INSPECTION TECHNICAL PROCEDURE

I-162

INDUSTRIAL HEALTH AND SAFETY INSPECTION

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INSPECTION TECHNICAL PROCEDURE I-162, REV. 0
INDUSTRIAL HEALTH AND SAFETY INSPECTION

1.0 PURPOSE

This inspection procedure provides the Office of Safety Regulation (OSR) guidance for inspecting the implementation of the Contractor's Non-Radiological Worker Safety and Health Program (also known as the Industrial Health and Safety (IH&S) program) which the Contractor has committed to in the Contract.[1] This inspection procedure implements RL/REG-2000-04, *IH&S Regulatory Plan*, Section 4.0, "Inspection Program."

The specific purposes of this inspection procedure are as follows:

1. Confirm the Contractor is maintaining a safe work environment through compliance with Occupational Safety and Health Administration (OSHA) standards (29 CFR 1926 and 29 CFR 1910)[2] along with Contractor-defined policies and procedures for protecting employees from conventional workplace hazards

2. Ensure timely identification and implementation of corrective actions needed to maintain a safe work environment.

2.0 OBJECTIVES

The objectives of the OSR IH&S Inspection Program, as defined in RL/REG-2000-04, Rev. 0, are:

1. Provide inspection input when making major regulatory decisions
2. Conduct general IH&S inspections of Contractor ongoing work activities.

The OSR IH&S Inspection Program uses three different OSR inspection procedures to accomplish these objectives. This procedure assesses the Contractor's compliance toward implementing effective programs and procedures that ensure that work activities are conducted according to IH&S regulatory requirements.

This inspection procedure is used in conjunction with an ongoing OSR construction inspection program, implemented under the OSR Inspection Program defined in RL/REG-98-05, *Inspection Program Description for the Regulatory Oversight of the River Protection Project Waste Treatment Plant Contractor*. Further details are provided in RL/REG-98-24, *Inspection*

[1] Contract No. DE-AC27-01RV14136 between DOE and BNI, Inc., Section C.4(a)(1) and (c) and corresponding requirements in Standard 7, dated December 11, 2000.

[2] Some programs, such as fall protection, fire protection, confined spaces, etc., have changing requirements as the facility transitions from construction to operation (i.e., 29 CFR 1926 applies to construction and 29 CFR 1910 applies to operations). This procedure covers construction only.

Program Implementation Plan for the Regulatory Oversight of the River Protection Project Waste Treatment Plant Contractor. This inspection procedure and others will be used as needed to ensure that construction activities are conducted as required by 29 CFR 1910, "Occupation Safety and Health Standards," 29 CFR 1926, "Safety and Health Regulations for Construction," and Contractor procedures. Although a significant portion of this inspection procedure is expected to be accomplished at least once for each major contractor/subcontractor involved with the activities covered by this procedure, the entire procedure is not expected to be completed during any one inspection or every time the inspection procedure is used.

3.0 INSPECTION REQUIREMENTS

Each of the steps below is considered an inspection module, which, when combined with its respective guidance step(s), may be conducted at any time called for by an approved OSR inspection plan (RL/REG-98-24, Section 2.1), prepared according to RL/REG-98-25, Inspection Administrative Procedure (IAP) A-101, "Inspection Planning and Scheduling."

3.1 Assessing the Implementation of the Contractor's IH&S Activities

Verify that the following IH&S activities are accomplished as required by the Contractor's approved procedures and federal regulations. (29 CFR 1926 and 29 CFR 1910)

3.1.1 Scaffolding is designed, constructed, used, and maintained according to IH&S regulations. (29 CFR 1926.451, 452, 453, and 454)

3.1.2 Stairways and ladders are designed, constructed, used, and maintained according to IH&S regulations. (29 CFR 1910.23(d) and (e), 29 CFR 1926.1053, and 29 CFR 1926.1052)

3.1.3 Hand and power tools are properly maintained in a safe working condition and properly used. (29 CFR 1926.300-306)

3.1.4 Excavations are planned, designed, and conducted according to IH&S regulations. (29 CFR 1926.651)

3.1.5 Signs and barricades are authorized, prepared, and posted according to IH&S regulations. (29 CFR 1926.200-202)

3.1.6 Concrete and masonry precautions, limitations, and general requirements for all types of concrete and masonry placement, including the proper use of tools and equipment, will be implemented according to IH&S regulations. (29 CFR 1926.701-706)

3.1.7 Electrical work activities involving equipment installation, wiring design/installation, lock and tag of circuits, battery safety, etc., shall be conducted according to IH&S regulations as listed in Appendix G.

