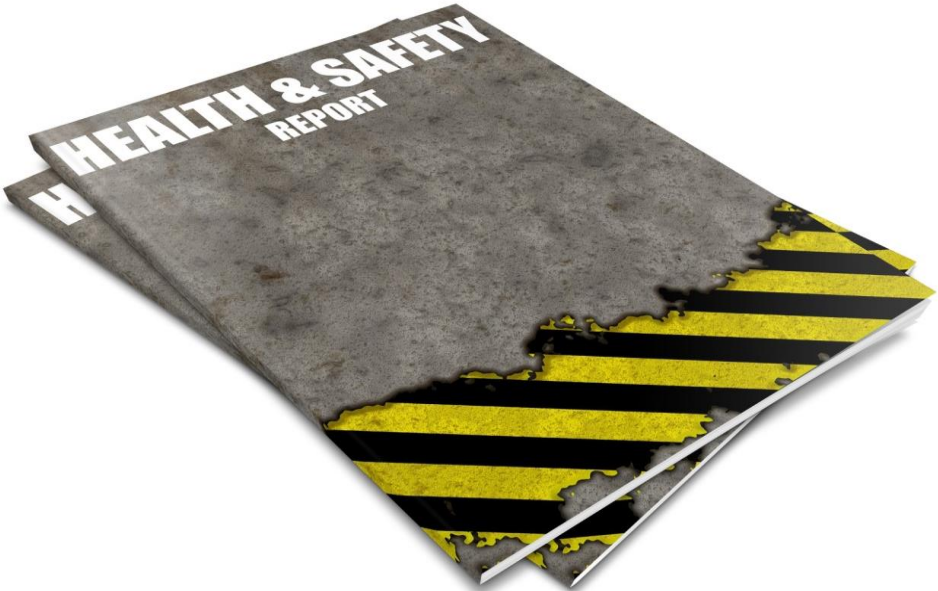
Care CEU's

Continuing Education for Nursing Home Administrators

OSHA Safety and Health Standards



Foreword

The summary of General Industry safety and health standards contained in this booklet are to aid employers, supervisors, workers, health and safety committee members, and safety and health personnel in their efforts toward achieving compliance with OSHA standards in the workplace.

Although this digest does not contain a summary of all the General Industry safety and health standards, the ones presented here are the standards most frequently cited, and which cover particularly hazardous situations. The standards are grouped by subject matter, followed by the reference to the appropriate standard. With few exceptions, the standards in this digest are from Title 29 of the Code of Federal Regulations (CFR), Part 1910.

Glossary

ANSI American National Standards Institute
ASME American Society of Mechanical Engineers
SDS Safety Data Sheets
ppb parts per billion
ppm parts per million
PPE Personal Protective Equipment
PEL Permissible Exposure Limit
SECAL Separate Engineering Control Air Limit
STEL Short-term Exposure Limit
TWA Time-weighted Average
TSD Treatment, Storage, and Disposal
VPP Voluntary Protection Programs

Injury and Illness Prevention Programs

An *injury and illness prevention program,* is a proactive process to help employers find and fix workplace hazards before workers are hurt. We know these programs can be effective at reducing injuries, illnesses, and fatalities. Many workplaces have already adopted such approaches, for example as part of OSHA's cooperative programs—such as the Voluntary Protection Programs. Not only do these employers experience dramatic decreases in workplace injuries, but they often report a transformed workplace culture that can lead to higher productivity and quality, reduced turnover, reduced costs, and greater employee satisfaction.

Based on the positive experience of employers with existing programs, OSHA believes that injury and illness prevention programs provide the foundation for breakthrough changes in the way employers identify and control hazards, leading to a significantly improved workplace health and safety environment. Adoption of an injury and illness prevention program will result in workers suffering fewer injuries, illnesses and fatalities. In addition, employers will improve their compliance with existing regulations, and will experience many of the financial benefits of a safer and healthier workplace cited in published studies and reports by individual companies, including significant reductions in workers' compensation premiums.

Thirty-four states and many nations around the world already require or encourage employers to implement such programs. The key elements common to all of these programs are management leadership, worker participation, hazard identification and assessment, hazard prevention and control, education and training, and program evaluation and improvement.

Most successful injury and illness prevention programs include a similar set of commonsense elements that focus on finding hazards in the workplace and developing a plan for preventing and controlling those hazards. Each of these key elements are important in ensuring the success of the overall program, and the elements are interrelated and interdependent. In other words, they must be used together to create a system of prevention and control. The elements recommended by OSHA are:

- **Management Leadership:** Management demonstrates their commitment to improve safety and health, establishes goals and objectives, and provides adequate resources and support.
- **Employee Participation:** Management actively involves employees in the program – for example, identifying and reporting hazards and investigating incidents. Employees are encouraged to communicate openly with management and report safety and health concerns.
- **Hazard Identification and Assessment:** Processes and procedures are put in place to continually identify and assess workplace hazards and evaluate risks.
- **Hazard Prevention and Control:** Processes and procedures are created and implemented to control workplace hazards.
- **Education and Training:** All workers are provided with education or training to carry out their part under the program. In addition, all workers are trained in a language and manner they can understand to recognize workplace hazards and trained in the control measures needed to protect themselves and other workers from these hazards.
- **Program Evaluation and Improvement:** Processes are established to monitor the program performance, verify implementation, and identify deficiencies and opportunities for improvement. Employers take necessary actions to improve the program.

Several government agencies and consensus standards organizations have guidance for injury and illness prevention programs. OSHA issued voluntary safety and health program management guidelines in 1989 that encourage the systematic identification, evaluation, and prevention or control of general

workplace hazards and the hazards of specific jobs and tasks. More recently, the American National Standards Institute (ANSI) issued ANSI Z10-2005, *Occupational Health and Safety Management Systems*. This voluntary consensus standard provides critical management system requirements and guidelines for improvement of occupational health and safety. The British Standards Institution also recently issued OHSAS 18001, an *Occupational Health and Safety Assessment Series* for health and safety management systems. OHSAS 18001 is an international occupational health and safety management system specification intended to help organizations control occupational health and safety risks.

Further information on injury and illness prevention programs can be found on OSHA's website at http://www.osha.gov/dsg/topics/safetyhealth/index.html.

Top 10 Most Frequently Cited Standards

Federal OSHA maintains a list of the top 10 most frequently cited standards following inspections of worksites to alert employers, so they can take steps to find and fix recognized hazards before preventable injuries and illnesses occur. For fiscal year 2011, the most frequently cited standards include:

1. 1926.451 Scaffolding (Construction)
2. 1926.501 Fall Protection (Construction)
3. 1910.1200 Hazard Communication (p. 59)
4. 1910.134 Respiratory Protection (p. 67)
5. 1910.147 Lockout/Tagout (p. 29)
6. 1910.305 Electrical, Wiring Methods (p. 92)
7. 1910.178 Powered Industrial Trucks (p. 77)
8. 1926.1053 Ladders (Construction)
9. 1910.303 Electrical, General Requirements (p. 92)
10. 1910.212 Machine Guarding (p. 78)

For more information about commonly cited standards, visit: http://www.osha.gov/dcsp/compliance_assistance/frequent_standards.html.

More information about OSHA standards for Construction is available in the Construction Industry Digest, at http://www.osha.gov/Publications/osha2202.html.

General Industry Standards

General Duty Clause (Pub. Law 91-596 Section 5(a)(1))

Hazardous conditions or practices not covered in an OSHA standard may be covered under Section 5(a)(1) of the *Occupational Safety and Health Act* (OSH Act), which states: "Each employer must furnish to each of his employees employment and a place of employment which are free from recognized hazards that are causing or are likely to cause death or serious physical harm to his employees."

Fatality, Injury and Illness Information

Recording and Reporting Occupational Fatalities, Injuries and Illnesses

Employers must notify the Occupational Safety and Health Administration (OSHA) of the death of any employee from a work-related incident or the inpatient hospitalization of three or more employees as a result of a work-related incident. This includes fatalities that occur during work, as a result of a work-related heart attack.

The report of such incidents must be given orally (via telephone or in person) to the OSHA Area Office (or State Plan Office) that is nearest to the site of the incident within 8 hours of the employer learning of the injury, illness, or fatality **(§1904.39(a))**. Employers may also use OSHA's toll-free telephone number, 1-800-321-OSHA (6742) when reporting work-related incidents. Please note that some State Plans have fatality/catastrophe reporting requirements that are more stringent than the Federal requirements stated above.

Employers with more than ten employees and whose establishments are not classified as a partially exempt industry must record and report work-related injuries and illnesses using OSHA Forms 300, 300A and 301 (**§1904)**. OSHA Forms 300, 300A and 301 are available at http://www.osha.gov/recordkeeping/RKforms.html.

Employers who are required to keep Form 300, the Injury and Illness log, must post Form 300A, the Summary of Work-Related Injuries and Illnesses, in the workplace every year from February 1 to April 30 **(§1904.32(b)(6))**. Current and former employees, or their representatives, have the right to access injury and illness records **(§1904.35(b)(2))**. Employers must give the requester a copy of the relevant record(s) by the end of the next business day **(§1904.35(b)(2))**.

Partially exempt industries include establishments in specific low hazard retail, service, finance, insurance or real estate industries and are listed in Appendix A to Subpart B **(§1904.2(a)(1)).** The list is also available online at http://www.osha.gov/recordkeeping/ppt1/RK1exempttable.html.

Walking-Working Surfaces

Aisles and Passageways

Where mechanical handling equipment is used, sufficient safe clearances must be allowed for aisles, at loading docks, through doorways, and wherever turns or passage must be made. Aisles and passageways must be kept clear and in good repair, with no obstruction across or in aisles that could create a hazard **(§1910.22(b)(1) and §1910.176(a))**.

Permanent aisles and passageways must be appropriately marked **(§1910.22(b)(2) and §1910.176(a))**.

Covers and/or guardrails must be provided to protect personnel from the hazards of open pits, tanks, vats, ditches, etc. **(§1910.22(c))**.

Dockboards

Dockboards must be strong enough to carry the load imposed on them **(§1910.30(a)(1))**.

Portable dockboards must be secured in position, either by being anchored or equipped with devices that will prevent their slipping (movement) when in use **(§1910.30(a)(2))**.

Floors, General Conditions

All places of employment, passageways, storerooms, and service rooms must be kept clean and orderly and in a sanitary condition **(§1910.22(a)(1))**.

The floor of every workroom must be maintained in a clean and, so far as possible, a dry condition. Where wet processes are used, drainage must be maintained, and false floors, platforms, mats, or other dry standing places should be provided where practicable **(§1910.22(a)(2))**.

To facilitate cleaning, every floor, working place, and passageway must be kept free from protruding nails, splinters, holes, or loose boards **(§1910.22(a)(3))**.

Floor Loading Limit

In every building or other structure, or part thereof, used for mercantile, business, industrial, or storage purposes, the loads approved by the building official must be marked on plates of approved design that must be supplied and securely affixed by the owner of the building, or his duly authorized agent, in a conspicuous place in each space to which they relate. Such plates must not be removed or defaced but, if lost, removed, or defaced, must be replaced by the owner or his agent **(§1910.22(d)(1))**.

Guarding Openings and Holes

Every stairway and ladderway floor opening must be guarded by standard railings with standard toeboards on all exposed sides except at the entrance. For infrequently used stairways, the guard may consist of a hinged cover and removable standard railings. The entrance to ladderway openings must be guarded to prevent a person from walking directly into the opening **(§§1910.23(a)(1) and (a)(2))**.

Every hatchway and chute floor opening must be guarded by a hinged floor opening cover equipped with standard railings that leave only one exposed side or a removable railing with toeboard on not more than two sides and a fixed standard railing with toeboards on all other exposed sides **(§1910.23(a)(3))**.

Every floor hole into which persons can accidentally walk must be guarded by either a standard railing with standard toeboard on all exposed sides, or a floor hole cover that should be hinged in place. While the cover is not in place, the floor hole must be attended or must be protected by a removable standard railing **(§1910.23(a)(8))**.

Every open-sided floor, platform or runway that is 4 feet (1.2 meters) or more above adjacent floor or ground level must be guarded by a standard railing with toeboard on all open sides, except where there is an entrance to a ramp, stairway, or fixed ladder. Runways not less than 18 inches (45 centimeters) wide used exclusively for special purposes may have the railing on one side omitted where operating conditions necessitate **(§§1910.23(c)(1) and (c)(2))**.

Regardless of height, open-sided floors, walkways, platforms, or runways above or adjacent to dangerous equipment must be guarded with a standard railing and toeboard **(§1910.23(c)(3))**.

Housekeeping

All places of employment, passageways, storerooms, and service rooms must be kept clean and orderly and in a sanitary condition. The floor of every workroom shall be maintained in a clean and, so far as possible, dry condition. Where wet processes are used, drainage shall be maintained and false floors, platforms, mats or other dry standing places should be provided where practicable or appropriate waterproof footgear shall be provided **(§§1910.22(a)(1), (a)(2)** and **§1910.141(a)(3))**.

Fixed Ladders

All rungs must have a minimum diameter of 3/4 inch (1.8 centimeters), if metal, or 1 1/8 inches (2.8 centimeters), if wood. They must be a minimum of 16 inches (40 centimeters) wide and should be spaced uniformly no more than 12 inches (30 centimeters) apart **(§§1910.27(b)(1)(i) through (iii))**.

Further, rungs, cleats, and steps of individual rung ladders must be designed so that workers' feet cannot slide off their end. All ladders must be free of splinters, sharp edges, burrs, or projections which may be a hazard **(§§1910.27(b)(1)(iv) and (b)(1)(v))**.

Cages, wells, or ladder safety devices must be provided on all fixed ladders more than 20 feet (6 meters) long to a maximum unbroken length of 30 feet. A landing platform must be provided for each 30 feet (9 meters) of length. Where no cage is provided, landing platform intervals must be reduced to a maximum of 20 feet (6 meters) **(§§1910.27(d)(1), (d)(2), and (d)(5))**. Cages on fixed ladders must extend 42 inches (1 meter) above the top of the landing, unless other acceptable protection is provided, and the bottom of the cage must be not less than 7 feet (2.1 meters) nor more than 8 feet (2.4 meters) above the base of the ladder, with the bottom flared not less than 4 inches, or the portion of the cage opposite the ladder must be carried to the base **(§§1910.27(d)(1)(iii) and (iv))**.

The side rails of through- or side-step ladder extensions must extend 3 1/2 feet (1 meter) above parapets and landings. For through-ladder extensions, the rungs must be omitted from the extension and must have not less than 18 inches (45.7 centimeters) nor more than 24 inches (61 centimeters) clearance between rails. For side-step or offset fixed ladder sections, at landings, the side rails and rungs must be carried to the next regular rung beyond or above the 3 1/2 feet (1 meter) minimum **(§1910.27(d)(3))**.

Portable Ladders

Stepladders must be equipped with a metal spreader or locking device of sufficient size and strength to securely hold the front and back sections in an open position. The spreader must have all sharp points covered or removed to protect the user **(§1910.25(c)(2)(i)(f) and §1910.26(a)(3)(viii))**.

Ladders must be inspected frequently and those that have developed defects must be withdrawn from service for repair or destruction and tagged or marked as "Dangerous, Do Not Use" **(§1910.25(d)(1)(x) and §1910.26(c)(2)(vii))**.

Non-self-supporting ladders must be erected on a sound base with the base of the ladder a distance from the wall or upper support equal to one quarter the length of the ladder and placed to prevent slipping. Where the potential exists for slipping, the ladder must be lashed, or held in position. Ladders must not be used in a horizontal position as platforms, runways, or scaffolds **(§§1910.25(d)(2)(i) through (iii) and §§1910.26(c)(3)(i) and (iii))**.

The top of a ladder used to gain access to a roof must extend at least 3 feet (0.9 meters) above the point of contact (support), at eave, gutter, or roofline **(§1910.25(d)(2)(xv))**.

Portable ladders must have nonconductive siderails if they are used where the employee or the ladder could contact exposed energized parts **(§1910.333(c)(7))**.

Railings

A standard railing must consist of a top rail, intermediate rail, and posts, and must have a vertical height of 42 inches (1.05 meters) from the upper surface of the top rail to the floor, platform, runway, or ramp level. The top rail must be smooth-surfaced throughout the length of the railing. The intermediate rail must be approximately halfway between the top rail and the floor, platform, runway, or ramp. The ends of the rails must not overhang the terminal posts except where such overhang does not constitute a projection hazard **(§1910.23(e)(1))**.

A railing for open-sided floors, platforms, and runways must have a toeboard whenever persons can pass beneath the open sides, there is moving machinery, or there is equipment with which falling materials could cause a hazard **(§1910.23(c)(1))**.

Railings must be of such construction that the complete structure must be capable of withstanding a load of at least 200 pounds (90 kilograms) applied in any direction at any point on the top rail **(§1910.23(e)(3)(iv))**.

A stair railing must be of construction similar to a standard railing, but the vertical height must be no more than 34 inches (85 centimeters) nor less than 30 inches (75 centimeters) from the upper surface of the top rail to the surface of tread in line with the face of the riser at the forward edge of the tread **(§1910.23(e)(2))**.

Toeboards

Railings protecting floor openings, platforms, and scaffolds must be equipped with toeboards whenever persons can pass beneath the open side, wherever there is moving machinery, or wherever there is equipment with which falling material could cause a hazard **(§1910.23(c)(1))**.

A standard toeboard must be at least 4 inches (10 centimeters) in height and may be of any substantial material, either solid or open, with openings not to exceed 1 inch (2.5 centimeters) in greatest dimension **(§1910.23(e)(4))**.

Scaffolds

All scaffolds and their components must be capable of supporting, without failure, at least four times the maximum intended load **(§1910.28(a)(4))**.

All planking must be Scaffold Grade, as recognized by grading rules for the species of wood used. The maximum permissible spans for 2-inch (5 centimeters) x 9-inch (22.5 centimeters) or wider planks are shown in the following table:

	Material				
	Full Thickness Undressed Lumber			Nominal Thickness Lumber	
Working Load (p.s.f.)	25	50	75	25	50
Permissible Span (ft.)	10	8	6	8	9

The maximum permissible span for 1 1/4-inch (3.12 centimeters) x 9-inch (22.5 centimeters) or wider plank for full thickness is 4 feet (1.2 meters), with medium loading of 50 pounds (22.5 kilograms) per square foot **(§1910.28(a)(9))**.

Scaffold planks must extend over their end supports not less than 6 inches (15 centimeters) nor more than 18 inches (45 centimeters) **(§1910.28(a)(13))**.

Scaffold planking must be overlapped a minimum of 12 inches (30 centimeters) or secured from movement **(§1910.28(a)(11))**.

Skylights

Every skylight floor opening and hole must be guarded by a standard skylight screen or a fixed standard railing on all exposed sides **(§1910.23(a)(4))**.

