127(b)).

(NOTE: Similar language referring to the air cadmium level to which an employee is exposed is included in this definition.)

- *Final Medical Determination* - the written medical opinion of the employee's health status by the examining physician, or, if multiple physician review or the alternative physician determination is invoked, it is the final, written medical finding, recommendation, or determination that emerges from that process (29 CFR 1926.1127(b)).
- *High-Efficiency Particulate Air (HEPA) Filter* - a filter capable of trapping and retaining at least 99.97 percent of mono-dispersed particles of 0.3 micrometers in diameter (29 CFR 1926.1127(b)).
- *Objective Data* - for the purposes of 29 CFR 1926.1127, objective data are information demonstrating that a particular product or material containing cadmium or a specific process, operation, or activity involving cadmium cannot release dust or fumes in concentrations at or above the action level even under the worst-case release conditions. Objective data can be obtained from an industry-wide study or from laboratory product test results from manufacturers of cadmium-containing products or materials. The data the employer uses from an industry-wide survey must be obtained under workplace conditions closely resembling the processes, types of material, control methods, work practices and environmental conditions in the employer's current operations (29 CFR 1926.1127(n)(2)).
- *Regulated Area* - an area demarcated by the employer where an employee's exposure to airborne concentrations of cadmium exceeds, or can reasonably be expected to exceed the permissible exposure limit (PEL) (29 CFR 1926.1127(b)).

CADMIUM

GUIDANCE FOR CHECKLIST USERS

	REFER TO CHECKLIST ITEMS:
Missing Checklist Items	CA.2.1.US
Permissible Exposure Limits	CA.10.1.US
Exposure Monitoring	CA.20.1.US through CA.20.10.US
Regulated Areas	CA.30.1.US through CA.30.5.US
Methods of Compliance	CA.40.1.US through CA.40.15.US
Respirator Protection	CA.50.1.US through CA.50.8.US
Emergency Situations	CA.60.1.US through CA.60.3.US
Protective Work Clothing and Equipment	CA.70.1.US through CA.70.10.US
Hygiene Areas and Practices	CA.80.1.US through CA.80.4.US
Housekeeping	CA.90.1.US through CA.90.7.US
Medical Surveillance	
General	CA.100.1.US through CA.100.4.US
Initial Examinations	CA.110.1.US through CA.110.6.US
Periodic Medical Surveillance	CA.120.1.US through CA.120.13.US
Medical Removal Protection	CA.130.1.US through CA.130.6.US
Medical Removal Protection Benefits	CA.140.1.US through CA.140.8.US
Hazard Communication	CA.150.1.US through CA.150.12.US
Recordkeeping	CA.160.1.US through CA.160.9.US
Observation of Monitoring	CA.170.1.US and CA.170.2.US

Appendix 104-1, *Respiratory Protection for Cadmium*

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REGULATORY REQUIREMENTS:	REVIEWER CHECKS: September 2002
<p>CA.2 MISSING CHECKLIST ITEMS</p> <p>CA.2.1.US. Employers must comply with all applicable regulatory requirements not contained in this checklist (a finding under this checklist item will have the citation of the applied regulation as a basis of finding).</p>	<p>Determine whether any new regulations concerning cadmium have been issued.</p> <p>Determine whether the employer has activities or facilities that are regulated but not addressed in this checklist.</p> <p>Verify that the employer is in compliance with all newly issued and applicable regulations.</p>

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REGULATORY REQUIREMENTS:	REVIEWER CHECKS: September 2002
<p>CA.10 PERMISSIBLE EXPOSURE LIMITS</p> <p>CA.10.1.US. The employer must ensure that no employee is exposed to an airborne concentration of cadmium in excess of 5 ug/m³, calculated as an 8-h TWA (29 CFR 1926.1127(c)).</p>	<p>Verify that no employee is exposed to an airborne concentration of cadmium in excess of 5 ug/m³, calculated as an 8-h TWA.</p>