3.1.8 Cranes, hoists, elevators, and conveyors are used, maintained, inspected, and modified according to the precautions and limitations of IH&S regulations. (29 CFR 1926.550-555)

3.1.9 Personal protective equipment (PPE) shall be provided, used, and maintained in a sanitary and reliable condition according to IH&S regulations. (29 CFR 1926.95-104)

3.1.10 Fall protection is invoked and practiced according to IH&S regulations from the start of construction (this includes limited construction and pre-operational testing) until the completion of construction (commissioned for operations). (29 CFR 1926.501-503)

3.1.11 All forms of welding and cutting along with the storage and delivery of fuels for cutting and welding shall be conducted according to IH&S regulations. (29 CFR 1926.350-354 and 29 CFR 1926.251-254)

3.1.12 Fire protection and prevention shall be provided and practiced according to IH&S regulations. (29 CFR 1926.150-152)

3.1.13 Electrical transmission and distribution of high voltage electricity (>600 volts) shall be conducted according to IH&S regulations. (29 CFR 1926.950-960)

3.1.14 Occupational health and industrial hygiene shall be provided and practiced according to IH&S regulations (29 CFR 1926.50-56) including implementing a hazardous communications (HAZCOM) program if hazardous chemicals exist in the workplace and could expose the employees. The HAZCOM program shall be provided and implemented according to IH&S regulations. (29 CFR 1926.59 and 29 CFR 1910.1200)

3.1.15 General safety and health provisions of 29 CFR 1926 Subpart C which apply to this work location shall be implemented including the development and implementation of employee egress and emergency action plans to maintain a free and unobstructed egress from all parts of the facilities. The emergency action plan shall be kept at the workplace and made available for employee review according to IH&S regulations. (29 CFR 1926.34-35)

3.1.16 Steel erection shall be performed according to IH&S regulations (29 CFR 1926.750-753) with consideration for fall protection.

3.1.17 Safe operations, maintenance, and utilization of powered industrial trucks shall be inspected in accordance with IH&S regulations. (29 CFR 1910.178)

3.2 Assessing the Implementation of the Contractor's Personnel Training and Qualification Program

Verify that the individuals involved in performing IH&S activities are qualified to perform their job functions. (29 CFR 1910 and 29 CFR 1926)

4.0 INSPECTION GUIDANCE

Prior to performing IH&S inspections in the field, review the federal regulations and the Contractor's procedures for accomplishing the IH&S activities selected for examination. Appendixes to this procedure provide suggested attributes for inspection, based on the regulations. Review the Contractor procedures for implementing the IH&S activities selected for inspection using the appropriate Appendix. The Appendixes should not be viewed as a checklist for inspections but rather as suggestions of attributes to be inspected. The intent of this procedure is not that every item of an IH&S Appendix be inspected during each inspection of work activities. Rather, inspection of Contractor activities will be performed on a sampling basis, commensurate with activities underway. Minor IH&S infractions will be documented in the report and discussed with Contractor management. If the infraction is addressed appropriately, it does not need to be documented as a Finding. Significant infractions and/or programmatic IH&S concerns also should be raised to Contractor management attention and documented in inspection reports as Findings.

During the field observations, interview a sample of the craft personnel performing the observed activities. The interviews should focus on determining whether job and procedure knowledge, as it relates to worker safety, is satisfactory. Obtain the names and job functions of those interviewed and later use them to verify proper implementation of personnel qualification requirements, as specified in Section 4.2, below.

4.1 Assessing the Implementation of the Contractor's IH&S Activities

The interview(s) with the crafts or supervisors involved in the work activity should not interfere with the work. These interviews should focus on determining if the Contractor is maintaining a safe work environment and whether the crafts understand the requirements associated with safe work in their work activities.

4.1.1 Select at least three scaffolding systems (preferably erected in separate locations by different individuals or work groups) and assess whether the scaffolding was erected, used, and maintained according to the IH&S regulations. Appendix A provides suggested inspection attributes for evaluating scaffolding.

4.1.2 Select at least three stairway or ladder systems (preferably erected in separate locations by different individuals or work groups) and assess whether the stairway or ladder was erected, used, and maintained according to the IH&S regulations. Appendix B provides suggested inspection attributes for evaluating stairway and ladder systems.

4.1.3 Select at least three different situations where a hand tool or power-operated hand tool is being operated and assess whether the tool was maintained and used according to the IH&S regulations. Appendix C provides suggested inspection attributes for evaluating tools.

4.1.4 Visit all available excavations in progress or currently in place and assess whether the excavations were conducted according to the IH&S regulations. Appendix D provides

suggested inspection attributes for evaluating excavations. This inspection may be coordinated with Inspection Technical Procedure (ITP) I-112, "Geotechnical/Foundations."

4.1.5 View at least three different applications and locations of signs and barricades and assess whether the signs or barricades were selected, erected, and maintained according to the IH&S regulations. Appendix E provides suggested inspection attributes for evaluating signs and barricades.

4.1.6 Observe at least three different concrete pours and assess whether the concrete pours were conducted according to the IH&S regulations. Appendix F provides suggested inspection attributes for evaluating concrete pours. This inspection may be coordinated and conducted in conjunction with ITP I-113, "Structural Concrete."