Fixed Industrial Stairs

Every flight of stairs having four or more risers must be provided with a standard railing on all open sides. Handrails must be provided on at least one side of closed stairways, preferably on the right side descending. Where stairways have one side open, at least one stair railing must be provided on the open side, and where both sides of the stairwell are open, one stair railing on each side must be installed **(§1910.23(d)(1) and §1910.24(h))**. Stairs must be constructed so that the riser height and tread width are uniform throughout **(§1910.24(f))**. In addition, fixed stairways must have a minimum width of 22 inches (55.9 centimeters) **(§1910.24(d))**.

Fixed stairways must be provided for access from one structure level to another where operations necessitate regular travel between levels, and for access to operating platforms at any equipment which requires attention routinely during operations. Fixed stairs must also be provided where access to elevations is daily or at each shift where such work may expose employees to acids, caustics, gases or other harmful substances, or for which purposes the carrying of tools or equipment by hand is normally required. Spiral stairways must not be permitted except for special limited usage and secondary access situations where it is not practical to provide a conventional stairway. Winding stairways may be installed on tanks and similar round structures where the diameter of the structure is not less than 5 feet (1.5 meters) **(§1910.24(b))**.

Means of Egress

Emergency Action Plans

Wherever any given OSHA standard requires an emergency action plan to ensure employee safety in the event of fire and other emergencies, such action plan must be prepared in writing, kept in the workplace, and reviewed with affected employees. However, employers with 10 or fewer employees may communicate the plan orally to employees. The plan must include the following elements: escape procedures and routes, critical plant operations, employee accounting following an emergency evacuation, rescue and medical duties, means of reporting emergencies, and persons to be contacted for information or clarification (**§1910.38**).

Exits

Every building designed for human occupancy must be provided with exit routes sufficient to permit the prompt escape of occupants in case of emergency **(§1910.36(b))**. **An exit door must be unlocked (§1910.36(d))**.

In hazardous areas, or where employees may be endangered by the blocking of any single means of egress due to fire or smoke, there must be at least two means of egress that are remote from each other **(§§1910.36(b)(1) and (b)(2))**.

Exits and the way of approach and travel from exits must be maintained so that they are unobstructed and are accessible at all times **(§1910.37(a)(3))**. In addition, employees must be able to open exit doors from the inside at all times without keys, tools, or special knowledge **(§1910.36(d))**. All exits must discharge directly to the street or other open space that gives safe access to a public way **(§1910.36(c)(1))**.

Exit doors serving more than 50 people, or at high-hazard areas, must swing in the direction of exit travel **(§1910.36(e)(2))**.

Exits must be marked by readily visible, suitably illuminated exit signs. Exit signs must be distinctive in color and provide contrast with surroundings. The word "EXIT" must be in plainly legible letters, not less than 6 inches (15 centimeters) high **(§1910.37)**.

The capacity of exit routes must be sufficient to handle the occupant load and meet the minimum height (7.5 feet (2.3 m)) and width (28 inches (71.1 cm)) requirements. Any projections from the ceiling must not reach a point of less than 6.66 feet (2.0 m) from the floor **(§§1910.36(f) and (g))**. Any door, passage, or stairway that is neither an exit nor a way of exit access and that is so located or arranged as to be likely to be mistaken for an exit must be identified by a sign reading "Not an Exit" or similar designation **(§1910.37(b)(5))**.

An employer demonstrating compliance with the exit-route provisions of NFPA 101, Life Safety Code, 2009 edition, or the exit-route provisions of the International Fire Code, 2009 edition, would be deemed in compliance with the corresponding requirements in **§§1910.34, 1910.36, and 1910.37 (§1910.35)**.

Occupational Health and Environmental Controls

Nonionizing Radiation (Electromagnetic Radiation)

Nonionizing radiation (electromagnetic radiation) applies to all radiations originating from radio stations, radar equipment, and other possible sources of electromagnetic radiation such as those used for communication, radio navigation, and industrial and scientific purposes **(§§1910.97(a)(1)(i) and (a)(4))**.

For normal environmental conditions and for incident electromagnetic energy of frequencies from 10 MHz to 100 GHz, employers must ensure that the radiation level not exceed 10 mW/cm^2 (milliwatt per square centimeter) as averaged over any possible 0.1-hour period without careful consideration of the reasons for doing so. A radiation level of 10 mW/cm^2 (milliwatt per square centimeter) as averaged over any possible 0.1-hour period means that there exists a power density of 10 mW/cm^2 for periods of 0.1-hour or more, and an energy density of 1 mW-hr./cm^2 (milliwatt hour per square centimeter) during any 0.1-hour period **(§1910.97(a)(2)(i))**.

It is important for employers to be responsible for and implement proper controls to prevent any employee from being exposed to electromagnetic radiation in excess of the acceptable limits, as it has been shown that some parts of the human body (e.g., eyes, testicles) may be harmed if exposed to incident radiation levels significantly in excess of the recommended levels **(§1910.97(a)(2)(ii))**.

Each electromagnetic radiation area must be conspicuously posted with appropriate signs and/or barriers **(§1910.97(a)(3))**.

Noise Exposure

When **workers' noise exposures equal or exceed a time weighted average noise level of 85 dBA** over an 8-hour work shift, employers must implement a Hearing Conservation Program. Hearing Conservation Programs require employers to measure noise levels, provide free annual hearing exams, free hearing protection, and training, and conduct evaluations of the adequacy of the hearing protectors in use **(§§1910.95(c), (d)(1) and (j)(4))**.

When workers are exposed to sound levels exceeding those shown in Table G-16 (below), employers must use feasible engineering or administrative controls to protect workers. When engineering or administrative controls fail to reduce the noise level to within the levels of Table G-16 , personal protective equipment must be provided and used to reduce the noise to an acceptable level **(§§1910.95(a) and (b)(1))**.

The employer must make available to affected employees or their representatives copies of this standard, as well as post a copy in the workplace **(§1910.95)(l)(1))**.

Table G-16 – Permissible Noise Exposure[2]
(§1910.95(b)(1))

Duration per day, hours slow response	Sound level dBA
8	90
6	92
4	95
3	97
2	100
1.5	102
1	105
0.5	110
0.25 or less	115

[2] When the daily noise exposure is composed of two or more periods of noise exposure of different levels, their combined effect should be considered, rather than the individual effect of each. If the sum of the following fractions: C(1)/T(1) + C(2)/T(2) C(n)/T(n) exceeds unity, then, the mixed exposure should be considered to exceed the limit value (Cn indicates the total time of exposure at a specified noise level, and Tn indicates the total time of exposure permitted at that level). Exposure to impulsive or impact noise should not exceed 140 dB peak sound pressure level.

Local/Exhaust Ventilation

Blast-cleaning enclosures must be exhaust ventilated in such a way that a continuous inward flow of air will be maintained at all openings in the enclosure during blasting operations. The rate of exhaust must be sufficient to provide prompt clearance of the dust-laden air within the enclosure after the cessation of blasting. All air inlets and access openings must be baffled or so arranged that by the combination of inward air flow and baffling the escape of abrasive or dust particles into an adjacent work area will be minimized and visible spurts of dust will not be observed. Following blasting operations, the blast must be turned off and the exhaust system must be run for a sufficient period of time to remove the dusty air within the enclosure before the enclosure can be opened **(§1910.94(a)(3))**.

The construction, installation, inspection, and maintenance of exhaust ventilation systems must conform to the principles and requirements set forth in American National Standard Fundamentals Governing the Design and Operation of Local Exhaust Systems, Z9.2-1960, and ANSI Z33.1-1961 **(§1910.94(a)(4)(i))**.

When dust leaks are noted, repairs must be made as soon as possible **(§1910.94(a)(4)(i)(a))**. The static pressure drop at the exhaust ducts leading from the equipment must be checked at initial installation and periodically thereafter to assure continued satisfactory operation. Whenever an appreciable change in the pressure drop indicates a partial blockage, the system must be cleaned and returned to normal operating condition **(§1910.94(a)(4)(i)(b))**.

In installations where the abrasive is recirculated, the exhaust ventilation system for the blasting enclosure must not be relied upon for the removal of fines from the spent abrasive instead of an abrasive separator. An abrasive separator must be provided for this purpose **(§1910.94(a)(4)(ii))**.

The air exhausted from blast-cleaning equipment must be discharged through dust collecting equipment. Dust collectors must be set up so that the accumulated dust can be emptied and removed without contaminating other working areas **(§1910.94(a)(4)(iii))**.

Spray booths or spray rooms are to be used to enclose or confine all spray finishing operations **(§§1910.94(c)(2) and (c)(3))**. The total air volume exhausted through a spray booth must be such as to dilute the solvent vapor to at least 25 percent of the lower explosive limit of the solvent being sprayed **(§1910.94(c)(6)(ii))**.

Spray booths must be constructed of steel, securely and rigidly supported, or of concrete or masonry except that aluminum or other substantial noncombustible material may be used for intermittent or low volume spraying. Spray booths must be designed to sweep air currents toward the exhaust outlet. The interior surfaces of spray booths must be smooth and continuous without edges and otherwise designed to prevent pocketing of residues and facilitate cleaning and washing without injury. The floor surface of a spray booth and operator's working area, if combustible, must be covered with noncombustible material of such character as to facilitate the safe cleaning and removal of residues. Distribution or baffle plates, if installed to promote an even flow of air through the booth or cause the deposit of overspray before it enters the exhaust duct, must be of noncombustible material and readily removable or accessible on both sides for cleaning. Such plates must not be located in exhaust ducts **(§1910.94(c)(3)(i)(a) and §1910.107(b)(1) through (b)(4))**.

Exhaust systems for grinding, polishing, and buffing operations should be designed and tested in accord with American Standard Fundamentals Governing the Design and Operation of Local Exhaust Systems, Z9.2-1960 **(§1910.94(b)(4)(ii))**.

Sanitation

Change Rooms

Whenever employees are required to wear protective clothing due to possible contamination with toxic materials, employers must provide employees with a change room. The change room must be equipped with storage facilities for street clothes and separate storage facilities for the protective clothing **(§1910.141(e))**.

Drinking Water

Potable drinking water must be provided in all places of employment **(§1910.141(b)(1)(i))**. Potable drinking water dispensers

must be designed, constructed, and serviced to ensure sanitary conditions and must be capable of being closed, and have a tap **(§1910.141(b)(1)(iii))**. Open containers such as barrels, pails or tanks for drinking water from which the water must be dipped or poured, whether or not they are fitted with a cover, are prohibited **(§1910.141(b)(1)(v))**. A common drinking cup is not allowed **(§1910.141(b)(1)(vi))**.

Eating and Drinking Areas

Employers must not allow workers to consume food or beverages in toilet rooms or in any area exposed to a toxic material **(§1910.141(g)(2))**. A covered receptacle of corrosion-resistant or disposable material must be provided in designated eating and drinking areas for the disposal of waste food. Receptacles must be provided with a solid tight-fitting cover, unless sanitary conditions can be maintained without the use of a cover **(§1910.141(g)(3))**.

Showers

Where showers are required to be provided, one shower must be provided for every 10 employees of each sex, or numerical fraction thereof, who are required to shower during the same shift; body soap or other appropriate cleansing agents must be provided in a convenient location to the showers; hot and cold water feeding a common discharge line must be provided; and individual clean towels must be made available **(§§1910.141(d)(3)(i) through (v))**.

Toilets

Toilet facilities must be provided according to the following: 1-15 persons, one facility; 16-35 persons, two facilities; 36-55 persons, three facilities; 56-80 persons, four facilities; 81-110 persons, five facilities; 111-150 persons, six facilities; over 150 persons, one for each additional 40 persons. Where toilet rooms will be occupied by no more than one person at a time and can be locked from the inside, separate rooms for each sex need not be provided **(§1910.141(c)(1)(i))**. However, these requirements do not apply to mobile crews or to normally unattended work locations so long as employees working at these locations have transportation immediately available to nearby toilet facilities **(§1910.141(c)(1)(ii))**.

Each water closet must occupy a separate compartment with a door and walls or partitions between fixtures sufficiently high to ensure privacy **(§1910.141(c)(2))**.

Wash basins (lavatories), with hot and cold, or tepid running water, hand soap or equivalent, and hand towels, blowers or equivalent, must be provided in every place of employment **(§§1910.141(d)(2)(i) through (iv))**.

Confined Spaces

Permit-Required Confined Spaces

The employer must evaluate the workplace to determine if confined space conditions exist that necessitate permits for entry. A decision flow chart[3] is contained in Appendix A to section 1910.146 of the OSHA Permit-Required Confined Space standard to facilitate compliance with this requirement **(§1910.146(c)(1))**.

If permit-required confined spaces exist, the employer must inform exposed workers, by posting danger signs or by any other equally effective means, of the existence and location of and the danger posed by the permit spaces **(§1910.146(c)(2))**.

If the employer decides that employees will not enter permit spaces, the employer must take effective measures to prevent them from entering the permit spaces and must comply with additional requirements of the standard **(§1910.146(c)(3))**.

If confined space entry is required, a written permit program must be developed and initiated by the employer. The written program must be available for inspection by employees and their authorized representatives **(§1910.146(c)(4))**.

Before entry is authorized, the employer must develop and implement the means, procedures, and practices necessary for safe entry operations, which includes, but is not limited to, the following: specifying acceptable entry conditions; providing each authorized entrant or that employee's authorized representative with the opportunity to observe any monitoring or testing of permit spaces; isolating the permit space; purging, inerting, flushing, or ventilating the permit space as necessary to eliminate or control atmospheric hazards; providing pedestrian, vehicle, or other barriers as necessary to protect entrants from external hazards; and verifying that conditions in the permit space are acceptable for

[3] Appendix A provides information and non-mandatory guidelines to assist employers and employees in complying with the appropriate requirements.

entry throughout the duration of an authorized entry **(§§1910.146(d)(3) and (e)(1))**.

The employer must provide training so that all employees whose work is regulated by the permit entry system section acquire the understanding, knowledge, and skills necessary for the safe performance of the duties assigned by the standard **(§1910.146(g)(1))**.

The employer must ensure that each designated member of the rescue and emergency service team is provided with, and is trained to use properly, the personal protective equipment (PPE) and rescue equipment necessary for making rescues from permit spaces **(§§1910.146(k)(2) and (k)(2)(i))**. The necessary PPE must be provided at no cost to the employee **(§1910.132(h))**. The employer must also evaluate each prospective rescuers' ability to respond to a rescue summons in a timely manner, considering the hazards involved **(§1910.146(k)(1)(i))**.

Control of Hazardous Energy (Lockout/Tagout)

The Control of Hazardous Energy covers the servicing and maintenance of machines and equipment in which the unexpected start-up or energization of the machines or equipment, or release of stored energy could cause injury to employees **(§1910.147(a)(1)(i))**. In order to prevent injury to employees, each employer is required to establish a program and utilize procedures for affixing appropriate lockout or tagout devices to energy isolating devices, and to otherwise disable the machines or equipment to prevent the unexpected start-up, energization, or release of stored energy **(§1910.147(a)(3)(i))**.

The program and procedures discussed above must also include employee training for those involved in the servicing of machines or equipment, and periodic inspections that must be conducted at least annually to ensure the continued effectiveness of the program **(§1910.147(c)(1))**. The periodic inspection must include a review of the procedures with all employees who are authorized to use the procedures when lockout is used, and with all authorized and affected employees when tagout is used **(§1910.147(c)(6)(i))**. When outside contractors are performing servicing or maintenance within a plant or facility, each employer must coordinate with the

other employers to ensure that no employees are endangered **(§1910.147(f)(2)(i))**. When a group of employees are performing a servicing or maintenance activity, each employee must be afforded protection equivalent to the utilization of individual lockout or tagout **(§1910.147(f)(3)(i))**. When servicing or maintenance extends over more than one shift, specific procedures must be utilized to ensure continuity of personnel protection, including provision for the orderly transfer of lockout or tagout control **(§1910.147(f)(4))**.

If an energy isolating device is capable of being locked out, the employer's energy control program must utilize lockout, unless the employer can demonstrate that the utilization of a tagout system will provide full employee protection as set forth in **§1910.147(c)(3) (§1910.147(c)(2)(iii))**. Further, after January 2, 1990, whenever replacement or major repair, renovation or modification of a machine or equipment is performed, and whenever new machines or equipment are installed, energy isolating devices for such machine or equipment must be designed to accept a lockout device **(§1910.147(c)(2)(iii))**.

If an energy isolating device is not capable of being locked out, the employer's energy control program must utilize a tagout system **(§1910.147(c)(2)(i))**. Further, in demonstrating that a level of safety is achieved in the tagout program that is equivalent to the level of safety obtained by using a lockout program, the employer must demonstrate full compliance with all tagout-related provisions of §1910.147 together with such additional elements as are necessary to provide the equivalent safety available from the use of a lockout device. Additional means to be considered as part of the demonstration of full employee protection must include the implementation of additional safety measures such as the removal of an isolating circuit element, blocking of a controlling switch, opening of an extra disconnecting device, or the removal of a valve handle to reduce the likelihood of inadvertent energization **(§1910.147(c)(3)(ii))**. This requirement to implement an additional safety measure is often referred to as "tags-plus".

Hazardous Materials

Compressed Gas Cylinders

Inside of buildings, oxygen-fuel gas welding cylinders must be stored in a well-protected, well-ventilated, dry location, at least 20 feet (6.1 meters) from highly combustible materials such as oil or excelsior. Cylinders should be stored in definitely assigned places away from elevators, stairs, or gangways. Assigned storage spaces must be located where cylinders will not be knocked over or damaged by passing or falling objects, or subject to tampering by unauthorized persons. Cylinders must not be kept in unventilated enclosures such as lockers and cupboards **(§1910.253(b)(2)(ii))**.

Where such a cylinder is designed to accept a valve protection cap, caps must be in place, hand-tight, except when the cylinder is in use or is connected for use **(§1910.253(b)(2)(iv))**.

Oxygen-fueled Gas

Acetylene

Under no conditions must acetylene be generated, piped (except in approved cylinder manifolds) or utilized at a pressure in excess of 15 pounds per square inch (psig) (103 kPa gauge pressure) or 30 psia (206 kPa absolute). The use of liquid acetylene is prohibited **(§1910.253(a)(2))**.

Acetylene cylinders must be stored and used in a vertical, valve-end-up position only **(§1910.253(b)(3)(ii))**.

The in-plant transfer, handling, storage, and use of acetylene in cylinders must comply with the provisions of Compressed Gas Association pamphlet G-1.3-2009 **(§1910.102(a))**.

Compressed Gases

Hydrogen

Hydrogen containers must comply with one of the following: (1) designed, constructed, and tested in accord with appropriate requirements of ASME Boiler and Pressure Vessel Code, Section VIII – Unfired Pressure Vessels – 1968; or (2) designed, constructed, tested and maintained in accord with U.S. Department of Transportation specifications and regulations **(§§1910.103(b)(1)(i)(a)(1) and (b)(2))**.