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<p>CA.20 EXPOSURE MONITORING</p> <p>CA.20.1.US. Prior to the performance of any construction work where employees may be potentially exposed to cadmium, the employer must establish the applicability of 29 CFR 1926.1127 in accordance with specific requirements (29 CFR 1926.1127(d)(1)(i)).</p> <p>CA.20.2.US. Where cadmium has been determined to be present in the workplace, and it has been determined that there is a possibility the employee's exposure will be at or above the action level, the competent person must identify employees potentially exposed to cadmium at or above the action level (29 CFR 1926.1127(d)(1)(ii)).</p> <p>CA.20.3.US. Determinations of employee exposure must be made from breathing-zone air samples that reflect the monitored employee's regular, daily 8-h TWA exposure to cadmium (29 CFR 1926.1127(d)(1)(iii)).</p> <p>CA.20.4.US. 8-h TWA exposures must be determined for</p>	<p>Verify that, prior to the performance of any construction work where employees may be potentially exposed to cadmium, the employer establishes the applicability of 29 CFR 1926.1127.</p> <p>Verify that the employer establishes the applicability of 29 CFR 1926.1127 by determining whether cadmium is present in the workplace and whether there is the possibility that employee exposures will be at or above the action level.</p> <p>Verify that the employer designates a competent person to make this determination.</p> <p>Verify that investigation and material testing techniques are used, as appropriate, in the determination.</p> <p>Verify that the investigation includes a review of relevant plans, past reports, material safety data sheets, and other available records, and consultations with the property owner and discussions with appropriate individuals and agencies.</p> <p>Determine whether it has been established that cadmium is present in the workplace, and that there is a possibility the employee's exposure will be at or above the action level.</p> <p>Verify that the competent person identifies those employees potentially exposed to cadmium at or above the action level.</p> <p>Verify that determinations of employee exposure are made from breathing-zone air samples that reflect the monitored employee's regular, daily 8-h TWA exposure to cadmium.</p> <p>Verify that 8-h TWA exposures are determined for each employee on the basis of one or more personal breathing-zone air samples reflecting full shift exposure on</p>

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<p>each employee on the basis of one or more personal breathing-zone air samples reflecting full shift exposure on each shift, for each job classification, in each work area (29 CFR 1926.1127(d)(1)(iv)).</p> <p>CA.20.5.US. Where a determination shows the possibility of employee exposure to cadmium at or above the action level, the employer must conduct exposure monitoring in accordance with specific requirements (29 CFR 1926.1127(d)(2)(i) through (d)(2)(iii)).</p> <p>CA.20.6.US. Where a determination is made that a potentially exposed employee is not exposed to airborne concentrations of cadmium at or above the action level, the employer must make a written record of such determination (29 CFR 1926.1127(d)(2)(iv)).</p> <p>CA.20.7.US. Monitoring must be conducted in accordance with specific frequency requirements (29 CFR 1926.1127(d)(3)).</p>	<p>each shift, for each job classification, in each work area.</p> <p>(NOTE: Where several employees perform the same job tasks, in the same job classification, on the same shift, in the same work area, and the length, duration, and level of cadmium exposures are similar, an employer may sample a representative fraction of the employees instead of all employees in order to meet this requirement.)</p> <p>Verify that, in representative sampling, the employer samples the employee(s) expected to have the highest cadmium exposures.</p> <p>Determine whether a determination shows the possibility of employee exposure to cadmium at or above the action level.</p> <p>Verify that the employer conducts exposure monitoring as soon as practicable.</p> <p>Verify that the exposure monitoring is representative of the exposure for each employee in the workplace who is or may be exposed to cadmium at or above the action level.</p> <p>Verify that, if the employee periodically performs tasks that may expose the employee to a higher concentration of airborne cadmium, the employee is monitored while performing those tasks.</p> <p>(NOTE: Where the employer has objective data demonstrating that employee exposure to cadmium will not exceed airborne concentrations at or above the action level under the expected conditions of processing, use, or handling, the employer may rely upon such data instead of implementing initial monitoring.)</p> <p>Determine whether a determination has been made that a potentially exposed employee is not exposed to airborne concentrations of cadmium at or above the action level.</p> <p>Verify that the employer makes a written record of such determination.</p> <p>Verify that the record includes:</p> <ul style="list-style-type: none"> - at least the monitoring data developed under 29 CFR 1926.1127, where applicable - the date of determination - the name and social security number of each employee. <p>Determine whether the initial monitoring or periodic monitoring reveals employee exposures to be at or above the action level.</p> <p>Verify that the employer monitors at a frequency and pattern needed to ensure that the monitoring results reflect with reasonable accuracy the employee's typical exposure levels, given the variability in the tasks performed, work practices, and</p>