4.1.7 Observe at least three different work activities involving electrical work and assess whether the activities were conducted according to the IH&S regulations. Appendix G provides suggested inspection attributes for evaluating electrical safety. This inspection may be coordinated and conducted in conjunction with ITP I-118, "Electrical Terminations," ITP I-122, "Electrical Equipment," and ITP I-126, "Electrical Circuit Testing."

4.1.8 Observe at least three different work activities involving active use of cranes, hoists, elevators, or conveyors and assess whether the equipment was used (this includes maintenance, modifications, and inspection, etc.) according to IH&S regulations. Appendix H provides suggested inspection attributes for evaluating this area.

4.1.9 Observe at least three different work activities that require Personal Protective Equipment (PPE) application and assess whether the PPE is being properly used. Appendix I provides suggested inspection attributes for evaluating PPE.

4.1.10 Observe fall protection in place on scaffolds, ladders, cranes, steel erection, transmission line work, or any other activities where the individual has the potential to fall more than 6 feet. Appendix J provides suggested inspection attributes for evaluating this area.

4.1.11 Observe at least three different cutting or welding operations and assess whether the work was conducted per procedures according to IH&S regulations. Also, observe at least three different locations where fuels (e.g., bottled, piped, or otherwise stored) were in a storage or delivery system but were not actively in use. Appendix K provides suggested inspection attributes for evaluating this area.

4.1.12 Observe at least three different locations (e.g., an office building, fuel storage area, or flammable/combustible liquid storage/use area) and assess whether fire protection and prevention are being practiced according to IH&S regulations. Appendix L provides suggested inspection attributes for evaluating this area.

4.1.13 Observe three different situations if possible (e.g., transmission tower work, substation work, and underground electrical work) where high voltage electricity (>600 volts) might

be present and assess whether the work is being performed according to IH&S regulations in this area. Appendix M provides suggested inspection attributes for evaluating this area. (29 CFR 1926.950-960)

4.1.14 Observe three different areas of occupational health and industrial hygiene (e.g., sound levels, housekeeping, and medical services) and assess whether the facility location is according to IH&S regulations in this area. Appendix N provides suggested inspection attributes for evaluating this area (29 CFR 1926.50-56). In addition, observe three different areas of hazardous communications (HAZCOM) (e.g., applying HAZCOM where chemicals are stored or where chemicals are used, or using Material Safety Data Sheets [MSDS]) and employee knowledge in this area. Assess whether the work is being performed according to IH&S regulations in this area. Appendix N provides suggested inspection attributes for evaluating this area. (29 CFR 1926.59 and 29 CFR 1910.1200)

4.1.15 Observe three different areas of emergency egress and the emergency action plan (e.g., exit doors, alarm systems, and emergency action plan) and assess whether the areas are being performed according to IH&S regulations. Appendix O provides suggested inspection attributes for evaluating this area. (29 CFR 1926.34-35)

4.1.16 Observe steel erection and assess whether the activities are being performed in accordance to IH&S regulations using Appendix P. This observation may be done in conjunction with fall protection using Appendix J. (29 CFR 1926.750-752)

4.1.17 Observe at least one operation which utilizes powered industrial trucks. Appendix Q provides suggested inspection attributes for evaluating this area. (29 CFR 1910.178)

4.2 Assessing the Implementation of the Contractor's Personnel Training and Qualification Program

Review the Contractor's procedures specifying the requirements for education, experience, training, and certification of personnel responsible for implementing the IH&S program for the area being assessed. If not accomplished in Section 4.1 above, interview and collect the names of at least the following personnel:

- Three craftsmen involved in implementing the IH&S area
- At least one person involved in verifying that specified IH&S conditions have been accomplished.

During the interviews, verify that the personnel were sufficiently knowledgeable of applicable procedure requirements. Also, examine the training and qualification records of the personnel interviewed. Determine whether the records demonstrate conformance with the Contractor's requirements for personnel training, qualification, and certification. (29 CFR 1910 and 29 CFR 1926)

5.0 OSR ACTIONS TO DOCUMENT AND RESOLVE CONDITIONS

If deficient conditions are identified during the inspection, they should be dealt with immediately. In all cases, the condition should be documented in the body of the inspection report and should include the OSR and Contractor's action to resolve the condition. The inspector should bring the condition to the attention of the responsible Contractor manager. If the matter is corrected by the Contractor in a timely manner and the VCO agrees, no OSR action will be taken other than documenting the condition in the inspection report. Issues that are significant or repetitive may, at OSR management's discretion, be documented as Findings and addressed in a similar manner as other OSR Findings that are addressed in inspection reports.

6.0 REFERENCES

29 CFR 1910, "Occupational Safety and Health Standards for General Industry," *Code of Federal Regulations,* as amended.

29 CFR 1926, "Safety and Health Regulations for Construction," *Code of Federal Regulations*, as amended.

ANSI A11.1-1965, "Practice for Industrial Lighting," American National Standard Institute, 1970.