Hydrogen systems must be located (1) so that they are readily accessible to delivery equipment and to authorized personnel, (2) above ground, (3) so they are not beneath electric power lines, and (4) clear from flammable liquid piping or piping of other flammable gases. Systems near aboveground flammable liquid storage must be located on ground that is higher than the flammable liquid storage, except when dikes, diversion curbs, grading, or separating solid walls are used to prevent accumulation of flammable liquids under the system **(§§1910.103(b)(2)(i)(a) through (e))**.

Permanently installed containers must be provided with substantial non-combustible supports on firm non-combustible foundations **(§1910.103(b)(1)(i)(b))**.

Nitrous Oxide

The piped systems for the in-plant transfer and distribution of nitrous oxide must be designed, installed, maintained, and operated in accord with Compressed Gas Association pamphlet G-8.1-1964 (**§1910.105**).

Oxygen

Oxygen cylinders in storage must be separated from fuel-gas cylinders or combustible materials (especially oil or grease) a minimum distance of 20 feet (6.1 meters) or by a noncombustible barrier at least 5 feet (1.5 meters) having a fire resistance rating of at least 1/2 hour **(§1910.253(b)(4)(iii))**.

Dip Tanks Containing Flammable or Combustible Liquid

Dip tanks with more than 150 gallons (570 liters) capacity, or 10 square feet (0.9 square meters) in liquid surface area, must be equipped with a properly trapped overflow piping that discharges to a safe location outside the building **(§1910.125(b)(1))**.

There must be no open flames, spark producing devices, or heated surfaces having a temperature sufficient to ignite vapors in any flammable vapor area **(§1910.125(e)(1)(ii))**.

Areas in the vicinity of dip tanks must be kept as clear of combustible stock as practical and must be kept entirely free of combustible debris **(§1910.125(e)(4)(i))**.

All dip tanks exceeding 150 gallons (570 liters) of flammable liquid capacity or having a liquid surface area exceeding four square feet (0.36 meters) must be protected with at least one of the following automatic extinguishing facilities: water spray system, foam system, carbon dioxide system, dry chemical system, or automatic dip tank cover **(§§1910.125(f)(1)(i) and (f)(2))**.

This provision must apply to hardening and tempering tanks having a liquid surface area of 25 square feet (2.37 square meters) or a capacity of at least 500 gallons (1,893 liters) or more **(§1910.125(f)(1)(ii))**.

Explosives and Blasting Agents

All explosives must be kept in approved magazines **(§1910.109(c)(1)(i))**. Stored packages of explosives must be laid flat with the top side up. Black powder, when stored in magazines with other explosives, must be stored separately **(§1910.109(c)(5)(i))**.

Vehicles used to store packages of explosives or blasting agents must keep Department of Transportation placards visible until the vehicle is empty of explosives or blasting agents **(§1910.109(d)(2)(ii) and §1910.1201)**.

Smoking, matches, open flames, spark-producing devices, and firearms (except firearms carried by guards) must not be permitted inside of or within 50 feet (15 meters) of magazines. The land surrounding a magazine must be kept clear of all combustible materials for a distance of at least 25 feet (7.5 meters). Combustible materials must not be stored within 50 feet (15 meters) of magazines **(§1910.109(c)(5)(vii))**.

The manufacture of explosives and pyrotechnics must meet the requirements of OSHA's Process Safety Management standard **(§§1910.109(k)(2) and (k)(3))**.

Flammable Liquids

Flammable liquids must be kept in covered containers or tanks when not actually in use **(§1910.106(e)(2)(iv)(a))**.

For fire protection purposes, the quantity of flammable or combustible liquid that may be located outside of an inside storage

room or storage cabinet in a building or any one fire area of a building must not exceed **(§1910.106(e)(2)(ii)(b))**:

- 25 gallons (95 liters) of Class IA liquids in containers;
- 120 gallons (456 liters) of Class IB, IC, II, or III liquids in containers; or
- 660 gallons (2,508 liters) of Class IB, IC, II, or III liquids in a single portable tank.

Flammable or combustible liquids must be drawn from or transferred into vessels, containers, or portable tanks within a building only through a closed piping system; from safety cans, by means of a device drawing through the top; or from a container or portable tanks by gravity through an approved self-closing valve. Transferring by means of air pressure on the container or portable tanks must be prohibited **(§1910.106(e)(2)(iv)(d))**.

Containers and Portable Tank Storage

Not more than 60 gallons (228 liters) of Class I or Class II liquids, nor more than 120 gallons (456 liters) of Class III liquids may be stored in a storage cabinet **(§1910.106(d)(3)(i))**.

Inside storage rooms for flammable and combustible liquids must be constructed to meet the required fire-resistive rating and wiring for their use. Such construction must comply with the test specifications set forth in Standard Methods of Fire Tests of Building Construction and Materials, NFPA 251-1969. Openings to other rooms or buildings must be provided with noncombustible liquid-tight raised sills or ramps at least 4 inches (10.16 centimeters) high, or the floor in the storage area must be at least 4 inches below the surrounding floor. Openings must be provided with approved self-closing fire doors. A sill or ramp that provides an open-grated trench inside of the room, draining to a safe location is also acceptable **(§1910.106(d)(4)(i))**.

Flammable or combustible liquids, including stock for sale, must not be stored so as to limit use of exits, stairways, or areas normally used for the safe egress (exit) of people **(§1910.106(d)(5)(i))**.

Outside storage areas must be graded so as to divert spills away from buildings or other exposures, or be surrounded with curbs at least 6 inches (15 centimeters) high with appropriate drainage to a

safe location for accumulated liquids. The storage areas must be protected against tampering or trespassing, where necessary, and must be kept free of weeds, debris, and other combustible material not necessary to the storage **(§§1910.106(d)(6)(iii) and (iv))**.

Adequate precautions must be taken to prevent the ignition of flammable vapors. Sources of ignition include, but are not limited to, open flames; lightning; smoking; cutting and welding; hot surfaces; frictional heat; static, electrical, and mechanical sparks; spontaneous ignition, including heat-producing chemical reactions, and radiant heat **(§1910.106(e)(6)(i))**.

Class I liquids must not be dispensed into containers unless the nozzle and container are electrically interconnected **(§1910.106(e)(6)(ii))**.

Boilers

Pressure Vessels (Boilers)
A pressure vessel is a storage tank or vessel which has been designed to operate at pressures above 15 p.s.i.g. **(§1910.106(a)(26))**.

Pressure vessels must be built in accord with the Code for Unfired Pressure Vessels, Section VIII of the ASME Boiler and Pressure Vessel Code 1968 **(§§1910.106(b)(1)(v)(b) and (iv)(b)(2))**. The working pressure must not exceed the design pressure of the vessel **(§1910.106(b)(1)(v)(a))**.

Pressure vessels may be used as low-pressure tanks or atmospheric tanks **(§§1910.106(b)(1)(iii)(c) and (iv)(d))**, but must not be used for the storage of a flammable or combustible liquid at a temperature at or above its boiling point if designated an atmospheric tank **(§1910.106(b)(1)(iii)(d))**.

In addition to the reference above, low-pressure tanks may also be built in accord with the following consensus standards:

- American Petroleum Institute Standard No. 620. Recommended Rules for the Design and Construction of Large, Welded, Low-Pressure Storage Tanks, Third Edition, 1966 **(§1910.106(b)(1)(iv)(b)(1))**; and
- The principles of the Code for Unfired Pressure Vessels, Section VIII of the ASME Boiler and Pressure Vessels Code, 1968 **(§1910.106(b)(1)(iv)(b)(2))**.

Atmospheric tanks may be built in accord with the following consensus standards:

- Underwriters' Laboratories, Inc., Subjects No. 142, Standard for Steel Aboveground Tanks for Flammable and Combustible Liquids, 1968; No. 58, Standard for Steel Underground Tanks for Flammable and Combustible Liquids, Fifth Edition, December 1961; or No. 80, Standard for Steel Inside Tanks for Oil-Burner Fuel, September 1963 **(§1910.106(b)(1)(iii)(a)(1))**;
- American Petroleum Institute Standards No. 650, Welded Steel Tanks for Oil Storage, Third Edition, 1966 **(§1910.106(b)(1)(iii)(a)(2))**; and
- American Petroleum Institute Standards No. 12B, Specification for Bolted Production Tanks, Eleventh Edition, May 1958, and Supplement 1, March 1962; No. 12D, Specification for Large Welded Production Tanks, Seventh Edition, August 1957; or No. 12F, Specification for Small Welded Production Tanks, Fifth Edition, March 1961. Tanks built in accord with these standards must be used only as production tanks for storage of crude petroleum in oil-producing areas **(§1910.106(b)(1)(iii)(a)(3))**.

Note: Atmospheric tanks built according to Underwriters' Laboratories, Inc., must be limited to 2.5 p.s.i.g. under emergency venting conditions **(§1910.106(b)(1)(iv)(c))**.

Hazardous Waste Operations and Emergency Response

Any information concerning the chemical, physical, and toxicological properties of each substance known or expected to be present on site that is available to the employer and relevant to the duties an employee is expected to perform must be made available to the affected employees prior to the commencement of their work activities. The employer may utilize information developed for the hazard communication standard for this purpose **(§1910.120(c)(8))**.

Training is required for all employees who work at hazardous waste cleanup sites, treatment storage and disposal (TSD) sites (Environmental Protection Agency permitted sites), and who respond to any emergencies involving hazardous substances. Training must cover the necessary information to perform these jobs safely including information on the proper personal protective

equipment and procedures to safeguard employees against hazards and effects of exposure to toxic substances **(§§1910.120(e), (p)(7), and (q)(6))**. The level of training is broken into five positions that include: first responder awareness, first responder operations, hazardous materials technician, hazardous materials specialist, and the on-scene incident commander **(§§1910.120(q)(6)(i) through (v))**.

A safety and health program that details the responsibilities and methods for assuring employee safety is necessary for employees engaged in hazardous waste cleanup and for TSD activities **(§§1910.120(b)(1) and (p)(1))**.

Medical surveillance (physical examination) is required for employees who are or maybe exposed to hazardous substances or health hazards, or who wear respirators for 30 or more days per year, or who develop signs or symptoms possibly related to workplace exposure **(§1910.120(f)(2))**.

Personal protective equipment must be selected and used to protect employees from hazardous substances and physical hazards **(§1910.120(g)(3)(i))**.

When necessary, a decontamination procedure must be used to assure that hazardous substances are removed from workers before they leave the worksite as well as from equipment that is to be taken off site **(§§1910.120(k)(1) and (2), (p)(4), and (q)(2)(vii))**.

When hazardous waste cleanup or removal operations commence on a site and the duration of the work will require six months or greater time to complete, the employer must provide showers, including change rooms, for all employees exposed to hazardous substances and health hazards involved in hazardous waste cleanup or removal operations **(§1910.120(n)(7))**.

Showers must be located in areas where exposures are below the permissible exposure limits and published exposure levels. If this cannot be accomplished, then a ventilation system must be provided that will supply air that is below the permissible exposure limits and published exposure levels **(§1910.120(n)(7)(iii))**. The employer must ensure that employees shower at the end of their work shift **(§1910.120(n)(7)(iv))**.

An emergency response plan must be developed and implemented to handle anticipated emergencies prior to the commencement

of emergency response operations. The plan must be in writing and be available for inspection and copying by employees, their representatives, and OSHA personnel **(§1910.120(q)(1))**.

Process Safety Management of Highly Hazardous Chemicals

Employers with highly hazardous chemicals must develop and implement a process safety management system that complies with the elements of **§1910.119**.

Employers must develop a written plan of action regarding employee participation and must consult with employees and their representatives on the conduct and development of process hazards analyses and on the development of the other elements of process safety management **(§§1910.119(c)(1) and (2))**.

The employer must complete a compilation of written process safety information before conducting any process hazard analysis. The compilation of written process safety information is to enable the employer and the employees involved in operating the process to identify and understand the hazards posed by those processes involving highly hazardous chemicals. This process safety information must include information pertaining to the hazards of the highly hazardous chemicals used or produced by the process, information pertaining to the technology of the process, and information pertaining to the equipment in the process **(§1910.119(d))**. The employer must perform a process hazard analysis (hazard evaluation) appropriate to the complexity of the company's processes and must identify, evaluate, and control the hazards involved in the process **(§1910.119(e)(1))**.

The employer must develop and implement written operating procedures that provide clear instructions for safely conducting activities involved in each covered process consistent with the process safety information **(§1910.119(f)(1))**. The employer must develop and implement safe work practices to provide for the control of hazards during operations such as lockout/tagout; confined space entry; opening process equipment or piping; and control over entrance into a facility by maintenance, contractor, laboratory, or other support personnel **(§1910.119(f)(4))**.

Each employee presently involved in operating a process, and each employee before being involved in operating a newly-assigned process, must be trained in an overview of the process and in the operating procedures as specified in the Operating Procedures section of the standard. The training must include emphasis on the specific safety and health hazards, emergency operations including shutdown, and safe work practices applicable to the employee's job tasks **(§1910.119(g)(1))**.

Contract employers must assure that each contract employee is trained and understands the work practices necessary to safely perform his/her job and the hazards of the process **(§§1910.119(h)(3)(i) and (ii))**.

The employer, when selecting a contractor, must obtain and evaluate information regarding the contract employer's safety performance and programs and inform contract employees of process hazards and the facility emergency action plan **(§§1910.119(h)(2)(i) through (iii))**.

The employer must perform a pre-startup safety review for new facilities and for modified facilities when the modification is significant enough to require a change in the process safety information **(§1910.119(i)(1))**.

Employers must issue a hot work permit for any hot work operations conducted on or near a covered process **(§1910.119(k)(1))**.

The employer must establish and implement written procedures to maintain the ongoing integrity of process equipment **(§1910.119(j)(2))**.

The employer must establish and implement written procedures to manage changes to process chemicals, technology, equipment, and procedures, and changes to facilities that affect a covered process **(§1910.119(l)(1))**.

The employer must investigate each incident which resulted in, or could reasonably have resulted in a catastrophic release of highly hazardous chemicals in the workplace **(§1910.119(m)(1))**.

The employer must establish and implement an emergency action plan for the entire plant in accord with the provisions of **§1910.38(a) (§1910.119(n))**.

Employers must also certify, at least every 3 years, that they have evaluated compliance with the provisions of the OSHA Process Safety Management of Highly Hazardous Chemicals standard **(§§1910.119(n) and (o)(1))**.

Spray-Finishing Operations

Conventional dry type spray booths equipped with overspray dry filters or filter rolls must conform to the following specifications:

- The spraying operations, except electrostatic spraying operations must ensure an average air velocity over the open face of the booth of not less than 100 feet (30 meters) per minute;
- Electrostatic spraying operations may be conducted with an air velocity over the open face of the booth of not less than 60 feet (18 meters) per minute, depending on the volume of the finishing material being applied and its flammability and explosion characteristics;
- Visible gauges, or audible alarm or pressure activated devices, must be installed to indicate or ensure that the required air velocity is maintained;
- Filter rolls must be inspected after each period of use and clogged filter pads discarded and replaced. Filter pads must be inspected to ensure proper replacement of filter media;
- Spray booths must be so installed that all portions are readily accessible for cleaning;
- A clear space of not less than 3 feet (0.9 meters) on all sides must be kept from storage or combustible construction; and
- Space within the spray booth on the downstream and upstream sides of filters must be protected with approved automatic sprinklers **(§1910.107(b))**.

There must be no open flame or spark-producing equipment in any spraying area, nor within 20 feet (6 meters) thereof, unless separated by a partition **(§1910.107(c)(2))**.

Electrical wiring and equipment not subject to deposits of combustible residues but located in a spraying area must be of an explosion-proof type approved for Class I, group D locations **(§1910.107(c)(6))**.

The quantity of flammable or combustible liquids kept in the vicinity of spraying operations must be the minimum required for operations and should ordinarily not exceed a supply for one day or one shift. Bulk storage of portable containers with flammable or combustible liquids must be in a separate, constructed building detached from other important buildings or cut off in a standard manner **(§1910.107(e)(2))**.

Whenever flammable or combustible liquids are transferred from one container to another, both containers must be effectively bonded and grounded to prevent discharge of sparks of static electricity **(§1910.107(e)(9))**.

All spraying areas must be kept as free from the accumulation of deposits of combustible residues as practical, with cleaning conducted daily if necessary. Scrapers, spuds, or other such tools used for cleaning purposes must be of nonsparking material **(§1910.107(g)(2))**.

Residue scrapings and debris contaminated with residue must be immediately removed from the premises and properly disposed of. Approved metal waste cans must be provided wherever rags or waste are impregnated with finishing material and all such rags or waste deposited therein immediately after use. The contents of waste cans must be properly disposed of at least once daily or at the end of each shift **(§1910.107(g)(3))**. "No smoking" signs in large letters on a contrasting color background must be conspicuously posted in all spraying areas and paint storage rooms **(§1910.107(g)(7))**.

Hazardous Agents

Air Contaminants

Section 1910.1000 contains more than 600 permissible exposure limits (PEL). Tables Z-1, Z-2, and Z-3 list these PELs in alphabetical order. To achieve compliance with this section when air concentrations exceed the PEL, administrative or engineering controls must first be determined and implemented whenever feasible. When such controls are not feasible to achieve full compliance, protective equipment or any other protective measures must be used to keep the exposure of employees to air contaminants within the limits prescribed in **§1910.1000(e)**. In

addition, whenever respirators are used, they must comply with **§1910.134.**

Asbestos

Employers must ensure that no employee is exposed to an airborne concentration of asbestos above the excursion limit. Specifically, asbestos exposure must not be in excess of 0.1 fiber per cubic centimeter of air (0.1 f/cc) as an 8-hour time-weighted average (TWA) **(§1910.1001(c)(1))**, and 1.0 f/cc over a period of 30 minutes **(§1910.1001(c)(2))**.

A determination of each employee's exposure must be made from breathing zone air samples that are representative of full-shift, 8-hour TWA, and 30-minute short-term exposures associated with operations that are most likely to produce exposures above the excursion limit for each shift **(§§1910.1001(d)(1)(i) and (ii))**.

Employers must conduct periodic monitoring for employees exposed above the action level, 8-hourTWA, or 30-minute excursion limit **(§1910.1001(d)(3))**.

Wherever the airborne concentration of asbestos and/or presumed asbestos-containing material (PACM) exceeds the TWA, employers must establish regulated areas that are demarcated from the rest of the workplace in a manner that minimizes the number of persons exposed to asbestos **(§§1910.1001(e)(1) and (2))**. Access to the regulated areas must be limited to authorized persons that are supplied with and using an appropriate respirator, selected in accord with **§1910.1001(g)(2) (§§1910.1001(e)(3) and (4))**.

Employers must institute engineering and work practice controls to reduce and maintain employee exposure at or below the TWA and the excursion limit, except to the extent that such controls are not feasible **(§1910.1001(f)(1)(i))**. Asbestos must be handled, mixed, applied, removed, cut, scored, or otherwise worked in a wet state. Wet methods, enclosed processes, or ventilated areas must be used when products containing asbestos are removed from bags, cartons, or containers **(§§1910.1001(f)(1)(vi) and (viii))**. Sanding of asbestos-containing flooring material is prohibited **(§1910.1001(f)(1)(x))**.