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<p>CA.20.8.US. The employer must institute additional monitoring in certain circumstances (29 CFR 1926.1127(d)(4)).</p> <p>CA.20.9.US. Employees must be notified of monitoring results in accordance with specific requirements (29 CFR 1926.1127(d)(5)(i)).</p> <p>CA.20.10.US. The employer must use a method of monitoring and analysis that meets specific requirements (29</p>	<p>environmental conditions on the job site.</p> <p>Verify that the employer monitors at a frequency and pattern needed to ensure the adequacy of respiratory selection and the effectiveness of engineering and work practice controls.</p> <p>(NOTE: If the initial monitoring or the periodic monitoring indicates that employee exposures are below the action level and that result is confirmed by the results of another monitoring taken at least 7 days later, the employer may discontinue the monitoring for those employees whose exposures are represented by such monitoring.)</p> <p>Determine whether:</p> <ul style="list-style-type: none"> - there has been a change in the raw materials, equipment, personnel, work practices, or finished products that may result in additional employees being exposed to cadmium at or above the action level or in employees already exposed to cadmium at or above the action level being exposed above the PEL, or - whether the employer or competent person has any reason to suspect that any other change might result in such further exposure. <p>Verify that the employer institutes exposure monitoring.</p> <p>Verify that the employer notifies each affected employee individually in writing of the monitoring results.</p> <p>Verify that the employer makes such notification no later than 5 working days after the receipt of the results of any monitoring performed under 29 CFR 1926.1127.</p> <p>Verify that the employer posts the results of the exposure monitoring in an appropriate location that is accessible to all affected employees.</p> <p>Verify that such posting takes place no later than 5 working days after the receipt of the results of any monitoring performed under 29 CFR 1926.1127.</p> <p>Verify that, whenever monitoring results indicate that employee exposure exceeds the PEL, the employer includes in the written notice:</p> <ul style="list-style-type: none"> - a statement that the PEL has been exceeded - a description of the corrective action being taken by the employer to reduce employee exposure to or below the PEL. <p>Verify that the employer uses a method of monitoring and analysis that has an accuracy of not less than ± 25 percent for airborne concentrations of cadmium at or above the action level and the PEL.</p>

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CFR 1926.1127(d)(6).	Verify that the employer uses a method of monitoring and analysis that has a confidence level of 95 percent for airborne concentrations of cadmium at or above the action level and the PEL.

Appendix 104-1

Respiratory Protection for Cadmium
(29 CFR 1926.1127, Table 1)

Airborne Concentration of Cadmium or Condition of Use ^(a)	Required Respirator Type ^(b)
10 x PEL or less	A half mask, air-purifying respirator equipped with a HEPA ^(c) filter ^(d)
25 x PEL or less	A powered air-purifying respirator (PAPR) with a loose-fitting hood or helmet equipped with a HEPA filter, or a supplied-air respirator with a loose-fitting hood or helmet facepiece operated in the continuous flow mode.
50 x PEL or less	A full facepiece air-purifying respirator with a HEPA filter, or a PAPR with a tight-fitting half mask equipped with a HEPA filter, or a supplied air respirator with a tight-fitting half mask operated in the continuous flow mode.
250 x PEL or less	A PAPR with a tight-fitting full facepiece equipped with a HEPA filter, or a supplied-air respirator with a tight-fitting full facepiece operated in the continuous flow mode.
1000 x PEL or less	A supplied-air respirator with half mask or full facepiece operated in the pressure demand or other positive pressure mode.
>1000 x or unknown concentrations	A self-contained breathing apparatus with a full facepiece operated in the pressure demand or other positive pressure mode, or a supplied-air respirator with a full facepiece operated in the pressure demand or other positive pressure mode and equipped with an auxiliary escape type self-contained breathing apparatus operated in the pressure demand mode.
Fire fighting	A self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

^a Concentrations expressed as multiple of the PEL.

^b Respirators assigned for higher environmental concentrations may be used at lower exposure levels. Quantitative fit testing is required for all tight-fitting air purifying respirators where airborne concentration of cadmium exceeds 10 x the TWA PEL (10x5 µg/m³ = 50 mg/m³). A full facepiece respirator is required when eye irritation is experienced.

^c HEPA - high efficiency particulate air.

^d Fit testing, qualitative or quantitative, is required.