RL/REG-98-05, *Inspection Program Description for the Regulatory Oversight of the RPP-WTP Contractor*, Rev. 3, U.S. Department of Energy, Richland Operations Office, 1999.

RL/REG-98-24, *Inspection Program Implementation Plan for the Regulatory Oversight of the RPP-WTP Contractor*, Rev. 1, U.S. Department of Energy, Richland Operations Office, 2000.

RL/REG-98-25, *Inspection Administrative Procedures* (IAP), U.S. Department of Energy, Richland Operations Office, 1998.

IAP A-101, "Inspection Planning and Scheduling"

RL/REG-98-26, *Inspection Technical Procedures* (ITP), U.S. Department of Energy, Richland Operations Office, 1998.

ITP I-112, "Geotechical/Foundations"
ITP I-113, "Structural Concrete Inspection"
ITP I-118, "Electrical Termination Installation Inspection"
ITP I-122, "Electrical Equipment Installation"
ITP I-126, "Electrical Circuit Testing Inspection"

RL/REG-2000-04, *Industrial Health and Safety Regulatory Plan*, Rev. 0, U.S. Department of Energy, Richland Operations Office, 2000.

7.0 LIST OF TERMS

ACGIH	American Conference of Governmental Industrial Hygienists
ANSI	American National Standards Institute
GFCI	ground fault circuit interrupters
HAZCOM	hazardous communications
IH&S	Industrial Health and Safety
IAP	Inspection Administrative Procedure
ITP	Inspection Technical Procedure
MSDS	Material Safety Data Sheets
OSHA	Occupational Safety and Health Administration
PPE	personnel protective equipment
OSR	Office of Safety Regulation
VCO	Verification and Confirmation Official

Appendix A. Scaffold Inspection Attributes

This checklist does not apply to crane and derrick suspended personnel platforms or to suspension scaffolds.

A.1 General Requirements

The following attributes are based on the requirements of 29 CFR 1926.451:

- Scaffolds are designed by qualified persons and constructed and loaded according to the design.
- Working level platforms are planked fully or decked between the front uprights and the guardrail supports. The space between adjacent units and between the platform and the uprights shall be ≤1 in. wide. (Refer to 29 CFR 1926.451 for further options.)
- Scaffold platforms and walkways are ≥18 in. wide. Areas too narrow to accommodate this width shall have platforms/walkways as wide as feasible and guardrails and/or personal fall arrest systems. Ladder jack, top plate, roof bracket, and pump jack scaffolds shall be ≥12 in. wide.
- Front edges of all unguarded platforms are established. The maximum distances are found in 29 CFR 1926.451, b.(3). The key safety requirements allow the workers to apply their skill/craft while acceptably controlling falls or falling materials.
- All platform ends, unless restrained, extend over their supports ≥6 in.
- Platform extensions over scaffolding supports are provided to ensure stability to working surface. (Refer to 29 CFR 1926.451 for further information and exceptions.)
- Where scaffold planks are abutted, they rest on separate supports, use a common support design, or use hook-on platforms that are designed to rest on common supports.
- Where scaffold platforms are overlapped to create a long platform, the overlap shall be ≥12 in. and occur over the supports unless the platforms are nailed together or movement is otherwise restrained.
- Where scaffold platforms change direction (e.g., corner), platforms that rest on bearers at other than right angles shall be laid first, and platforms that rest at right angles over the same bearer shall be laid second.
- Wood platforms shall not be covered with opaque finishes, except platform edges may be covered or marked for identification. Coatings cannot obscure the top or bottom of wood surfaces.

- Scaffold components produced by different manufacturers on dissimilar materials shall not be intermixed unless they fit together without force and the scaffold's structural integrity is maintained. A competent person must determine that the scaffold is structurally sound.

- Scaffolds with height to base width ratios of >4:1 shall be restrained from tipping by guying, tying, bracing, or equivalent. Guys/ties/braces shall be as follows:

  - Installed at locations where horizontal members support both inner and outer legs.

  - Installed according to manufacturer's recommendations or the closest horizontal member to the 4:1 height. (Other detailed requirements can be found in 29 CFR 1926.451.)

- Scaffold poles, legs, posts, frames, and uprights shall be plumb, braced to prevent swaying and displacement, and bear on base plates or other firm foundations. Footings and supports must be level, sound, and capable of load support.

- Front-end loaders and similar equipment shall not be used to support scaffold platforms unless designed by the manufacturer for such use. Forklifts shall not be used to support scaffold platforms unless the entire platform is attached to the fork and the forklift is not moved horizontally while the platform is occupied.

- Scaffold platforms >2 ft. above or below a point of access shall use portable ladders, hook-on ladders, attachable ladders, scaffold stair towers, stairway-type ladders, ramps, walkways, integral prefabricated scaffold access, or direct access from another scaffold, structure, personnel hoist, or similar surface for access. Cross-braces shall not be used as a means of access. (Refer to 29 CFR 1926.451(e)(2) through (9) for detailed information on the different means of access.)