Respirators must be used: (1) while feasible engineering and work practice controls are being installed or implemented; (2) during maintenance and repair activities, or other activities where engineering and work practice controls are not feasible; (3) where feasible engineering and work-practice controls are not yet sufficient to reduce employee exposure to or below the TWA and/or excursion limit; and (4) in emergencies **(§§1910.1001(g)(1)(i) through (iv))**.

Employers and owners of buildings constructed prior to 1980 which contain thermal system insulation or sprayed-on or troweled-on surfacing material must presume that these materials contain asbestos, or else conduct sampling and analysis to verify that the materials do not contain more than 1 percent asbestos **(§§1910.1001(j)(1) and (2))**. Building and facility owners must inform employers of employees, and employers must inform employees who will perform housekeeping activities in areas which contain asbestos-containing materials (ACM) and/or PACM of the presence and location of ACM and/or PACM in such areas which may be contacted during such activities **(§1910.1001(j)(2)(iii))**.

Employers must train each employee who is exposed to airborne concentrations of asbestos at or above the PEL and/or excursion limit. The employer must institute a training program and ensure employee participation in the program **(§1910.1001(j)(7)(i))**.

Employers must institute a medical surveillance program for all employees who are or will be exposed to airborne concentrations of fibers of asbestos at or above the TWA and/or excursion limit **(§1910.1001(l)(1)(i))**.

Employers must maintain accurate records required to comply with the provisions of the standard, including air monitoring, objective data, training and medical surveillance **(§1910.1001(m))**.

Bloodborne Pathogens

Each employer having employee(s) who may incur skin, eye, mucous membrane, mouth, or parenteral contact with blood or other potentially infectious materials as a result of performing their professional duties must establish a written Exposure Control Plan designed to eliminate or minimize exposure **(§1910.1030(c)(1)(i))**.

Employers required to establish an Exposure Control Plan must solicit input from non-managerial employees who are potentially exposed to injuries from contaminated sharps on the identification, evaluation, and selection of effective engineering and work practice controls, and must document such solicitation in the Exposure Control Plan **(§1910.1030(c)(1)(v))**.

Universal precautions must be observed to prevent contact with blood or other potentially infectious materials. The concept of Universal Precautions requires that all human blood and certain human body fluids are treated as if known to be infectious for HIV, HBV, and other bloodborne pathogens **(§1910.1030(b))**. Under circumstances in which differentiation between body fluid types is difficult or impossible, all body fluids must be considered potentially infectious materials **(§1910.1030(d)(1))**. This includes first-aid workers and other emergency care providers who might be exposed to bleeding victims.

Engineering and work practice controls (e.g., sharps disposal containers, self-sheathing needles, safer medical devices, such as sharps with engineered sharps injury protections and needleless systems) must be used to eliminate or minimize employee exposure. Where occupational exposure remains after instituting these controls, personal protective equipment must also be used **(§1910.1030(d)(2)(i))**. All engineering controls used must be examined and maintained, or replaced on a regular schedule to ensure their effectiveness **(§1910.1030(d)(2)(ii))**.

In addition to the above methods, vaccinations provide an important role in exposure control. The hepatitis B vaccine and vaccination series must be offered to all workers, at no cost, who have a reasonably anticipated exposure to blood or other potentially infectious materials **(§1910.1030(f))**. The vaccine is given in a series of three injections over a 6-month period and all three injections must be received. Healthcare workers and healthcare providers who do not wish to be vaccinated must sign a declination form.

Employers must establish and maintain a sharps injury log to record percutaneous (through the skin) injuries from contaminated sharps **(§1910.1030(h)(5))**.

Benzene

Employee exposure to gaseous and liquid benzene must be limited to one (1) part per million (ppm) as an 8-hour time-weighted average (TWA), known as the permissible exposure limit (PEL), and five (5) ppm as averaged over a period of fifteen (15) minutes, known as the short-term exposure limit (STEL) **(§§1910.1028(c)(1) and (2))**.

A determination of each employee's exposure must be made from breathing zone air samples that are representative of full-shift, 8-hour TWA, and 15-minute short-term exposures associated with operations that are most likely to produce exposures above the STEL for each shift **(§§1910.1028(e)(1)(i) through (iii))**. The employer must conduct periodic monitoring for employees exposed above the action level, PEL, or STEL **(§§1910.1028(e)(3)(i), (ii), and (iv))**. The employer must also monitor for employee exposure when there may be new or additional exposures **(§1910.1028(e)(5)(i))**.

The employer must institute engineering and work practice controls to reduce and maintain employee exposure at or below the PEL **(§§1910.1028(f)(1)(i) and (ii))**.

Employers must provide each employee with an appropriate respirator that must be used when engineering and work practice controls are infeasible or insufficient to reduce employee exposure to permissible levels **(§1910.1028(g)(1))**. When employees could have eye or skin contact with liquid benzene, the employer must also select and provide appropriate protective clothing or other equipment **(§1910.1028(h))**.

The employer must institute a medical surveillance program for employees who are or may be exposed to benzene at or above the PEL and other thresholds for certain numbers of days annually **(§1910.1028(i)(1)(i))**. The employer must make available medical examinations and consultations, including certain laboratory tests, to each covered employee before initial assignment, at least annually, and in certain other situations **(§1910.1028(i)(2)(i))**. Employees required to use respirators must also be provided pulmonary function tests every three years **(§1910.1028(i)(3)(iii))**.

A medical exam following exposure in an emergency situation may require special elements or actions, including a urinary

phenol test, blood tests, and physician's referral to a hematologist/internist for further evaluation or treatment **(§§1910.1028(i)(4) and (5))**. Employers must implement a medical removal plan, including medical removal protection benefits, for employees referred to a hematologist/internist **(§§1910.1028(i)(8) and (9))**.

The employer must establish a regulated area wherever exposures to concentrations of benzene may exceed or reasonably be expected to exceed the PEL or STEL **(§1910.1028(d)(1))**. Regulated areas must be determined in a manner that minimizes the number of employees within the regulated area and access must be limited to authorized persons **(§§1910.1028(d)(2), (d)(3), and (j)(1)(i))**. Labels or other appropriate forms of warning must be provided for containers of benzene **(§1910.1028(j)(1)(ii))**.

Employers must also provide employees with information and training on benzene at the time of initial assignment and, for employees who may be exposed at or above the action level, at least annually thereafter **(§1910.1028(j)(3)(i))**.

The employer must establish and maintain an accurate record of initial monitoring data or objective data relied upon in place of certain initial monitoring provisions and a record for each employee subject to medical surveillance requirements **(§§1910.1028(k)(1)(i) and (k)(2)(i))**.

1,3-Butadiene

The standard establishes permissible exposure limits (PELs) of 1 part per million (ppm) as an 8-hour time-weighted average (TWA) and 5 ppm as a 15-minute short-term exposure limit (STEL) for 1,3-butadine (BD) **(§§1910.1051(c)(1) and (2))**.

Employee exposures to BD must be determined from breathing zone air samples that are representative of the 8-hour TWA and 15-minute STEL associated with operations most likely to produce exposures exceeding the STEL for each shift and job classification **(§§1910.1051(d)(1)(i) through (iii))**. Employers must conduct periodic monitoring for employees exposed above the action level (0.5 ppm as a TWA), PEL, or STEL **(§§1910.1051(d)(3)(i) through (iii))**. Additional monitoring is required when there has been a change in production, process, control equipment, personnel, or work

practices and if a spill, leak, or rupture has occurred **(§§1910.1051(d)(5)(i) and (ii))**.

Employers must institute engineering and work practice controls (excluding employee rotation) to reduce and maintain employee exposure at or below the TWA and the STEL **(§§1910.1051(f)(1)(i) through (ii) and (f)(2)(iv))**.

For operations and jobs in which exposures exceed the action level, employers must establish an exposure goal program to reduce exposures **(§1910.1051(g)(1))**.

Employers must provide each employee with an appropriate respirator that must be used when engineering and work practice controls do not reduce employee exposures to permissible levels **(§§1910.1051(f)(1)(ii) and (h)(1)(i) through (iv))**. Employers must comply with requirements of the respiratory protection program and for respiratory protection **(§§1910.1051(h)(2)(i) through (vi) and (h)(3)(i) through (iii))**. When appropriate for limiting skin and eye contact, employers must provide appropriate protective clothing and equipment, including eye and face protection that meet the requirements of **§1910.33 (§1910.1051(i))**.

Employers must provide medical screening and surveillance to employees with BD exposures at or above the action level for 30 or more days and employees who are or may be exposed at or above PELs for 10 or more days a year **(§1910.1051(k)(1)(i))**. Employers must continue providing medical surveillance and screening for employees who were exposed to BD for 10 or more years at concentrations exceeding the PELs for 30 or more days or the action level for 60 or more days a year, in addition to employees exposed to above 10 ppm on 30 or more days in any year and exposed during an emergency **(§§1910.1051(k)(1)(ii) and (iii))**. Frequency of medical surveillance and screening varies according to exposure scenarios **(§§1910.1051(k)(3)(i) through (iii))**. Information from medical screening must be aggregated and periodically reviewed to assess the health of the employee population **(§1910.1051(k)(8)(i))**.

The standard also contains requirements for regulated areas, emergency plans, hazard communication, and recordkeeping **(§§1910.1051(e), (j), (l), and (m))**.

Cadmium

Employee exposure to cadmium must be limited to the permissible exposure limit (PEL) of 5 micrograms per cubic meter of air (µg/m^3) as an 8-hour time-weighted average (TWA) **(§1910.1027(c))**.

Employee exposure to cadmium must be determined from breathing zone air samples that represent the 8-hour TWA for employees expected to have the highest exposure for each shift and job classification **(§§1910.1027(d)(1)(ii) and (iii))**. Employers must conduct periodic monitoring for employees exposed above the action level (2.5 µg/m^3 TWA) **(§1910.1027(d)(3)(i))**. Additional monitoring is required when there has been a change that could result in further exposures **(§1910.1027(d)(4))**.

Employers must establish engineering and work practice controls (excluding employee rotation) to reduce and maintain employee exposure at or below the PEL for most industries **(§1910.1027(f)(1)(i))**. For six industries (nickel-cadmium battery, zinc/cadmium refining, lead smelting, pigment manufacture, plating, and stabilizers), the employer must use engineering and work practice controls to limit employee exposures to the appropriate separate engineering control air limit (SECAL) of 15 or 50 µg/m^3 **(§1910.1027(f)(1)(ii))**.

Employers must demonstrate the effectiveness of ventilation systems, use a high-efficiency filter if air is recirculated, and minimize employee exposure during ventilation system maintenance **(§§1910.1027(f)(3)(i) through (iv))**.

Employers must provide each employee with an appropriate respirator that must be used when engineering and work practice controls do not reduce employee exposure to the PEL or appropriate SECAL **(§§1910.1027(f)(1)(iv), (g)(1), (g)(1)(i) through (iv), and (vi))**. Employers must comply with requirements of the respiratory protection program and respirator selection sections **(§§1910.1027(g)(2) and (3))**.

If employees are exposed to cadmium above the PEL or could experience skin or eye irritation, employers must provide appropriate protective clothing and equipment and provide for its cleaning, disposal, and repair **(§§1910.1027(i)(1), (i)(1)(i) through (iii), and (i)(3)(i) through (iv))**. Employers must also require employees

to remove contaminated clothing in change rooms and place the clothing in sealable containers that are labeled with warnings **(§§1910.1027(i)(2)(i) through (iv))**.

Employers must provide medical surveillance to employees who are exposed at or above the action level for 30 or more days per year, were previously exposed at or above the action level for a total of more than 60 months before this standard became effective, or are exposed in an emergency **(§§1910.1027(l)(1)(i)(A), (B), and (l)(7)(i))**. Surveillance includes measurement of blood and urinary cadmium and urinary β-2-microglobulin levels, and results of those analysis could affect frequency of periodic medical surveillance or trigger actions such as assessment of controls or removal from exposure **(§§1910.1027(l)(2) through (l)(5))**. Employees may see a second or third physician if the employer picks the initial physician **(§§1910.1027(l)(13)(i) and (iv))**.

Employers must remove employees from cadmium exposure for up to 18 months when a physician determines that medical removal is required for any reason such as cadmium and β-2-microglobulin levels in blood and/or urine, inability to wear a respirator, or evidence of cadmium-related illness **(§§1910.1027(l)(11)(i)(A), (C), and (l)(12)(i))**. During medical removal, employers must maintain the employee's earnings, seniority and other employment rights and benefits **(§1910.1027(l)(12)(ii))**.

The standard also has requirements for regulated areas, emergencies, hygiene areas and practices, housekeeping, hazard communication, recordkeeping, and observation of monitoring **(§§1910.1027(e), (h), and (j) through (o))**.

Chromium (VI)

Employee exposure to chromium (VI) must be limited to an airborne concentration of 5 parts chromium (VI) per cubic meter of air (5 $\mu g/m^3$) as an 8-hour time-weighted average (TWA) **(§1910.1026(c))**.

Employers must determine each employee's initial 8-hour TWA exposure to chromium (VI) through breathing zone air samples for each shift, each job classification, and each work area **(§1910.1026(d)(2)(i))**. Employers must conduct periodic monitoring for employees exposed above the action level or the TWA and

additional monitoring when necessary **(§§1910.1026(d)(2)(iii), (iv), and (vi))**. Exposure may be determined through a performance approach, rather than monitoring **(§1910.1026(d)(3))**. Employees have the right to observe monitoring and must be notified of results **(§§1910.1026(d)(4)(i) and (d)(6)(i))**.

Employers must establish a regulated area wherever exposures to airborne concentrations of chromium (VI) may exceed the TWA **(§1910.1026(e)(1))**. Regulated areas must be demarcated and access must be limited to authorized persons **(§§1910.1026(e)(2) and (3))**.

Employers must institute engineering and work practice controls to reduce and maintain employee exposure at or below the TWA or at or below 25 $\mu g/m^3$ in certain aerospace industries **(§§1910.1026(f)(1)(i) and (ii))**. Employers are not permitted to rotate employees to comply with permissible exposure limits **(§1910.1026(f)(2))**.

Employers must provide each employee with an appropriate respirator that must be used when engineering and work practice controls are infeasible or insufficient to reduce employee exposure to permissible levels and must implement a respiratory protection program **(§§1910.1026(f)(1)(i), (g)(1)(iii), and (g)(2))**. When employees could have chromium (VI)-induced skin or eye irritation, employers must also provide appropriate personal protective clothing and equipment, which must be properly removed, stored, cleaned and replaced, and follow appropriate hygiene and housekeeping practices **(§§1910.1026(h)(1) through (3) and (i) through (j))**.

Employers must institute a medical surveillance program for all employees who may be exposed to chromium (VI) at or above the action level for at least 30 days a year or who show signs or symptoms associated with chromium (VI) exposure **(§§1910.1026(k)(1)(i)(A) through (C))**. Employers must make available medical examinations and consultations within 30 days after initial assignment, at least annually thereafter, and under other conditions **(§§1910.1026(k)(2)(i) through (vi))**.

Employers must make appropriate arrangements for emergencies, including providing respiratory protection and medical surveillance to employees under these conditions **(§§1910.1026(g)(1)(v), (k)(1)(i)(C), and (k)(2)(v))**.

This standard also contains requirements for hazard communication and recordkeeping **(§§1910.1026(l)(2) and (m))**.

Ethylene Oxide

Employee exposure to ethylene oxide (EtO) must be limited to one (1) part per million (ppm) as an 8-hour time-weighted average (TWA) and five (5) ppm as averaged over a period of fifteen (15) minutes (excursion limit) **(§§1910.1047(c)(1) and (2))**.

A determination of each employee's exposure must be made from breathing zone air samples that are representative of full-shift, 8-hour TWA, and 15-minute short-term exposures associated with operations that are most likely to produce exposures above the excursion limit for each shift **(§§1910.1047(d)(1)(i) through (ii))**. The employer must conduct periodic monitoring for employees exposed above the action level, 8-hour TWA, or 15-minute excursion limit **(§§1910.1047(d)(3)(i), (ii), and (iv))**.

The employer must institute engineering and work practice controls to reduce and maintain employee exposure at or below the TWA and the excursion limit **(§§1910.1047(f)(1)(i) and (ii))**.

Employers must provide each employee with an appropriate respirator that must be used when engineering and work practice controls are infeasible or insufficient to reduce employee exposure to permissible levels **(§§1910.1047(f)(1)(ii) and (g)(1))**. When employees could have eye or skin contact with EtO or EtO solutions, the employer must also select and provide appropriate protective clothing or other equipment **(§1910.1047(g)(4))**.

A written plan for emergency situations must be developed for each workplace where there is a possibility of an emergency, and the plan must be implemented in the event of an emergency **(§1910.1047(h)(1)(i))**. The plan must cover respiratory protection for employees engaged in correcting emergency conditions, emergency action procedures, and fire prevention elements **(§§1910.1047(h)(1)(ii) and (iii))**.

The employer must institute a medical surveillance program for all employees who are or may be exposed to EtO at or above the action level, without regard to the use of respirators, for at least

30 days a year **(§1910.1047(i)(1)(i)(A))**. The employer must make available medical examinations and consultations to each covered employee at least annually and in other situations such as when employees develop signs or symptoms that might be related to exposure or when employees are exposed during an emergency **(§§1910.1047(i)(1)(i) and (i)(2)(i))**.

The employer must establish a regulated area wherever exposures to airborne concentrations of EtO may exceed the TWA or can reasonably be expected to exceed the excursion limit **(§1910.1047(e)(1))**. Regulated areas must be demarcated in any manner that minimizes the number of employees within the regulated area and access must be limited to authorized persons **(§§1910.1047(e)(2), (e)(3), and (j)(1)(i))**.

Labels or other appropriate forms of warning must be provided for containers of EtO **(§1910.1047(j)(1)(ii))**.

Employers must also provide employees who are potentially exposed to EtO at or above the action level or above the excursion limit with information and training on EtO at the time of initial assignment and at least annually thereafter. **(§1910.1047(j)(3)(i))**.

The employer must establish and maintain an accurate record of objective data relied upon to support an exemption from requirements of the standard or used in place of initial monitoring; records of all measurements taken to monitor employee exposure to EtO; and a record for each employee subject to medical surveillance requirements of this section **(§§1910.1047(k)(1)(i) through (iii), (k)(2)(i) through (iii), and (k)(3)(i) through (iii))**.

Formaldehyde

Employee exposure to formaldehyde must be limited to 0.75 parts per million (ppm) as an 8-hour time-weighted average (TWA) and 2.0 ppm short-term exposure limit (STEL) as averaged over a period of fifteen (15) minutes **(§§1910.1048(c)(1) and (2))**.

The employer must identify all employees who may be exposed at or above the action level or at or above the STEL and measure, or use objective data, to determine the exposure of each employee so identified **(§1910.1048(d)(2))**.