- A competent person shall check that scaffolds not be loaded in excess of their maximum intended loads or rated capacities and shall inspect for defects before each shift or after any occurrence.

- Scaffolds shall not be moved horizontally while employees are on them unless a registered professional engineer has specifically designed them for such movement.

- Scaffolds shall only be erected, moved, dismantled, or altered by experienced/trained employees under the supervision of a competent person qualified in scaffold erection, moving, dismantling, or alteration.

- Scaffolds shall not be erected, used, dismantled, altered, or moved such that they, or any conductive material handled on them, might come closer to exposed and energized power lines than specified in Table A-1. However, scaffolds and materials may be closer than specified in Table A-1 if the electrical company has de-energized the lines or installed protective coverings to prevent accidental contact with the lines.

Table A-1. Minimum Scaffold Distances from Power Lines

	Minimum Distance	Alternative
Insulated Lines	–	–
Less than 300 volts	3 ft.	–
300 volts to 50 kV	10 ft.	–
More than 50 kV	10 ft. plus 0.4 in. for each 1 kV over 50 kV	2 times the length of the line insulator, but never <10 ft.
Uninstalled Lines		–
Less than 50 kV	10 ft.	–
More than 50 kV	10 ft. plus 0.4 in. for each 1 kV over 50 kV	2 times the length of the line insulator, but never <10 ft.

- Employees shall be prohibited from working on scaffolds covered with snow, ice, or other slippery material unless they remove such materials.

- Tag lines or equivalent shall be used to control swinging loads being hoisted onto or near scaffolds.

- Work on scaffolds shall be prohibited during storms or high winds unless determined by a competent person to be safe and employees are protected by personal fall arrest systems or wind screens. Windscreens shall not be used unless the scaffold is secured against the anticipated wind forces.

- Debris shall not be allowed to accumulate on platforms.

- Makeshift devices (boxes) shall not be used on scaffold platforms to increase working height. Ladders may be used on large area scaffolds where the criteria of 29 CFR 1926.451(f)(15)(i) through (iv) are satisfied.

- A competent person shall determine fall protection needs for erecting or dismantling scaffolds.

- Lean-to scaffolds (scaffolds kept erect by tilting it toward and resting it against a structure) are prohibited.

- Employee on scaffolds >10 ft. above a lower level shall be protected from falling to that lower level. (Refer to 29 CFR 1926.451(g)(3) for specific requirements for personal fall arrest systems used on scaffolds.)

- Toe boards shall be of sound and sturdy construction. The toe boards are installed between the working surface and the mid-rail. The specific requirements for materials and construction are found in 29 CFR 1926.451(h).

- Guardrail systems shall be installed by qualified persons along open sides and ends of platforms before they are released for employees to use. The following also apply to guardrails:

  - Top rails shall be constructed above the platform surface. Mid-rails, when used, shall be about midway between the top rail and platform surface. Construction specifications for distance of the top rail from the platform is found in 29 CFR 1926.451(g).

  - If used, screens and mesh shall extend from the top rail to the scaffold platform along the entire opening. Refer to 29 CFR 1926.451(g) for construction requirements for balusters or additional rails.

  - For guardrail systems installed on most scaffolds, top rails shall be secure and of sound construction capable of withstanding the force applied by workers. Refer to 29 CFR 1926.451(g) for construction specifications.

  - Mid-rails, screens, mesh, intermediate vertical members, etc., shall be capable of withstanding a force expected to be applied by workers in a downward or horizontal direction. Refer to 29 CFR 1926.451(g) for design construction specifications.

  - Guardrail surfaces shall prevent puncture/laceration injury to employees and snagging of clothing.

  - Rail ends shall not overhang terminal posts if they constitute a projection hazard.

  - If rope is used for top rails or mid-rails, it shall be frequently inspected by a competent person. Banding shall not be used as a top or mid-rail.

  - Cross bracing is acceptable for use as a top rail and mid-rail when the cross point serves the protective requirement of a top rail or mid-rail. Refer to 29 CFR 1926.451(g) for design and construction specifications.

- Where there is a danger of tools, materials, or equipment falling from a scaffold and striking employees, the following apply:

  - The area below shall be barricaded with restricted entry, or toe boards shall be erected along the edge of platforms >10 ft. above lower levels.

  - Where tools, materials, or equipment are piled higher than the top edge of the toe board, paneling or screening extending from the toe board or platform to the top of the guardrail shall be erected.

  - Guardrail system openings shall prevent passage of potential falling objects or a canopy structure, debris net, or catch platform, strong enough to withstand the impact forces, shall be erected.

- Mobile scaffolds shall have the following attributes:

  - Castors and wheels locked with positive wheel locks, wheel and swivel locks, or equivalent while the scaffold is used in a stationary manner.

  - Castor and wheel stems in scaffold legs or adjustment screws pinned or otherwise secured.

  - Screw jacks or equivalent when leveling of the scaffold is necessary.

- Force shall be applied close to the base (≤5 ft. above the support surface) when a mobile scaffold is moved.

- Power systems used to propel mobile scaffolds shall be designed for such use. Forklifts, trucks, and similar motor vehicles or add-on motors shall not be used unless the scaffold is designed for such.

  Employees shall not be allowed to ride on mobile scaffolds unless the following conditions are met as referenced in 29 CFR 1926.453(m) for operational criteria for mobile scaffolds:

  - The moving surface is generally level and free of pits, holes, and obstructions.

  - The scaffold height to base width ratio is ≤2:1 (unless scaffold meets recognized stability test).

  - Outrigger frames, when used, are installed on both sides of the scaffold.

  - The propelling force is applied directly to the wheels and speed is slow.

  - No employee is on a part of the scaffold that extends beyond the wheels, castors, or other supports.

A.2 Aerial Lifts

The following attributes are based on the requirements of 29 CFR 1926.453:

- Modification of aerial lifts, for uses other than intended by the manufacturer, shall be certified in writing by the manufacturer or equivalent, to conform with this section and ANSI A92.2-1969.

- Ladder/tower truck aerial ladders shall be secured in the lower traveling position before highway travel.

- Only authorized persons shall operate aerial lifts, and lift controls shall be tested daily before they are used.

- Belting off to an adjacent pole, structure, or equipment while working from an aerial lift is prohibited.

- Body belts shall be worn and a lanyard attached to the boom or basket when working from an aerial lift.

- Boom and basket load limits specified by the manufacturer shall not be exceeded.

- Before using an aerial lift on an incline, brakes shall be set, outriggers positioned on pads or a solid surface when used, and wheel chocks placed.

- Aerial lift trucks shall not be moved when the boom is elevated and the basket is occupied, except if specifically designed for this type of operation.

- Aerial lifts primarily designed as personnel carriers shall have both platform (upper) and lower controls. Upper controls shall be within easy reach of the operator; lower controls shall provide for overriding the upper controls; and controls shall be plainly marked as to their function.

- Insulated portions of an aerial lift shall not be altered in any way that might reduce its insulating value.

A.3 Training

The following attributes are based on the requirements of 29 CFR 1926.454:

- Employees who perform work while on a scaffold shall be trained by a person qualified in the subject matter to recognize the hazards of the scaffold being used and to understand the procedures to control or minimize those hazards.

- Employees involved in erecting, disassembling, moving, operating, repairing, maintaining, or inspecting a scaffold shall be trained by a competent person to recognize hazards of the work.

- Employees shall be retrained when an employer has reason to believe the employee lacks the skill or understanding needed for safe work involving erecting, using, or dismantling scaffolds.

Appendix B. Stairway and Ladder Inspection Attributes

B.1 Stairway Railings and Guards

The following attributes are based on the requirements of 29 CFR 1910.23(d) specifications regarding handrail requirements based upon the width of stairway:

- Stair flights having four or more risers shall have standard railings and handrails installed as follows:
  - At least one handrail on generally narrow stairways with both sides enclosed.
  - One handrail on each side on generally narrow stairways with both sides open.
  - At least one handrail on the open side on generally narrow stairways having one side open.
  - Standard railings shall be provided on the open sides of all exposed stairways and stair platforms. Handrails shall be provided on at least one side of closed stairways.
  - Generally wider stairways shall have one handrail on each enclosed side and one stair railing on each open side.
  - Wide stairways shall have one handrail on each enclosed side, one stair railing on each open side, and one intermediate stair railing located about midway of the width.
- Winding stairs shall be equipped with a handrail offset to prevent walking on any portion of the treads having a width of <6 in.

B.2 Railings, Toe Boards, and Cover Specifications

The following attributes are based on the requirements of 29 CFR 1910.23(e) for specification of design and construction dimensions and capabilities of components:

- A standard railing shall consist of top rail, intermediate rail, and posts. The top rail shall be smooth-surfaced throughout the length. The intermediate rail shall be about halfway between the top rail and the floor.
- Ends of rails overhanging terminal posts shall not constitute a projection hazard.
- Standard stair railings shall be of similar construction to a standard railing.

- Other types, sizes, and arrangements of railing construction are acceptable under the following conditions:

  - The top rail is smooth-surfaced.

  - The top rail is of sound and sturdy construction capable of effectively supporting the force exerted by occupants.

  - Protection between the top rail and floor/tread/platform is equivalent to that afforded by a standard intermediate rail.

  - Standard toe boards shall be 4 in. nominal in vertical height, securely fastened, with a slight clearance above the floor level, and have openings with dimensions that are not >1 in. Where a toe board does not provide adequate protection because of piling of material, panel or equivalent protection to the toe board shall be provided to the intermediate or top rail.