Periodic monitoring must be conducted for employees exposed above the action level, 8-hour TWA, or 15-minute STEL **(§1910.1048(d)(3)(i))**. Exposure monitoring is required if the employer receives reports of signs or symptoms of respiratory or dermal (skin related) conditions associated with formaldehyde exposure **(§1910.1048(d)(2)(iii))**. Employees must be notified of their exposure monitoring results **(§1910.1048(d)(6))**.

The employer must implement engineering and work practice controls to reduce and maintain employee exposures to formaldehyde at or below the TWA and the STEL **(§1910.1048(f)(1))**. When engineering and work practice controls are infeasible or insufficient to reduce employee exposure to permissible levels, such as during maintenance activities or vessel cleaning, employers must provide employees with an appropriate respirator **(§§1910.1048(f)(2) and (g))**.

If employees' eyes or skin may become splashed with solutions containing 1 percent or greater formaldehyde, protective clothing and equipment must be provided **(§1910.1048(h)(1))**, along with conveniently located eyewashes and quick drench showers **(§§1910.1048(i)(2) and (3))**.

The employer must establish regulated areas and restrict access to authorized employees wherever the airborne concentration of airborne formaldehyde exceeds either the TWA or the STEL, and post warning signs at all entrances to the area **(§1910.1048(e))**.

For operations involving formaldehyde liquids or gas, a preventive maintenance program is required to ensure that all leaks are repaired and spills are cleaned promptly by employees wearing suitable protective equipment and trained in proper methods for cleanup and decontamination **(§1910.1048(j))**.

In the event of emergencies involving formaldehyde, a plan to ensure that appropriate procedures are followed to minimize injury and loss of life must be implemented **(§1910.1048(k))**.

A medical surveillance program is required for employees exposed to formaldehyde at concentrations at or exceeding the action level or exceeding the STEL **(§1910.1048(l)(1)(i))**, and for employees who develop signs and symptoms of overexposure to formaldehyde, or who are exposed to formaldehyde in emergencies **(§1910.1048(l)**

(1)(ii)). If a physician finds that significant irritation of the mucosa (mucous membranes) of the eyes or of the upper airways, respiratory sensitization, dermal irritation, or dermal sensitization and recommends restrictions or removal, the employer must transfer, if possible, the employee to work having no or significantly less exposure to formaldehyde, and maintain the employee's current earnings, seniority, and other benefits **(§1910.1048(l)(8)(vi))**.

Containers of formaldehyde must be marked with precautionary labels **(§1910.1048(m)(3)(i))**.

Employers must provide training to employees on formaldehyde at the time of their initial assignment and annually thereafter **(§1910.1048(n)(1))**.

The employer must establish and maintain accurate records of any objective data relied upon to support an exemption from requirements of the standard or used in place of initial monitoring; records of all measurements taken to monitor employee exposure to formaldehyde; and a record for each employee subject to medical surveillance requirements of this section **(§1910.1048(o))**.

Lead

Employee exposure to lead must be limited to a permissible exposure limit (PEL) of 50 micrograms per cubic meter of air (µg/m^3) as an 8-hour time-weighted average (TWA) **(§1910.1025(c)(1))**. When determining TWA exposures, employers must adjust for a greater than 8-hour workday and may consider respirator protection factors and duration of respirator use **(§§1910.1025(c)(2) and (3))**.

For each shift, job, and work area, employers must collect representative, full-shift (minimum of 7 continuous hours) personal samples for employees likely to have the greatest exposure **(§§1910.1025(d)(1)(ii) through (iii) and (d)(3)(ii))**. Employers must conduct periodic monitoring for employees exposed above the action level (30 µg/m^3 TWA) or when there has been a production, process, control, or personnel change **(§§1910.1025(d)(6)(ii) through (iii) and (d)(7))**.

Employers must use engineering and work practice controls to reduce and maintain employee exposure at or below the TWA

PEL **(§§1910.1025(e)(1)(i) and (ii))**. Employers must demonstrate effectiveness of ventilation systems and use a high efficiency filter, monitors, and automatic bypasses for return air **(§§1910.1025(e)(4)(i) and (ii))**. Employers must also establish a job rotation schedule if using administrative controls **(§§1910.1025(e)(5)(i) through (iii))**.

Employers must provide each employee with an appropriate respirator that must be used when engineering and work practice controls do not reduce employee exposure to or below the PEL **(§§1910.1025(e)(2), (f)(1), and (f)(1)(i) through (iii))**. Employers must comply with requirements of the respiratory protection program and respirator selection **(§§1910.1025(f)(2)(i) and (ii), (f)(3)(i)(A) through (C), and (f)(3)(ii))**. If employees are exposed to lead above the PEL or could experience skin or eye irritation, employers must provide appropriate protective clothing and equipment and provide for its cleaning, disposal, and repair **(§§1910.1025(g)(1), (g)(1)(i) through (iii), and (g)(2)(i) through (ii))**. Employers must require that employees remove contaminated clothing in change rooms and place the clothing in sealable containers that are labeled with warnings and prohibited activities **(§§1910.1025(g)(2)(iv) through (viii))**.

Employers must provide medical surveillance to employees who are or may be exposed to lead at or above the action level for at least 30 days a year **(§§1910.1025(j)(1)(i) and (j)(2)(i)(A))**. Employers must make available medical examinations and consultations at least annually if blood lead levels are at or exceed 40 µg/100 g and in situations such as when employees develop signs of lead poisoning or request advice related to child conception **(§§1910.1025(j)(3)(i)(A) and (j)(3)(i)(C))**. Employees may go to a second or third physician if the employer picks the initial physician **(§§1910.1025(j)(3)(iii)(A) and (D))**. The standard prohibits chelation for preventative purposes and establishes requirements for use of chelation for treatment or diagnosis **(§§1910.1025(j)(4)(i) and (ii))**.

Employers must remove employees from exposure to lead for up to 18 months when blood lead level is measured at 60 µg/100 g blood or higher or at an average of 50 µg/100 g blood over time **(§§1910.1025(k)(1)(i)(A) and (B), and (k)(2)(i))**. Employees must also be removed if they have a medical condition which puts them at risk **(§1920.1025(k)(1)(ii)(A))**. During medical removal employers

must maintain the employee's benefits such as earnings and seniority **(§1910.1025(k)(2)(ii))**.

The standard also has requirements for housekeeping, hygiene facilities and practices, employee information and training, hazard communication, recordkeeping, and observation of monitoring **(§§1910.1025(h) through (i), and (n) through (o))**.

Methylene Chloride

Employee exposure to methylene chloride (MC) must be limited to an airborne concentration of 25 parts MC per million parts of air (25 ppm) as an 8-hour time-weighted average (TWA) and 125 parts MC per million parts of air (125 ppm) as a 15-minute short-term exposure limit (STEL) **(§§1910.1052(c)(1) and (2))**.

Employers must determine each employee's initial exposure through breathing zone air samples that represent full-shift, 8-hour TWA, or 15-minute STEL **(§§1910.1052(d)(1)(i)(A) and (B), and (d)(2))**. Employers must conduct periodic monitoring for employees exposed above the action level, 8-hour TWA, or 15-minute STEL and additional monitoring when necessary **(§§1910.1052(d)(3) and (4))**. Employees have the right to observe monitoring and must be notified of results **(§§1910.1052(d)(5)(i) and (d)(6)(i))**.

Employers must establish a regulated area wherever exposures to airborne concentrations of MC may exceed the TWA or STEL **(§1910.1052(e)(1))**. Regulated areas must be demarcated, access must be limited to authorized persons, and respiratory protection must be worn **(§§1910.1052(e)(2), (e)(6), (g)(1)(i), and (l)(3)(ii))**.

Employers must institute engineering and work practice controls to reduce and maintain employee exposure at or below the TWA and STEL **(§1910.1052(f)(1))**. Employers are not permitted to rotate employees to comply with permissible exposure limits **(§1910.1052(f)(2))**.

Employers must provide each employee with an appropriate respirator that must be used when engineering and work practice controls are infeasible or insufficient to reduce employee exposure to permissible levels and must implement a respiratory protection program **(§§1910.1052(f)(1), (g)(1), and (g)(2)(i))**. Half masks are

not permitted **(§1910.1052(g)(3)(i))**. Employers must also provide appropriate protective clothing and equipment when employees could have MC-induced skin or eye irritation **(§1910.1052(h)(1))**.

Employers must institute a medical surveillance program for all employees who are or may be exposed to MC at or above the action level for at least 30 days a year, above the TWA or STEL for at least 10 days a year, or as determined by a licensed healthcare professional **(§§1910.1052(j)(1)(i) and (ii))**. Employers must make available medical examinations and consultations at least annually **(§1910.1052(j)(4)(ii))**.

Employers must make appropriate arrangements for emergencies, including providing respiratory protection, hygiene facilities and medical surveillance to employees under these conditions **(§§1910.1052(g)(1)(v), (g)(2)(ii), (g)(3)(ii), (g)(4), (i)(2), (j)(1)(iii), (j)(6)(i), and (j)(8)(iii))**.

Employers must communicate cancer, skin and eye irritation, and cardiac, liver, and central nervous system effects associated with MC in an understandable manner on labels and in safety data sheets **(§1910.1052(k))**. Employers must provide affected employees with information and training on MC at the time of initial assignment and at least annually thereafter **(§§1910.1052(l)(1) and (2))**.

Employers must establish and maintain an accurate record of MC exposure monitoring data, objective data relied upon to support an exemption from requirements of the standard or used in place of initial monitoring; and a record for each employee subject to medical surveillance requirements of this section.

Methylenedianiline

Employee exposure to methylenedianiline (MDA) must be limited to an airborne concentration of 10 parts MDA per billion parts of air (10 ppb) as an 8-hour time-weighted average (TWA) and 100 parts MDA per billion parts of air (100 ppb) as a 15-minute short-term exposure limit (STEL) **(§1910.1050(c))**.

Employers must determine each employee's initial exposure through breathing zone air samples that represent full-shift,

8-hour TWA, and 15-minute short-term exposures **(§§1910.1050(e)(1)(i) and (e)(2))**. Employers must conduct periodic monitoring for employees exposed above the action level, 8-hour TWA, or 15-minute STEL and additional monitoring when necessary **(§§1910.1050(e)(3)(i) and (ii), and (e)(5))**. Employees have the right to observe monitoring and must be notified of results **(§§1910.1050(e)(7)(i) and (o)(1))**. Employers must routinely visually inspect the hands, face and forearms of employees potentially exposed to MDA **(§1910.1050(e)(8))**.

Employers must establish a regulated area wherever exposures to airborne concentrations of MDA may exceed the TWA **(§1910.1050(f)(1)(i))**. Regulated areas must be demarcated, access must be limited to authorized persons, and protective clothing and equipment must be worn **(§§1910.1050(f)(2) through (4), and (k)(1)(i))**.

Employers must institute engineering and work practice controls to reduce and maintain employee exposure at or below the TWA and STEL and maintain a written compliance program **(§§1910.1050(g)(1)(i) and (g)(2)(i))**. Employers are not permitted to rotate employees to comply with permissible exposure limits **(§1910.1050(g)(3))**.

Employers must provide each employee with an appropriate respirator that must be used when engineering and work practice controls are infeasible or insufficient to reduce employee exposure to permissible levels and must implement a respiratory protection program **(§§1910.1050(g)(1)(ii) and (h)(1)(iii))**. When employees could have MDA-induced skin or eye irritation, employers must also provide appropriate personal protective clothing and equipment, which must be properly removed, stored, cleaned and replaced, and follow appropriate hygiene and housekeeping practices **(§§1910.1050(i)(1) through (3), and (j))**.

Employers must institute a medical surveillance program for all employees who may be exposed to MDA at or above the action level for at least 30 days a year, who are subject to dermal (skin) MDA exposure for at least 15 days a year, or who show signs or symptoms associated with MDA exposure **(§§1910.1050(m)(1)(i)(A) through (B), and (E))**. Employers must make available medical examinations and consultations before initial assignment, at least

annually thereafter, and under other conditions **(§§1910.1050(m)(2)(i), (m)(3)(i), and (m)(5))**.

Employers must develop and implement a written plan for each workplace where there is a possibility of an emergency **(§1910.1050(d)(1)(i))**. The plan must cover respiratory protection for employees engaged in correcting emergency conditions, emergency action procedures, and fire prevention elements **(§§1910.1050(d)(1)(ii) and (iii))**.

Employers must post and maintain legible signs for regulated areas and labels on containers of MDA **(§§1910.1050(k)(1)(i) and (ii))**. Employers must provide affected employees with information and training on MDA at the time of initial assignment and at least annually thereafter **(§1910.1050(k)(4)(i))**.

This standard also contains requirements for medical removal and recordkeeping **(§§1910.1050(m)(9)(v) and (n))**.

Hazard Communication

The purpose of the Hazard Communication standard is to ensure that the hazards of all chemicals produced or imported are classified, and that information concerning the classified hazards is transmitted downstream to employers and employees. OSHA has modified its Hazard Communication standard to be consistent with the provisions of the United Nations Globally Harmonized System of Classification and Labeling of Chemicals (GHS), Revision 3. This modification to the standard will internationally harmonize OSHA's classification and hazard communication system, establishing uniform pictograms, hazard phrases, label elements, and safety data sheets. This update to the Hazard Communication standard will improve the quality and consistency of information, enhance the effectiveness of hazard communication, ensure that employees are apprised of the chemical hazards to which they may be exposed, and reduce the incidence of chemical-related occupational illnesses and injuries.

Hazard Communication requires chemical manufacturers and importers to evaluate the chemicals they produce or import, and provide hazard information to downstream employers and employees. This transmittal of information is to be accomplished

by means of labeling and safety data sheets **(§§1910.1200(f)(1) and (g)(1))**. Label elements, such as signal words, hazard statements, and pictograms have been harmonized, and assigned to each hazard class and category.

In order to classify chemical hazards, the importer or manufacturer is provided with specific criteria and detailed instructions for hazard evaluation and determinations. Additionally, mandatory Appendices A and B provide classification guidance for Health Hazards and Physical Hazards, respectively **(§1910.1200(d)(1))**. Once a chemical has been classified, the label/safety data sheet preparer can obtain the relevant harmonized information from the Appendixes of the standard.

Chemical manufacturers, importers, or distributors must ensure that each container of classified hazardous chemicals leaving the workplace is labeled, tagged, or marked with the following information: a product identifier, signal words, hazard statements, pictograms, precautionary statements, and the name, address, and telephone number of the chemical manufacturer, importer, or other responsible party **(§1910.1200(f)(1))**. Chemical manufacturers or importers must ensure that distributors and employers are provided an appropriate safety data sheet with their initial shipment, and with the first shipment after a safety data sheet is updated **(§1910.1200(g)(6)(i))**. The employer must maintain, in the workplace, copies of the required safety data sheets for each hazardous chemical and must ensure that they are readily accessible during each work shift to employees when they are in their work areas **(§1910.1200(g)(8))**.

Employers must develop, implement, and maintain at each workplace a written, comprehensive hazard communication program which at least describes how the criteria for labels and other forms of warnings, safety data sheets, and employee information and training will be met, and which also includes a list of the hazardous chemicals known to be present using a product identifier that is referenced on the appropriate safety data sheet (the list may be compiled for the workplace as a whole or for individual work areas); and, the methods the employer will use to inform employees of the hazards of non-routine tasks (for example, the cleaning of reactor vessels), and the hazards associated

with chemicals contained in unlabeled pipes in their work areas **(§§1910.1200(e)(1)(i) and (e)(1)(ii))**.

Employers are required to provide effective information and train employees on the hazards of the hazardous chemicals in the work area. At a minimum, employee training must include: methods and observations that may be used to detect the presence or release of a hazardous chemical in the work area (such as monitoring conducted by the employer, continuous monitoring devices, visual appearance or odor of hazardous chemicals when being released); the physical and health hazards of the chemicals in the work area; the measures employees can take to protect themselves from these hazards, including specific procedures the employer has implemented to protect employees from exposure to hazardous chemicals, such as appropriate work practices, emergency procedures, and personal protective equipment to be used; and the details of the hazard communication program developed by the employer, including an explanation of the labels received on shipped containers and the workplace labeling system used by their employer; the safety data sheet, including the order of information and how employees can obtain and use the appropriate hazard information **(§§1910.1200(h)(3)(i) through (iv))**.

Exposure to Hazardous Chemicals in Laboratories

The requirements in 29 CFR 1910.1450 apply to all employers engaged in the laboratory use of hazardous chemicals **(§1910.1450(a)(1))**. "Laboratory use of hazardous chemicals" is defined as the handling or use of hazardous chemicals in which all of the following conditions are met: (i) chemical manipulations are carried out on a "laboratory scale"; (ii) multiple chemical procedures or chemicals are used; (iii) the procedures involved are not part of a production process, nor in any way simulate a production process; and (iv) "protective laboratory practices and equipment" are available and in common use to minimize the potential for employee exposure to hazardous chemicals **(§1910.1450(b))**.

For laboratory uses of OSHA regulated substances, the employer must assure that laboratory employees' exposures to such substances do not exceed the permissible exposure limits specified in 29 CFR part 1910, subpart Z **(§1910.1450(c))**.

Where there is reason to believe that exposure levels of a hazardous substance routinely exceed the action level (or in the absence of an action level, the PEL), employers must conduct initial monitoring to measure each employee's exposure **(§1910.1450(d)(1))**.

If the initial monitoring discloses employee exposure over the action level (or in the absence of an action level, the PEL), the employer must immediately comply with the exposure monitoring requirements of the relevant standard **(§1910.1450(d)(2))**. Termination of monitoring of the particular hazardous substance, requiring periodic monitoring, may only be determined in accord with the requirements under the relevant standard **(§1910.1450(d)(3))**. Within 15 days of receipt of any monitoring results, the employer must notify affected employees of the results in writing either individually or by posting results in an appropriate location that is accessible to employees **(§1910.1450(d)(4))**.

Where hazardous chemicals are used in the workplace (laboratory), the employer must develop a written Chemical Hygiene Plan and carry out its provisions **(§1910.1450(e)(1))**. This plan must be made readily available to employees and their representatives, as well as be capable of protecting employees from health hazards associated with the hazardous chemicals in that laboratory and keeping exposures below the permissible exposure limits specified in 29 CFR part 1910, subpart Z **(§§1910.1450(e)(1)(i) and (ii), and (e)(2))**.

Ionizing Radiation

Employers must be responsible for proper controls to prevent any employee from being exposed to ionizing radiation in excess of acceptable limits **(§1910.1096(c)(1))**. No employer may possess, use, or transfer sources of ionizing radiation in such a manner as to cause any individual to receive a dose in excess of those in Table G-18, below, **(§1910.1096(b)(1))**, with the exception that an employer may permit an individual to receive doses to the whole body greater than those permitted so long as: (1) During the calendar quarter[4] the dose to the whole body must not exceed 3 rems; (2) the dose to the whole body, when added to the accumulated

[4] Calendar quarter means any 3-month period determined as per §1910.1096(b)(4).

occupational dose must not exceed 5 (N-18) rems, where "N" equals the individual's age in years at his/her last birthday; and (3) the employer maintains adequate past and current exposure records **(§§1910.1096(b)(2)(i) through (iii))**.