- Handrails/railings shall be mounted with brackets attached to the lower side and with the following:

  - Smooth surfaces on top sides, no obstructions, ends that shall not constitute a projection hazard, and a minimum clearance of 3 in. between the railing and any other objects.

  - Diameter ≥2 in. if hardwood and 1.5 in. if metal pipe and constructed to be capable to effectively support the force exerted by occupants.

B.3 Stairways

The following attributes for temporary stairways are based on the requirements of 29 CFR 1926.1052:

- A stairway or ladder shall be provided at access points with a break in elevation of ~1.5 ft. except where a ramp, runway, sloped embankment, or hoist is provided.

- When there is only one point of access between levels, it shall be kept clear or a second access established.

- Stairways used for construction (not part of permanent structure) shall have landings at least every 19-20 risers and be in the direction of travel.

- Stairs shall be installed between 30 degrees and 50 degrees from horizontal.

- A platform shall be provided where doors/gates open directly on a stairway.

- All parts of stairways shall be free of hazardous projections such as nails.

- Stairways shall not be used when slippery conditions exist.

- Pan-type stairs (where treads and/or landings will be filled with concrete or other material later) shall not be used unless temporarily fitted with wood or other solid material at least to the top edge of the pan.

- Skeleton metal stairs (where permanent treads and/or landings will be installed later) shall not be used unless temporarily fitted with secured treads/landings long enough to cover the entire tread/landing area.

- Temporary treads shall be made of solid material and installed the full width and depth of the stair.

- Stairways with four or more risers shall have handrails and stair rails along each unprotected edge.

- Winding and spiral stairways shall have handrails offset enough to prevent walking on portions of the stairway where the tread width is <6 in.

- The height of stair rails shall be ≥36 in. from the upper surface of the stair rail to the tread surface, in line with the riser face at the forward edge of the tread.

- Mid-rails, screens, mesh, intermediate vertical members, or equivalent protection shall be provided between the top of the stair rail and steps. Specific requirements are as follows:

  - Mid-rails shall be midway between the top of the stair rail and the steps.

  - Screens or mesh shall extend from the top of the stair rail to the steps and along the entire opening.

  - Vertical members (balusters) will be used between top-rail support posts.

- Handrails and the top edge of stair rail systems shall be of sound and sturdy construction and be able to withstand a force of workers/occupants.

- Stair rail systems and handrails shall have the following attributes for dimension, load bearing, design, and construction specifications based on 29 CFR 1926.1052:

  - Surfaced to prevent injury from punctures or lacerations and to prevent snagging of clothing.

  - An adequate handhold for grasping.

  - Ends constructed so they do not constitute a projection hazard.

  - A minimum clearance between handrail and wall of 3 in. if not a permanent part of the structure.

- Unprotected sides and edges of stairway landings are addressed in 29 CFR 1926.502(b) for dimension, load bearing, design, and construction requirements. The requirements are generally the same as those for stair rail systems discussed above, except for the following:

  - Mid-rails, screens, mesh, intermediate vertical members, solid panels, and equivalent structural members shall be of solid and sturdy construction capable to withstand force applied in any downward or outward direction at any point along the mid-rail or other member by workers.

B.4 General Ladder Requirements

The following attributes are based on the requirements of 29 CFR 1926.1053:

- A stairway or ladder shall be provided at access points with a break-in elevation of ~1.5 ft. if a ramp, runway, sloped embankment, or hoist is not provided.

- When two or more separate ladders are used to reach an elevated work area, the ladders shall be offset with a platform or landing between the ladders and have the appropriate guardrail systems.

- Ladders surfaces shall be smooth to prevent puncture or laceration injuries and snagging of clothes.

- Wood ladders shall not be coated with any opaque covering except for identification or warning labels that may be placed only on one face of a side rail.

- Ladders shall be maintained free of oil, grease, and other slipping hazards.

- Ladders shall be used only on stable and level surfaces unless they are secured to prevent displacement.

- Ladders shall not be used on slippery surfaces unless they are secured or provided with slip-resistant feet.

- Ladders placed where they can be displaced by work-place activities (e.g., passageways, doorways, or driveways) shall be secured or a barricade used to prevent accidental displacement.

- The area around the top and bottom of a ladder shall be kept clear.

- Ladders shall not be moved, shifted, or extended while they are occupied.

- Ladders shall be periodically inspected and defective ladders removed and tagged "Do Not Use."

- Users shall face the ladder while ascending or descending and have at least one hand free to grip the ladder.

B.5 Portable/Extension Ladders

The following attributes are based on the requirements of 29 CFR 1926.1053 regarding rung and spacing dimensions:

- Rungs shall be corrugated, knurled, dimpled, skid-resistant coated, or treated to minimize slipping.

- Upper rails shall extend ≥3 ft. above the upper landing surface. When the extension is not possible, the ladder shall be secured at its top to a rigid support and a grasping device shall be provided.

- The horizontal distance from the top support to the foot shall be about one-fourth the working length.