Each radiation area must be conspicuously posted with appropriate signs and/or barriers **(§1910.1096(e))**.

Employers must maintain records of the radiation exposure to all employees for whom personnel monitoring is required **(§§1910.1096(b)(2)(iii) and (n)(1))**.

Table G-18

	Rems[5] per calendar quarter
Whole body: Head and trunk; active blood-forming organs; lens of eyes; or gonads	1.25
Hands and forearms; feet and ankles	18.75
Skin of whole body	7.5

DOT Markings, Placards and Labels

Employers who receive shipments of hazardous materials that are required to be marked, placarded or labeled in accord with the U.S. Department of Transportation (DOT) Hazardous Materials Regulations (49 CFR Parts 171 through 180) must retain such warnings on the packaging and transport until the hazardous materials are removed **(§1910.1201(a))**.

Other shipments received by freight container, rail freight car, motor vehicle, or transport vehicle that are required to be marked or placarded in accord with the DOT Hazardous Materials Regulations must retain those markings and placards on the freight container, rail freight car, motor vehicle or transport vehicle until the hazardous materials are sufficiently removed **(§1910.1201(b))**.

[5] Rem is a measure of the dose of any ionizing radiation to body tissue in terms of its estimated biological effect relative to a dose of 1 roentgen (r) of x-rays (1 millirem [mrem] = 0.001 rem). The relation of the rem to other dose units depends on the biological effect under consideration and upon the conditions for irradiation.

Personal Protective Equipment

Proper protective equipment, including personal protective equipment (PPE) for eyes, face, head, and extremities, protective clothing, respiratory devices, hearing protection, and protective shields and barriers, must be provided, used, and maintained in a sanitary and reliable condition whenever there is a hazard from processes or environment, chemical hazards, radiological hazards, or mechanical irritants that may cause injury or illness to employees through absorption, inhalation, or physical contact **(§1910.132(a))**.

The above mentioned PPE, including their replacement, must be provided at no cost to the employee **(§§1910.132(h)(1) and (h)(5))**. However, employer-required payment does not apply to non-specialty safety-toe protective footwear (including steel-toe shoes or steel-toe boots) and non-specialty prescription safety eyewear, provided that the employer permits such items to be worn off the job-site **(§1910.132(h)(2))**.

Where employees provide their own protective equipment, the employer is responsible for assuring its adequacy, proper maintenance, and sanitation **(§1910.132(b))**.

On occasions where the employer provides metatarsal guards and allows the employee, at his or her request, to use shoes or boots with built-in metatarsal protection, the employer is not required to reimburse the employee for the shoes or boots **(§1910.132(h)(3))**. In addition, employers are not required to pay for: logging boots required by **§1910.266(d)(1)(v)**; everyday clothing, such as long-sleeve shirts, long pants, street shoes, and normal work boots; or ordinary clothing, skin creams, or other items used solely for protection from weather, such as winter coats, jackets, gloves, parkas, rubber boots, hats, raincoats, ordinary sunglasses, and sunscreen **(§1910.132(h)(4))**.

The employer must assess the workplace to determine if hazards are present, or are likely to be present, which necessitate the use of personal protective equipment (head, eye, face, foot, hand, or respiratory protection). If such hazards are present, or are likely to be present, the employer must select and have employees use the type(s) of personal protective equipment (PPE) that will protect them from the hazards identified in the hazard assessment. Employers must also communicate the selection decisions to

employees, and ensure that the PPE chosen for them properly fits **(§1910.132(d))**.

The employer must provide training to each employee who is required to use PPE, so they know at least the following: when PPE is necessary; what PPE is necessary; how to properly don (put on), doff (take off), adjust, and wear PPE; the limitations of the PPE; and the proper care, maintenance, useful life, and disposal of PPE **(§1910.132(f))**.

Eye and Face Protection

Employers must ensure that each affected employee uses appropriate eye or face protection when exposed to eye or face hazards from flying particles, molten metal, liquid chemicals, acids or caustic liquids, chemical gases or vapors, or potentially injurious light radiation **(§1910.133(a)(1))**.

Protective eye and face protection devices must comply with any of the following consensus standards:

- ANSI Z87.1-2003, "American National Standard Practice for Occupational and Educational Eye and Face Protection" **(§1910.133(b)(1)(i))**,
- ANSI Z87.1-1989 (R-1998), "American National Standard Practice for Occupational and Educational Eye and Face Protection" **(§1910.133(b)(1)(ii))**, or
- ANSI Z87.1-1989, "American National Standard Practice for Occupational and Educational Eye and Face Protection" **(§1910.133(b)(1)(iii))**.

Protective eye and face protection devices that the employer demonstrates are at least as effective as protective eye and face protection devices that are constructed in accord with one of the above consensus standards will be deemed to be in compliance with the requirements of this section **(§1910.133(b)(2))**.

Eyewash/Drench Shower
Suitable facilities for quick drenching or flushing of the eyes and body must be provided within the work area for immediate emergency use if there is a possibility that an employee might be exposed to injurious, corrosive materials **(§1910.151(c))**.

Foot Protection

Foot protective equipment must be worn when working in areas where there is a danger of foot injuries due to falling or rolling objects or objects piercing the sole, and where employees' feet are exposed to electrical hazards **(§1910.136(a)).** Protective footwear must comply with any of the following consensus standards:

- ASTM F-2412-2005, "Standard Test Methods for Foot Protection," and ASTM F-2413-2005, "Standard Specification for Performance Requirements for Protective Footwear" **(§1910.136(b)(1)(i))**;
- ANSI Z41-1999, "American National Standard for Personal Protection – Protective Footwear" **(§1910.136(b)(1)(ii))**; or
- ANSI Z41-1991, "American National Standard for Personal Protection – Protective Footwear" **(§1910.136(b)(1)(iii))**.

In the logging industry, employers must assure that each employee wears foot protection, such as heavy-duty logging boots that are waterproof or water repellent that covers and provides support to the ankle. The employer must assure that each employee who operates a chain saw wears foot protection that is constructed with cut-resistant material which will protect the employee against contact with a running chain saw. Sharp, calk-soled boots or other slip-resistant type boots may be worn where the employer demonstrates that they are necessary for the employee's job, the terrain, the timber type, and the weather conditions, provided that foot protection otherwise required by this paragraph is met **(§1910.266(d)(1)(v))**.

Electrically conductive shoes should be considered as a required, supplementary form of protection for work activities in which there is a danger of fire or explosion from the discharge of static electricity. Electrical-hazard or dielectric (nonconductive) footwear should be considered as a required, supplementary form of protection when an employee standing on the ground is exposed to hazardous step or touch potential (the difference in electrical potential between the feet or between the hands and feet). Such footwear should also be worn when primary forms of electrical protective equipment, such as rubber insulating gloves and blankets, do not provide complete protection for an employee standing on the ground.

Head Protection

Head protection equipment, such as helmets and hard hats must be worn when there is a possible danger of head injuries from impact, flying or falling objects, or electrical shock and burns **(§§1910.135(a)(1) and (a)(2))**.

Head protection must comply with any of the following consensus standards:

- ANSI Z89.1-2009, "American National Standard for Industrial Head Protection" **(§1910.135(b)(1)(i))**;
- ANSI Z89.1-2003, "American National Standard for Industrial Head Protection" **(§1910.135(b)(1)(ii))**; or
- ANSI Z89.1-1997, "American National Standard for Personnel Protection – Protective Headwear for Industrial Workers – Requirements" **(§1910.135(b)(1)(iii))**.

Head protection devices that the employer demonstrates are at least as effective as head protection devices that are constructed in accord with one of the above consensus standards will be deemed to be in compliance with the requirements of this section **(§1910.135(b)(2))**.

Respiratory Protection

Suitable respirators selected on the basis of the hazard to which the worker is exposed must be provided by the employer as necessary to protect the health of the workers **(§1910.134(a)(2))**.

Where respirators are required, the employer must establish and maintain a respiratory protection program. The program must be regularly evaluated to determine its continued effectiveness **(§§1910.134(a)(2) and (c)(1))**.

The employer must include in the program, as applicable, the procedures for selecting respirators for use in the workplace; medical evaluations of employees required to use respirators; fit testing procedures for tight-fitting respirators; procedures for proper use of respirators in routine and reasonably foreseeable emergency situations; procedures and schedules for cleaning, disinfecting, storing, inspecting, repairing, discarding, and otherwise maintaining respirators; procedures to ensure adequate

air quality, quantity, and flow of breathing air for atmosphere-supplying respirators; training of employees in the respiratory hazards to which they are potentially exposed during routine and emergency situations; training of employees in the proper use of respirators, including putting on and removing them, any limitations on their use, and their maintenance; and procedures for regularly evaluating the effectiveness of the program **(§§1910.134(c)(1)(i) through (1)(ix))**.

Employers must provide each respirator user with a respirator that is clean, sanitary, and in good working order. Respirators must be cleaned and disinfected as often as necessary to be maintained in a sanitary condition **(§1910.134(h)(1)(i))**.

All respirators must be stored to protect them from damage, contamination, dust, sunlight, extreme temperatures, excessive moisture, and damaging chemicals, and they must be packed or stored to prevent deformation of the facepiece and exhalation valve **(§1910.134(h)(2)(i))**.

The employer must ensure that (1) all respirators used in routine situations must be inspected before each use and during cleaning **(§§1910.134(h)(3)(i)(A))**, and (2) all respirators maintained for use in emergency situations must be inspected at least monthly and in accord with the manufacturer's recommendations, and must be checked for proper function before and after each use **(§1910.134(h)(3)(i)(B))**.

When inspecting respirators, the employer must ensure that the equipment is checked for function, tightness of connections, and the condition of the various parts including, but not limited to, the facepiece, head straps, valves, connecting tube, and cartridges, canisters or filters; that there are not any signs of deterioration; and that the elastomeric parts are still pliable **(§§1910.134(h)(3)(ii)(A) and (B))**.

Employers must provide effective training to employees who are required to use respirators. The training must be comprehensive, understandable, and recur annually and more often if necessary **(§1910.134(k))**.

From the training received, employees must be able to demonstrate knowledge of at least the following: why the respirator is necessary

and how improper fit, usage, or maintenance can compromise the protective effect of the respirator; what the limitations and capabilities of the respirator are; how to use the respirator effectively in emergency situations, including situations in which the respirator malfunctions; how to inspect, put on and remove, use, and check the seals of the respirator; what the procedures are for maintenance and storage of the respirator; how to recognize medical signs and symptoms that may limit or prevent the effective use of respirators; and the general requirements of the OSHA Respiratory Protection standard **(§§1910.134(k)(1)(i) through (vii))**.

Training must be provided to employees before requiring them to use a respirator in the workplace and must be conducted in a manner that is understandable to them **(§§1910.134(k)(2) and (3))**.

Fall Protection

Employees on working platforms must be protected by a personal fall arrest system **(§1910.66(j))**. All fall arrest system connectors must be drop forged, constructed with pressed or formed steel, or equivalent materials. Connectors must also have a corrosion-resistant finish, and all surfaces and edges must be smooth to prevent damage to interfacing parts of the system **(§1910.66, Appendix C, paragraph d)**.

OSHA standards **(§1910.66, Appendix C, paragraphs (c)(1) through (c)(11))** also require that:

- Lanyards and vertical lifelines have a minimum breaking strength of 5,000 pounds (22.2 kN);
- Self-retracting lifelines and lanyards that automatically limit free fall distance to two feet (0.61 m) or less have components capable of sustaining a minimum static tensile load of 3,000 pounds (13.3 kN) applied to the device when fully extended;
- Self-retracting lifelines and lanyards that do not limit free fall distance, ripstitch lanyards, and tearing and deforming lanyards be capable of sustaining a minimum tensile load of 5,000 pounds (22.2 kN) applied to the device when fully extended;
- Dee-rings and snap-hooks be capable of sustaining a minimum tensile load of 5,000 pounds (22.2 kN), in addition to being 100 percent proof-tested to a minimum tensile load of 3,600

pounds (16 kN) without cracking, breaking, or taking permanent deformation;

- Snap-hooks be sized to avoid unintentional disengagement due to depression, or be of locking type to prevent disengagement;
- Horizontal lifelines, where used, be designed, and installed as part of a complete personal fall arrest system, with a safety factor of at least two, under the supervision of a qualified person; anchorages be capable of supporting at least 5,000 pounds (22.2 kN) per employee attached, or designed, installed, and used as part of a complete personal fall arrest system, with a safety factor of at least two, under the supervision of a qualified person; and
- Ropes and straps (webbing) used in lanyards, lifelines, and strength components of body harnesses, be made from synthetic fibers or wire rope.

Personal fall arrest systems must be rigged so that an employee can neither free fall more than six feet (1.8 m), nor contact any lower level **(§1910.66, Appendix C, paragraph (e)(3))**. When stopping a fall, personal fall arrest systems must be capable of: limiting the maximum arresting force to 1,800 pounds (8 kN); bringing a worker to a complete stop and limit their maximum deceleration distance traveled to 3.5 feet (1.07 m); and having sufficient strength to withstand twice the potential impact energy of the worker **(§1910.66 Appendix C, paragraph (d))**.

Care must be taken to ensure that equipment is appropriately rigged to avoid disengagement. Snap-hooks, unless of a locking type, must not be directly attached to webbing, rope or wire rope; another snap-hook; a dee-ring with another snap-hook or other connector attached; a horizontal lifeline; or any other incompatible object with that could cause the snap-hook to depress and release itself **(§1910.66, Appendix C, paragraph (e))**.

Equipment/components used for personal fall arrest systems must only be used for the purpose of employee fall protection **(§1910.66, Appendix C, paragraph (e)(6))**. Such systems must be inspected prior to each use for mildew, wear, damage and other deterioration, and defective components must be removed from service if their strength or function may be adversely affected **(§1910.66, Appendix**

C, paragraph (f)). Further, any personal fall arrest systems or components subjected to impact loading must be immediately removed from service and never used again for employee fall protection, unless inspected and determined by a competent person to be undamaged and suitable for reuse **(§1910.66, Appendix C, paragraph (e)(7))**.

Before using a personal fall arrest system and after any component or system is changed, employees must be trained in the recognition of, and preventive measures for, the safety hazards associated with their individual work tasks; general recognition and prevention of safety hazards associated with the use of working platforms; emergency action plan procedures; work procedures; and personal fall arrest system inspection, care, use and system performance **(§1910.66, Appendix C, paragraphs (i)(1)(ii)(A) through (E), and (e)(9))**.

Medical Services

Medical Records and Employee Exposure Records

Employers must, upon request, make sure that each employee or their designated representative has access to their exposure records **(§1910.1020(e)(2)(i)(A))**. Upon an employee's first entering into employment, and at least annually thereafter, each employer must inform employees of the existence, location, and availability of their medical records; the person responsible for maintaining and providing access to their records; and their right of access to these records **(§§1910.1020(g)(1)(i) through (iii))**.

Medical Services and First Aid

The employer must ensure the ready availability of medical personnel for advice and consultation on matters of occupational health **(§1910.151(a))**.

When a medical facility for treatment of injured employees is not available in near proximity to the workplace, a person or persons must be adequately trained to render first aid. First-aid supplies must be well maintained and readily available for use by trained first-aid personnel **(§1910.151(b))**.

Fire Protection

Only approved portable fire extinguishers must be used **(§1910.157(c)(2))**. If portable fire extinguishers are provided for employee use, the employer must mount, locate, and identify them so they are readily accessible to employees without subjecting the employees to possible injury. These fire extinguishers must be maintained in a fully charged and operable condition and kept in their designated places at all times except during use **(§1910.157(c))**.

Employers must ensure that the appropriate types of portable fire extinguishers are selected and appropriately distributed in the workplace **(§1910.36(d))**. Extinguishers must also be visually checked monthly, maintenance checked annually, and hydrostatically tested at the intervals indicated **(§1910.157(e) and (f))**.

Where the employer has provided portable fire extinguishers for employee use in the workplace, the employer also must provide educational and training programs to familiarize employees with the general principles of fire extinguisher use and the hazards involved with incipient stage firefighting **(§1910.157(g)(1))**.

Welding, Cutting and Brazing

Welding General Requirements

Arc welding cables with damaged insulation or exposed, bare conductors must be replaced **(§1910.254(d)(9)(iii))**.

For special considerations when welding operations require fluxes, coverings, coatings, or alloys involving fluorine compounds, zinc, lead, beryllium, cadmium, or mercury, employers should refer to **§§1910.252(c)(5) through (12)**.

Mechanical ventilation must be provided when welding or cutting is performed either:

- In a space of less than 10,000 cubic feet (284 cubic meters) per welder **(§1910.252(c)(2)(i)(A))**;
- In a room having a ceiling height of less than 16 feet (5 m) **(§1910.252(c)(2)(i)(B))**; or
- In confined spaces or where the welding space contains

partitions, balconies, or other structural barriers to the extent that they significantly obstruct cross ventilation **(§1910.252(c)(2)(i)(C))**.

Proper shielding and eye protection to prevent exposure of personnel from welding hazards must be provided **(§§1910.252(b)(2)(i)(B) through (D) and (F) through (H))**.

Where the work permits, the welder should be enclosed in an individual booth painted with a finish of low reflectivity such as zinc oxide (an important factor for absorbing ultraviolet radiations) and lamp black, or must be enclosed with noncombustible screens similarly painted. Booths and screens must permit circulation of air at floor level. Workers or other persons adjacent to the welding areas must be protected from the rays by noncombustible or flameproof screens or shields or must be required to wear appropriate goggles **(§1910.252(b)(2)(iii))**.

Proper precautions (isolating welding and cutting, removing fire hazards and combustibles, and providing a fire watch) for fire prevention must be taken in areas where welding or other "hot work" is being done **(§1910.252(a))**.

Welding in Confined Spaces

All welding and cutting operations that are performed in confined spaces (such as a tank, boiler, or a pressure vessel) must be adequately ventilated to prevent the accumulation of toxic materials or possible oxygen deficiency **(§1910.252(c)(4)(i))**.

In such circumstances where it is impossible to provide such ventilation, airline respirators approved by the National Institute for Occupational Safety and Health (NIOSH) for this purpose must be used **(§1910.252(c)(4)(ii))**.

In areas immediately hazardous to life, full-facepiece, pressure-demand, self-contained breathing apparatus or a combination full-facepiece, pressure-demand supplied-air respirator with an auxiliary, self-contained air supply must be used. The breathing equipment must be approved by NIOSH under 42 CFR part 84 **(§1910.252(c)(4)(iii))**.

Where welding operations are performed in confined spaces and where welders and helpers are provided with airline respirators or self-contained breathing equipment, a worker must be stationed on

the outside of such confined spaces to ensure the safety of those working within **(§1910.146(d)(6) and §1910.252(c)(4)(iv))**.

Oxygen must never be used for ventilation **(§1910.252(c)(4)(v))**.

Materials Handling and Storage

Chains, Cables, Ropes and Hooks

Hooks and chains used with overhead or gantry cranes must be visually inspected daily. Monthly inspections must be done with a certification record, dated, and signed by the inspector and kept on file readily available to appointed personnel. Running ropes must be thoroughly inspected at least monthly and a certification record kept on file and readily available to appointed personnel. A certification record must include: the date of inspection, the signature of the person who performed the inspection, and the serial number, or other identifier **(§§1910.179(j)(1)(ii)(a) and (b), (j)(2), and (m)(1))**. All U-bolt clips on hoist ropes on overhead and gantry cranes must be installed so that the U-bolt is in contact with the dead end (short or nonload carrying end) of the rope. Clips must be installed in accord with the clip manufacturer's recommendation. All nuts on newly installed clips must be tightened after 1 hour of use **(§1910.179(h)(2)(v))**.

Hoist ropes on crawler, locomotive, and truck cranes must be free from kinks or twists and must not be wrapped around the load **(§§1910.180(h)(2)(i) and (h)(3)(ii)(a))**.

Slings and their fastenings and attachments must be inspected daily before use. Damaged or defective slings must be immediately removed from service **(§1910.184(d))**.

Hooks that have been opened more than 15 percent of the normal throat opening measured at the narrowest point or hooks that are twisted more than 10 degrees out of alignment are to be evaluated before use to determine if they are safe for the intended load **(§1910.180(d)(3)(v) and §1910.184(e)(9)(ii))**.

Cranes (Overhead and Mobile), Hoists and Derricks

All functional operating mechanisms, air and hydraulic systems, chains, ropes, slings, hooks, and other lifting equipment must

be visually inspected daily **(§1910.179(j)(2), §1910.180(d)(3), and §1910.184(d))**.

Complete inspection of the crane must be performed at 1-month to 12-month intervals depending on its activity, severity of service, and environmental conditions. The inspection must include the following areas: identification of deformed, cracked, corroded, worn, or loose members or parts; the brake system; limit indicators (wind, load); power plant, and electrical apparatus **(§1910.179(j)(3), §1910.180(d)(4), and §1910.181(d)(3)(i))**.

Unsafe conditions disclosed by the inspection requirements must be corrected before the operation is resumed and the crane must not be operated until all guards have been reinstalled **(§1910.179(l)(3)(i), §1910.180(f), and §1910.181(f)(3)(i))**.

Overhead cranes must have stops at the limits of travel of the trolley. Bridge and trolley bumpers or equivalent automatic devices must be provided. Bridge trucks must have tail sweeps **(§§1910.179(e)(1) through (4))**.

The rated load of the crane must be plainly marked on each side of the crane, and if the crane has more than one hoisting unit, each hoist must have its rated load marked on it or its load block, and this marking must be clearly legible from the ground or floor **(§1910.179(b)(5))**.

Pendant control boxes must be clearly marked for identification of functions **(§1910.179(g)(1)(v))**.

There must be no hoisting, lowering, or traveling while any employee is on the load or hook **(§1910.179(n)(3)(v), §1910.180(h)(3)(v), and §1910.181(i)(3)(v))**.

Storage

All stored materials (containers, bags, bundles, etc.) stacked in tiers must be stacked, blocked, interlocked, and limited in height so that they are secure against sliding or collapse **(§1910.176(b))**. Storage areas must be kept free from accumulation of materials that constitute hazards from tripping, fire, explosion or pest harborage. Vegetation control will be exercised when necessary **(§1910.176(c))**. Where mechanical handling equipment is used, sufficient safe clearance must be allowed for aisles, at loading docks, through

doorways, and whenever turns or passage must be made. Aisles and passageways must be kept clear and in good repair, with no obstruction across or in aisles that could create a hazard. Permanent aisles and passageways must be appropriately marked **(§1910.176(a))**.

Hazardous Equipment and Machinery

Air Receivers

All new air receivers installed must be designed and constructed to meet the standards of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section VIII, 1968 **(§1910.169(a)(2)(i))**.

Drain pipes and valves must be installed at the lowest point of every air receiver to provide for the removal of accumulated oil and water, which must be done frequently and at such intervals as to prevent the accumulation of excessive amounts of liquid in the receiver. Adequate automatic traps may be installed in addition to drain valves **(§1910.169(b)(2))**.

All air receivers must be equipped with an indicating pressure gauge (so located as to be readily visible) and with one or more spring-loaded safety valve(s) **(§1910.169(b)(3)(i))**. All safety valves must be tested frequently and at regular intervals to determine whether they are in good operating condition **(§1910.169(b)(3)(iv))**.

Belt Sanding Machines

Belt sanding machines used for woodworking must be provided with guards at each nip point where the sanding belt runs on to a pulley. These guards must effectively prevent the operator's hands and fingers from coming into contact with the nip points. Also, the unused run of the sanding belt must be guarded to prevent accidental contact **(§1910.213(p)(4))**.

Use of Compressed Air

Compressed air must not be used for cleaning purposes unless the pressure does not exceed 30 pounds (13.5 kilograms) per square

inch (6.5 square centimeters) when the nozzle end is obstructed or dead-ended, and then only with effective chip guarding and personal protective equipment **(§1910.242(b))**.

Fan Blades

When the periphery of the blades of a fan is less than 7 feet (2.1 meters) above the floor or working level, the blades must be guarded. The guard must have openings no larger than 1/2 inch (12.7 millimeters) **(§1910.212(a)(5))**.

Forklift Trucks (Powered Industrial Trucks)

If at any time a powered industrial truck is found to be in need of repair, defective, or in any way unsafe, the truck must be taken out of service until it has been restored to safe operating condition **(§1910.178(p)(1))**.

High Lift Rider trucks must be equipped with substantial overhead guards unless operating conditions do not permit **(§1910.178(e)(1))**.

Forklift trucks must be equipped with vertical-load, backrest extensions when the types of loads present a hazard to the operators **(§1910.178(e)(2))**.

The brakes of trucks must be set and wheel blocks (i.e., chocks) must be placed under the rear wheels to prevent the movement of trucks, trailers, or railroad cars while loading or unloading **(§1910.178(m)(7))**.

Only a trained and authorized operator must be permitted to operate a powered industrial truck. Methods must be devised to train operators in the safe operation of powered industrial trucks **(§1910.178(l))**. Further, workers under 18 years of age are not permitted to operate forklift trucks or powered industrial trucks **(29 CFR 570.58, Order 7)**. For more information on youth-worker requirements see OSHA Safety and Health Information Bulletin, SHIB 03-09-30.

Hand Tools

Portable electric equipment must be handled in a manner that will not cause damage. When the cord and plug connected tools are relocated they must be visually inspected before use on any shift for external defects (such as loose parts, deformed and missing pins, or damage to outer jacket or insulation) and for evidence of possible internal damage (such as pinched or crushed outer jacket) **(§§1910.334(a)(1) and (a)(2))**.

Each employer must be responsible for the safe condition of tools and equipment used by employees, including tools and equipment which may be furnished by employees **(§1910.242(a))**.

Portable electrical tools and equipment, except when UL approved double insulated construction (and distinctively marked as such), must be properly grounded **(§1910.304(g)(6)(vii)(B))**.

All hand tools must be kept in a serviceable condition. Handles and guards of tools must be kept tight in the tool and wooden handles must be free of splinters and sharp edges. Heads of shock, impact-driven and driving tools must be properly shaped, free of mushroomed heads, and are sufficiently sharp. If the cutting edge of a tool becomes dull, it must be sharpened in accord with manufacturer's specifications. When the head of any shock, impact-driven or driving tool begins to chip, it must be repaired or removed from service **(§1910.266(e)(1))**.

All non-current-carrying metal parts of portable equipment and fixed equipment including their associated fences, housings, enclosures, and supporting structures must be grounded **(§§1910.304(g)(6)(vi), (g)(6)(vii), and (g)(8)(i))**.

For construction-like activities, any 125-volt, single-phase, portable electric tool or equipment and its associated extension cord set that is connected to a 15-, 20-, or 30-ampre outlet must be protected by a ground-fault circuit interrupter **(§1910.304(b)(3)(ii)(A))**.

Machine Guarding

Machine guarding must be provided to protect the operator and other employees in the machine area from hazards such as those created by point of operation, ingoing nip points, rotating parts,

flying chips, and sparks. The guard must be such that it does not pose an accident hazard in itself. Some examples of guarding methods include barrier guards, two-hand tripping devices, and electronic safety devices **(§§1910.212(a)(1) and (2))**.

The point of operation of machines whose operation exposes an employee to injury must be guarded. The guarding device must be so designed as to prevent the operator from having any part of his body in the danger zone during the operating cycle **(§1910.212(a)(3)(ii))**. Special handtools for placing and removing material must permit easy handling of material without the operator placing a hand in the danger zone. However, such tools must only be used to supplement protection provided and not replace the use of other required guarding as listed above **(§1910.212(a)(3)(iii))**.

Some of the machines that usually require point of operation guarding are guillotine cutters, shears, alligator shears, power presses, milling machines, power saws, jointers, portable power tools, forming rolls, and calenders **(§§1910.212(a)(3)(iv)(a) through (i))**.

Fixed Machinery

Machines designed for a fixed location must be securely anchored to prevent walking or moving during operation **(§1910.212(b))**.

Mechanical Power Presses

The employer must provide and ensure the usage of point-of-operation guards or properly applied and adjusted point-of-operation devices to prevent entry of hands or fingers into the point of operation by reaching through, over, under, and around the guard on every operation performed on a mechanical power press. This requirement does not apply when the point-of-operation opening is 1/4 inch (6 mm) or less **(§§1910.217(c)(1)(i) and (ii), and (c)(2)(i)(a))**. A point-of-operation guard must also be designed, constructed, and adjusted so that no pinch points between the guard and moving machine parts are created; the possibility of misuse or removal of essential parts is minimized through the utilization of fasteners not readily removable by operator; maximum visibility of the point of operation is provided; and easy

inspection can be performed **(§§1910.217(c)(2)(i) and (c)(2)(i)(c) through (f))**.

Hand and foot operations must be provided with guards to prevent inadvertent activation of the press **(§§1910.217(b)(4)(i) and (b)(5)(i) through (ii))**.

The employer must provide and enforce the use of safety blocks whenever dies are being adjusted or repaired in the press. Brushes, swabs, lubricating rolls, and automatic or manual pressure guns, or other tools must be provided for lubrication so that operators and diesetters must not be required to reach into the point of operation or other hazard areas **(§§1910.217(d)(9)(iv) and (v))**.

Presence sensing devices must only be used for normal production operations. Operations that involve full revolution mechanical power presses; mechanical power presses configured so that a person could enter, pass through, and become clear of the sensing field; and die-setting and maintenance procedures must not be done in the presence sensing device initiation (PSDI) mode **(§1910.217(h))**.

Machines using full revolution clutches must incorporate a single-stroke mechanism. If the single-stroke mechanism is dependent upon spring action, the spring(s) must be of the compression type, operating on a rod or guided within a hole or tube, and designed to prevent interleaving of the spring coils in event of breakage **(§§1910.217(b)(3)(i) and (ii))**.

A main disconnect switch capable of being locked in the OFF position must be provided with every power press control system **(§1910.217(b)(8)(i))**.

To ensure safe operating conditions and to maintain a record of inspections and maintenance work, the employer must establish a program of periodic and regular inspections of power presses to ensure the safe operating condition and adjustment of all their parts, auxiliary equipment, and safeguards. The employer must maintain a certification record of inspections that includes the date of inspection, the signature of the person who performed the inspection, and the serial number, or other identifier, of the power press that was inspected **(§1910.217(e)(1)(i))**.

Portable Power Tools (Pneumatic)

For portable tools, a tool retainer must be installed on each piece of utilization equipment which, without such a retainer, may eject the tool **(§1910.243(b)(1))**.

Hose and hose connections used for conducting compressed air to utilization equipment must be designed for the pressure and service to which they are subjected **(§1910.243(b)(2))**.

Power Transmission Equipment Guarding

All belts, pulleys, sprockets and chains, flywheels, shafting and shaft projections, clutches, and couplings, or other rotating or reciprocating parts, or any portion thereof, within 7 feet (2.1 meters) of the floor or working platform must be effectively guarded **(§§1910.219(b)(1), (c)(2)(i), (c)(3), (d)(1), (e)(1)(i), (e)(2)(i), (e)(2)(ii), (f)(3), and (k)(1))**.

Under standard conditions, guards must be manufactured of the following materials: expanded metal, perforated or solid sheet metal, wire mesh on a frame of angle iron, or iron pipe securely fastened to the floor or to the frame of machine **(§1910.219(m)(1)(i))**. All metal should be free from burrs and sharp edges **(§1910.219(m)(1)(ii))**.

All guards must be rigidly braced every 3 feet or fractional part of their height to some fixed part of machinery or building structure. Where a guard is exposed to contact with moving equipment, additional strength may be necessary **(§1910.219(o)(1)(i)(a))**.

Wood guards may be used in the woodworking and chemical industries, in industries where the presence of fumes or where manufacturing conditions would cause the rapid deterioration of metal guards. Also, wood guards may be used in construction work and in locations outdoors, where extreme cold or extreme heat make metal guards and railings undesirable. In all other industries, wood guards must not be used **(§1910.219(o)(2)(i))**.

All guards for inclined belts must be arranged in such a manner that a minimum clearance of 7 feet (2.1 meters) is maintained between the belt and the floor at any point outside the guard **(§1910.219(e)(3)(ii))**.

Flywheels located so that any part is 7 feet (2.1 meters) or less above the floor or platform must be guarded with an enclosure of sheet, perforated, or expanded metal or woven wire **(§§1910.219(b)(1) and (b)(1)(i))**.

Flywheels protruding through a working floor must be entirely enclosed or surrounded by a guardrail and toeboard **(§1910.219(b)(1)(iii))**.

Where both runs of horizontal belts are 7 feet (2.1 meters) or less from the floor level, the guard must extend to at least 15 inches (37.5 centimeters) above the belt or to a standard height, except that where both runs of a horizontal belt are 42 inches (1.05 meters) or less from the floor, the belt must be fully enclosed **(§1910.219(e)(1)(i))**.

Gears, sprocket wheels, and chains must be guarded, unless they are more than 7 feet (2.1 meters) above the floor, or unless the mesh points are guarded. This requirement does not apply to manually operated sprockets **(§§1910.219(f)(1) through (3))**.

Couplings with bolts, nuts, or set screws extending beyond the flange of the coupling must be guarded by a safety sleeve **(§1910.219(i)(2))**.

Powered Platforms for Building Maintenance

All completed building maintenance equipment installations must be inspected and tested in the field before being placed in service. A similar inspection and test must be made following any major alteration to an existing installation. No hoist must be subjected to a load in excess of 125 percent of its rated load **(§1910.66(g)(1))**.

Structural supports, tie-downs, tie-in guides, anchoring devices, and any affected parts of a building included in the installation must be designed by or under the direction of a registered, professional engineer experienced in such design. Exterior installations must be capable of withstanding prevailing climatic conditions. The building installation must provide safe access to, and egress from, the equipment and sufficient space to conduct necessary maintenance. Affected parts of the building must have the capability of sustaining all the loads imposed by the equipment. The affected parts of the building must be designed to allow the equipment to be used

without exposing employees to a hazardous condition **(§§1910.66(e)(1)(i) through (v))**.

Repairs or major maintenance of those building portions that provide primary support for the suspended equipment must not affect the capability of the building to meet OSHA requirements **(§1910.66(e)(10))**.

The equipment power circuit must be an independent electrical circuit that must remain separate from all other equipment within or on the building, other than power circuits used for hand tools that will be used in conjunction with the equipment. If the building is provided with an emergency power system, the equipment power circuit may also be connected to this system **(§1910.66(e)(11)(iii))**.

Equipment installations must be designed by or under the direction of a registered professional engineer that is experienced in such design. The design must provide for a minimum live load of 250 pounds (113.6 kg.) for each occupant of a suspended or supported platform. Equipment that is exposed to wind when not in service must be designed to withstand forces generated by winds of at least 100 mph (44.7 m/s) at 30 feet (9.2 meters) above grade and when in service able to withstand forces generated by winds of at least 50 mph (22.4 m/s) at all elevations **(§§1910.66(f)(1)(i) through (iv))**.

Each suspended unit component, except suspension ropes and guardrail systems, must be capable of supporting, without failure, at least four times the maximum intended live load applied or transmitted to that component **(§1910.66(f)(5)(i)(A))**.

Portable Circular Saws

All portable, power driven circular saws (except those used for cutting meat) having a blade diameter greater than 2 inches (5 centimeters) must be equipped with guards above and below the base plate or shoe. The upper guards must cover the saw to the depth of the teeth, except for the minimum arc required to permit the base plate to be tilted for bevel cuts. The lower guard must cover the saw to the depth of the teeth, except for the minimum arc required to allow proper retraction and contact with the work. When the tool is withdrawn from the work, the lower guard

must automatically and instantly return to the covering position **(§1910.243(a)(1))**.

All cracked blades must be removed from service **(§1910.243(a)(4))**.

Woodworking Machinery

All woodworking machinery – such as table saws, swing saws, radial saws, band saws, jointers, tenoning machines, boring and mortising machines, shapers, planers, lathes, sanders, veneer cutters, and other miscellaneous woodworking machinery – must be enclosed or guarded, except that part of the blade doing the actual cutting, to protect the operator and other employees from hazards inherent to the operation **(§§1910.213(c) through (r))**.

Power control devices must be provided on each machine to make it possible for the operator to cut off the power to the machine without leaving his/her position at the point of operation. Power controls and operating controls should be located within easy reach of the operator while at his/her regular work location, making it unnecessary for the operator to reach over the cutter to make adjustments. This does not apply to constant pressure controls used only for setup purposes **(§§1910.213(b)(1) and (b)(4))**.

Restarts

In operations where injury to the operator might result if motors were to restart after power failures, provision must be made to prevent machines from automatically restarting upon restoration of power (**§1910.213(b)(3)**).

Band saw blades must be enclosed or guarded except for the working portion of the blade between the bottom of the guide rolls and the table. Band saw wheels must be fully encased. The outside periphery of the enclosure must be solid. The front and back must be either solid or wire mesh or perforated metal **(§1910.213(i)(1))**.

Circular Table Saws

Circular saws must have a hood over the portion of the saw above the table mounted so that the hood will automatically adjust itself to the thickness of and remain in contact with the material being cut (**§§1910.213(c)(1), (d)(1), and (e)(1)**). In addition, circular table saws must be furnished with a spreader to prevent material from squeezing the saw or being thrown back on the operator. The

spreader must be made of hard tempered steel, or its equivalent. The spreader must be attached so that it will remain in true alignment with the saw even when either the saw or table is tilted. The provision of a spreader in connection with grooving, dadoing, or rabbeting is not required. Each circular resaw (other than self-feed saws with a roller or wheel at back of the saw) must be provided with a spreader fastened securely behind the saw. The spreader must be slightly thinner than the saw kerf and slightly thicker than the saw disk (§§1910.213(c)(2) and (e)(2)).

Circular table saws used for ripping must have nonkickback fingers or dogs. **(§1910.213(f)(2))**.

Rip Saws

Rip saws must have a spreader aligned with the blade and must be no thinner than the blade. The provision of a spreader in connection with grooving, dadoing, or rabbeting is not required (§**§1910.213(c)(2) and (e)(2)**).

Rip saws must have nonkickback fingers or dogs **(§1910.213(c)(3))**.

Inverted Swing or Sliding Cut-off Saws

Inverted swing or sliding cut-off saws must be provided with a hood that will cover the part of the saw that protrudes above the top of the table or material being cut **(§1910.213(g)(4))**.

Radial Saws

Radial saws must have an upper guard that completely encloses the upper half of the saw blade. The sides of the lower exposed portion of the blade must be guarded by a device that will automatically adjust to the thickness of and remain in contact with the material being cut **(§1910.213(h)(1))**.

Radial saws used for ripping must have non-kickback fingers or dogs **(§1910.213(h)(2))**.

Radial saws must have an adjustable stop to prevent the forward travel of the blade beyond the position necessary to complete the cut in repetitive operations **(§1910.213(h)(3))**.

Radial saws must be installed so that the cutting head will return to the starting position when released by the operator **(§1910.213(h)(4))**.

Self-feed Circular Saws

Self-feed circular saws, feed rolls and blades must be protected by

a hood or guard to prevent the hand of the operator from coming into contact with the in-running rolls at any point **(§1910.213(f)(1))**.

Swing or Sliding Cut-off Saws

Swing or sliding cut-off saws must be provided with a hood that will completely enclose the upper half of the saw **(§1910.213(g)(1))**. Swing or sliding cut-off saws must be provided with limit stops to prevent the saws from extending beyond the front or back edges of the table **(§1910.213(g)(3))**.

Swing or sliding cut-off saws must be provided with an effective device to return the saw automatically to the back of the table when released at any point of its travel **(§1910.213(g)(2))**.

Abrasive Blasting

Blast cleaning nozzles must be equipped with an operating valve which must be held open manually. A support must be provided on which the nozzle may be mounted when not in use **(§1910.244(b))**.

Blast-cleaning enclosures must be exhaust ventilated in such a way that a continuous inward flow of air will be maintained at all openings in the enclosure during the abrasive blasting operation **(§1910.94(a)(3))**.

Abrasive Grinding

Abrasive wheels must be used only on machines provided with safety guards with the following exceptions:

- Wheels used for internal work while within the work being ground **(§1910.215(a)(1)(i) and §1910.243(c)(1)(i)(a))**;
- Mounted wheels, used in portable operations, 2 inches (5 centimeters) and smaller in diameter **(§1910.215(a)(1)(ii) and §1910.243(c)(1)(i)(b))**; and
- Type 16, 17, 18, 18R, and 19 cones, plugs, and threaded hole pot balls where the work offers protection **(§1910.215(a)(1)(iii) and §1910.243(c)(1)(i)(c))**.

Abrasive wheel safety guards must cover the spindle end, nut, and flange projections. Safety guards must also be mounted so as to

maintain proper alignment with the wheel, and the strength of the fastenings must exceed the strength of the guard, except:

- Safety guards on all operations where the work provides a suitable measure of protection to the operator may be so constructed that the spindle end, nut, and outer flange are exposed **(§1910.215(a)(2)(i) and §1910.243(c)(1)(ii)(b))**;
- Where the nature of the work is such as to entirely cover the side of the wheel, the side covers of the guard may be omitted **(§1910.215(a)(2)(i) and §1910.243(c)(1)(ii)(b))**; and
- The spindle end, nut, and outer flange may be exposed on portable machines designed as portable saws, as well as on other machines designed for, and used with, type 6, 11, 27, and 28 abrasive wheels, cutting off wheels, and tuck pointing wheels **(§1910.215(a)(2)(ii) and §1910.243(c)(1)(ii)(c))**.

Work rests on offhand grinding machines must be used to support the work. They must be of rigid construction and designed to be adjustable to compensate for wheel wear. Work rests must also be kept adjusted closely to the wheel with no more than a 1/8 inch (3.2 millimeters) opening. This will prevent the work from being jammed between the wheel and the rest, which may cause wheel breakage. Further, during any wheel adjustments the wheel must be motionless and wheel rests must be securely clamped after each adjustment **(§1910.215(a)(4))**.

Abrasive wheel safety guards for bench and floor stands and for cylindrical grinders must not expose the grinding wheel periphery for more than 90 degrees or ¼ of the periphery (bench and floor stands) and 180 degrees (cylindrical grinders). The exposure must begin at a point not more than 65 degrees above the horizontal plane of the wheel spindle. The protecting member must be adjustable for variations in wheel size so that the distance between the wheel periphery and adjustable tongue (tongue guard) or end of the peripheral member at the top must never exceed ¼ inch (6 millimeters) **(§§1910.215(b)(3) through (4), and (b)(9))**.

Machines designed for a fixed location must be securely anchored to prevent "walking," or designed in such a manner that prevents movement **(§1910.212(b))**.

Grain Handling Facilities

Entry into Grain Bins

Workers should not enter a grain storage bin unless it is absolutely necessary. If a worker enters a grain storage bin, employers must implement the following hazard control measures:

- De-energize and disconnect, lockout and tag, or block off all mechanical, electrical, hydraulic and pneumatic equipment that presents a danger **(§1910.272(g)(1)(ii))**.
- Prohibit workers from walking down grain and similar practices where walking on grain is intended to make it flow **(§1910.272(g)(1)(iv))**.
- Prohibit and prevent worker entry below a bridging condition, or where grain is built up on the side of the bin **(§1910.272(g)(6))**.
- Train workers at least annually and when changes in job assignment will expose workers to new hazards **(§1910.272(e))**.
- Provide each worker who enters a grain structure and who may be exposed to an engulfment hazard, with a body harness or boatswain's chair. The body harness must have a lifeline that is positioned and is of sufficient length to prevent a worker from sinking further than waist-deep in grain **(§1910.272(g)(2))**.
- Provide workers with rescue equipment, such as winch systems, that are specifically suited for bin rescue **(§1910.272(g)(4))**.
- Station an observer who is equipped to provide assistance and perform rescue operations outside the bin (**§1910.272(g)(3))**.
- Ensure that communications (visual, voice or signal line) are maintained between the observer and the workers who entered the bin **(§1910.272(g)(3))**.
- Test the air within a bin for oxygen content and the presence of hazardous gases (when there is a reason to believe they may be present) before entry **(§1910.272(g)(1)(iii))**.
- Provide and continue ventilation until any unsafe atmospheric conditions are eliminated. If toxicity or oxygen deficiency cannot be eliminated, workers must be provided with and wear appropriate respirators **(§1910.272(g)(1)(iii)(A) and (B))**.

- Issue a permit each time a worker enters a bin, unless the employer is present during the entire entry operation. The permit must certify that the precautions contained in **§1910.272(g)** have been implemented before workers enter the bin **(§1910.272(g)(1)(i))**.

Control of Grain Dust Fires and Explosions

The employer must develop and implement a written housekeeping program that establishes the frequency and method(s) determined best to reduce accumulations of fugitive grain dust on ledges, floors, equipment and other exposed surfaces **(§1910.272(j)(1))**.

For grain elevators, any fugitive grain dust accumulations that exceed 1/8 inch (.32 cm) at priority housekeeping areas must be immediately removed **(§1910.272(j)(2)(ii))**.

Compressed air can be used to blow dust from ledges, walls, and other areas only when all machinery that presents an ignition source in the area has been shut down, and all other known potential ignition sources in the area are removed or controlled **(§1910.272(j)(3))**.

Filter Collectors

All fabric dust filter collectors which are a part of a pneumatic dust collection system must be equipped with a monitoring device that will indicate a pressure drop across the surface of the filter **(§1910.272(l)(1))**.

Filter collectors installed after March 30, 1988 must be located:

- Outside the facility **(§1910.272(l)(2)(i))**;
- In an area inside the facility protected by an explosion suppression system **(§1910.272(l)(2)(ii))**; or
- In an area inside the facility that is separated from other areas of the facility by construction having at least a one hour fire-resistance rating. Filter collectors located inside these one hour rated rooms must be adjacent to an exterior wall and vented to the outside, as well as vent and ductwork designed to resist rupture due to deflagration **(§1910.272(l)(2)(iii))**.

Preventative Maintenance
The preventive maintenance must include regularly scheduled inspections of at least mechanical and safety control equipment associated with dryers, grain stream processing equipment, dust collection equipment, including filter collectors, and bucket elevators **(§1910.272(m)(1)).**

Any dust collection systems determined to be malfunctioning or operating below designed efficiency, must be promptly corrected. Additionally, overheated bearings and slipping or misaligned belts associated with inside bucket elevators must be promptly corrected or removed from service until repaired or replaced **(§1910.272(m)(2)).**

A certification record of each inspection performed must be maintained and contain the date of the inspection, the name of the person who performed the inspection, and the serial number, or other identifier, of the equipment that was inspected **(§1910.272(m)(3)).**

Inside Bucket Elevators
Bucket elevators shall not be jogged to free a choked leg **(§1910.272(q)(1))**.

Employers must mount bearings externally to the leg casing or provide devices to monitor the condition of bearings **(§1910.272(q)(4)).**

At facilities with a storage capacity of greater than one million bushels, employers must equip bucket elevators with a motion detector that will shut down the bucket elevator when belt speed is reduced by no more than 20% of the normal operating speed, as well as a means to keep the belt tracking properly or an alignment monitoring device that will initiate an alarm to employees when the belt is not tracking properly **(§§1910.272(q)(5), (6) and (7)).**

Hot Work Permit
Employers must issue a permit for all hot work unless the operations are conducted:

- In the presence of the employer or the employer's authorized representative who would otherwise issue the permit **(§1910.272(f)(1)(i))**;
- In an employer authorized welding shop **(§1910.272(f)(1)(ii))**; or

- Outside and away from the grain handling structure **(§1910.272(f)(1)(iii))**.

The permit shall certify that requirements contained in **§1910.252(a)** have been implemented and the permits shall be kept on file until the completion of hot work operations **(§1910.272(f)(2)).**

Emergency Action Plans

Due to the potential for fires and explosions existing in grain handling operations, employers must develop and implement an emergency action plan that meets the requirements in **§1910.38 (§1910.272(d)).**

The minimum elements of the plan must include:

- Procedures for reporting a fire or other emergency **(§1910.38(c)(1))**;
- Procedures for emergency evacuation, including type of evacuation and exit route assignments **(§1910.38(c)(2))**;
- Procedures to be followed by employees who remain to operate critical plant operations before they evacuate **(§1910.38(c)(3))**;
- Procedures to account for all employees after evacuation **(§1910.38(c)(4))**;
- Procedures to be followed by employees performing rescue or medical duties **(§1910.38(c)(5))**; and
- The name or job title of every employee who may be contacted by employees who need more information about the plan or an explanation of their duties under the plan **(§1910.38(c)(6)).**

Employer must have and maintain employee alarm system. The alarm system must comply with **§1910.165** requirements **(§1910.38(d)).**

Employers must train employees to recognize and prevent fire and explosion hazards including dust accumulations and ignition sources. This includes initial and refresher training for existing, new, and reassigned employees **(§1910.272(e)).**

At least two means of emergency escape must be provided from galleries (bin decks) **(§1910.272(o)(1))**.

For tunnels of grain elevators constructed before 1988, at least one means of emergency escape is required **(§1910.272(o)(2)).**

All tunnels of grain elevators constructed in 1989 or after must be provided with at least two means of emergency escape **(§1910.272(o)(2)).**

General Electrical Safety

Electrical equipment must be free from recognized hazards that are likely to cause death or serious physical harm to employees. Safety of equipment must be determined using the following considerations: (1) suitability for installation and use in conformity; (2) mechanical strength and durability, including parts designed to enclose and protect other equipment; (3) wire-bending and connection space; (4) electrical insulation; (5) heating and arcing effects when in use; (6) classification by type, size, voltage, current capacity, and specific use; and (7) any other factors that contribute to the practical safeguarding of persons using or likely to come into contact with the equipment **(§§1910.303(b)(1)(i) through (viii))**.

Electrical equipment and installations, including building electrical system components, and tools that use electrical power, that have been inspected and found by a nationally recognized testing laboratory to conform to specified plans or to procedures of applicable codes are deemed "accepted." They are, in addition, deemed "acceptable" to the Assistant Secretary of Labor **(§1910.399)**.

If no nationally recognized testing laboratory accepts, certifies, lists, labels, or determines the electrical equipment or its installation safe, another federal agency, state, municipal, or other local authority responsible for enforcing occupational safety provisions of the National Electrical Code may perform the inspection. If such equipment and its installation are found to be in compliance with the provisions of the National Electrical Code, they will be determined "acceptable" to the Assistant Secretary of Labor **(§1910.399)**.

Custom-made equipment or related installations that are designed, fabricated for, and intended for the use by a particular customer may be deemed "acceptable" as long as they are determined to

be safe for their intended use by their manufacturer on the basis of test data. This test data must be kept and made available by the employer **(§1910.399)**.

Flexible Cords and Cables (Extension Cords)

Flexible cords and cables must be protected from accidental damage **(§1910.305(a)(2)(x))**. Unless specifically permitted, flexible cords and cables may not be used as a substitute for the fixed wiring of a structure, where attached to building surfaces, where concealed or where run through holes in walls, ceilings, or floors, or where run in raceways or through doorways, windows, or similar openings **(§1910.305(g)(1)(iv))**. Flexible cords must be equipped with an attachment plug and be energized from an approved receptacle outlet **(§1910.305(g)(1)(iii))**.

Grounding/Grounded

For a grounded system, a grounding electrode conductor must be used to connect both the equipment grounding conductor and the grounded circuit conductor to the grounding electrode. Both the equipment grounding conductor and the grounding electrode conductor must be connected to the grounded circuit conductor on the supply side of the service disconnecting means or on the supply side of the system disconnecting means or overcurrent devices if the system is separately derived **(§1910.304(g)(4)(i))**.

For an ungrounded service-supplied system, the equipment grounding conductor must be connected to the grounding electrode conductor at the service equipment. For an ungrounded separately derived system, the equipment grounding conductor must be connected to the grounding electrode conductor at, or ahead of, the system disconnecting means or overcurrent devices **(§1910.304(g)(4)(ii))**.

The path to ground from circuits, equipment, and enclosures must be permanent and continuous, and effective **(§1910.304(g)(5))**.

Examination

Electrical equipment must be free from recognized hazards that are likely to cause death or serious physical harm to employees **(§1910.303(b)(1))**.

Guarding

Except as elsewhere required or permitted by 29 CFR 1910, subpart S, live parts of electric equipment operating at 50 volts or more shall be guarded against accidental contact by use of approved cabinets or other forms of approved enclosures or by any of the approved means **(§1910.303(g)(2))**.

Identification

Each disconnecting means, required by 29 CFR 1910, subpart S, for motors and appliances must be legibly marked to indicate its purpose, unless it is located and arranged so the purpose is evident **(§1910.303(f)(1))**.

Listing and Labeling

Listed or labeled equipment must be used or installed in accord with any instructions included in the listing or labeling **(§1910.303(b)(2))**.

Electrical Openings

Unused openings in electrical cabinets, boxes, and fittings must be effectively closed **(§1910.305(b)(1)(i))**.

Safety-Related Work Practices

Safety-related work practices must be employed to prevent electric shock or other injuries resulting from either direct or indirect electrical contacts, when work is performed near or on equipment or circuits that are or may be energized **(§1910.333(a))**.

Electrical safety-related work practices cover both qualified persons (those who have training in avoiding the electrical hazards of

working on or near exposed energized parts) and unqualified persons (those with little or no such training) **(§1910.331(a))**.

Live parts that an employee may be exposed to must be deenergized before the employee works on or near them, unless the employer can demonstrate that deenergizing introduces additional or increased hazards or it is infeasible due to equipment design or operational limitations **(§1910.333(a)(1))**.

Employers must develop and implement written lockout and/or tagout procedures that must be maintained and made available for inspection. **(§§1910.333(b)(2) and (b)(2)(i))**.

Overhead power lines must be deenergized and grounded by the owner or operator of the lines or other protective measures must be provided before work performed near them is started. Protective measures, such as guarding or insulating the lines, must be designed to prevent employees from contacting the lines **(§1910.333(c)(3))**.

Unqualified employees and mechanical equipment must be at least 10 feet (305 centimeters) away from overhead power lines. If the voltage to ground exceeds 50,000 volts (50kV), the minimum clearance distance should be increased by 4 inches (10 centimeters) for each additional 10,000 volts (10kV) **(§1910.333(c)(3)(i)(A))**.

OSHA requires portable ladders to have nonconductive side rails if used by employees who would be working where they might contact exposed energized circuit parts **(§1910.333(c)(7))**.

Splices

Conductors must be spliced or joined with splicing devices identified for such use or by brazing, welding, or soldering with a fusible alloy or metal. All splices, joints, and free ends of conductors must be covered with an insulation equivalent to that of the conductor or with an insulating device suitable for the purpose **(§1910.303(c)(3)(i))**.

Hazardous Workplace Complaints: Worker Rights

Workers have the right to a safe workplace. The *Occupational Safety and Health Act of 1970* (OSH Act) was passed to prevent workers from being killed or seriously harmed at work. The law requires employers to provide their employees with working conditions that are free of known dangers. Workers may file a complaint to have OSHA inspect their workplace if they believe that their employer is not following OSHA standards or that there are serious hazards. Further, the Act gives complainants the right to request that their names not be revealed to their employers. It is also against the law for an employer to fire, demote, transfer, or discriminate in any way against a worker for filing a complaint or using other OSHA rights.

If a workplace has unsafe or unhealthful working conditions, workers may want to file a complaint. Often the best and fastest way to get a hazard corrected is to notify a supervisor or employer.

Workers or their representatives may file a complaint online or by phone, mail, email or fax with the nearest OSHA office and request an inspection. A worker may also ask OSHA not to reveal his or her name. To file a complaint, call 1-800-321-OSHA [6742] or contact the nearest OSHA regional, area, state plan, or consultation office listed at www.osha.gov. The teletypewriter (TTY) number is (877) 889-5627.

Written, signed complaints submitted to OSHA area offices are more likely to result in an on-site OSHA inspection. Most online or unsigned complaints are resolved informally over the phone with the employer. Complaints from workers in states with an OSHA-approved state plan will be forwarded to the appropriate state plan for response.

Workers can call 1-800-321-OSHA [6742] to request a complaint form from their local OSHA office or visit http://www.osha.gov/pls/osha7/eComplaintForm.html to download the form. Completed forms should be faxed or mailed to the local OSHA office (provided at the end of this guide). Include your name, address and telephone number so that OSHA can contact you.

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