- If the employee or ladder could contact energized electrical equipment, the ladder shall have nonconductive side rails.

- The ladders shall be placed with both top rails supporting equally unless equipped with a support attachment.

B.6 Stepladders

The following attributes are based on the requirements of 29 CFR 1926.1053 regarding step spacing and clearance distance:

- A metal spreader or locking device shall be provided to hold the ladder in open position when it is in use.

- The top step of a stepladder shall not be used as a step and shall be so marked.

B.7 Fixed Ladders

The following attributes are based on the requirements of 29 CFR 1926.1053:

- The minimum clearance distance between the side rails is maintained.

- A minimum perpendicular clearance between rungs/cleats/steps and any obstruction is required.

- A minimum perpendicular clearance between rungs/cleats/steps and any obstruction is maintained.

- Ladders without cages/wells shall have established clearances from their centerlines to the nearest side object.

- Rungs/steps of metal ladders shall be corrugated, knurled, dimpled, coated with skid-resistant material, or treated to minimize slipping.

- If the total length of a climb is ≥24 rungs high, ladders shall be equipped with safety devices, self-retracting lifelines or rest platforms. Caged fixed ladders will have offset ladder landing platforms at ~50 rung intervals.

- Cages shall be clear of projections as required for design construction specifications in 29 CFR 1926.10539a)(20).

- Wells shall completely encircle the ladder and be free of projections as required for design construction specifications in 29 CFR 1926.1053(a).

- Safety climbing devices and related support systems shall permit an employee to ascend/descend without having to hold, push, or pull any part of the device. Design, construction criteria for safety devices and related support systems are in 29 CFR 1926.1053(a).

- Through or sidestep fixed ladders shall extend ~4 rungs above the top of the access level.

- For through-fixed-ladder extensions, steps/rungs shall be omitted from the extension and the extension side rails shall be flared. Dimensional requirements are covered in 29 CFR 1926.10539a)(25).

- For side-step fixed ladders, the side rails and steps/rungs shall be continuous in the extension.

B.8 Training

The employer shall ensure that each employee has been trained in use, care, and inspection of ladders by a competent person.

Appendix C. Tools - Hand and Power Tools Inspection Attributes

C.1 General Requirements

The following attributes are based on the requirements of 29 CFR 1926.300:

- All hand and power tools shall be maintained in a safe condition. Power tools designed to accommodate guards shall have the guards in place.
- Moving parts of equipment (e.g., belts, gears, shafts, pulleys, sprockets, spindles, drums, flywheels, chains, or other reciprocating or rotating parts) shall be guarded if employees exposed to parts can make contact.
- Machinery whose operation exposes employees to injury shall use "point of operation" guarding.
- Machines designed for a fixed location shall be securely anchored.
- Power-on switches shall meet the following conditions:
  - Power drills, grinders with wheels >2 in., disc/belt sanders, reciprocating saws, and similar hand-held tools shall be equipped with momentary contact "on-off" control. Switch locks are allowed if a single motion of the finger can turn them off.
  - Hand-held power circular and chain saws and percussion tools shall be equipped with a constant pressure switch that will shut off when pressure is released.
  - Small hand-held power tools (e.g., vibrating sanders, grinders with wheels ≤2 in., routers, planers, laminate trimmers, nibblers, shears, and scroll and jig saws may be equipped with "on-off" control.

C.2 Hand Tools

The following attributes are based on the requirements of 29 CFR 1926.301:

- Wrenches shall not be used when jaws are sprung or worn to the point that slippage can occur.
- Impact tools (e.g., punches, wedges, and chisels) shall be kept free of mushroomed heads.
- Wooden handles shall be kept free of splinters or cracks and be tight in the tool.

C.3 Power-Operated Hand Tools

The following attributes are based on the requirements of 29 CFR 1926.302:

- Electric tools shall be double insulated or grounded.
- Pneumatic tools shall have the following attributes:
  - The tools shall be positively secured to the hose to prevent accidental disconnect.
  - Nailers, staplers, and similar equipment shall have a muzzle safety device.
  - Air hoses with an inside diameter >0.5 in. shall have a reducing safety device at the source.
  - Airless spray guns shall either be equipped with automatic or visible manual safety devices that prevent the trigger from being pulled until the safety device is released or have a diffuser nut and nozzle tip guard.
  - Abrasive blast cleaning nozzles shall be equipped with an operating valve that is manually held open.
- Fuel-powered tools shall meet the following attributes:
  - Stopped while being refueled, serviced, or maintained
  - All applicable requirements met for industrial exposure concentrations of toxic gases and fire protection
  - Used with personal protective equipment.
- Hydraulic powered tools shall use fire-resistant fluids and meet manufacturers' operating limits for hoses, connectors, valves, pipes, etc.
- Powder-actuated tools shall meet the following requirements:
  - Tool safety devices shall be tested each day before loading, and defective tools shall be immediately removed from service.
  - Tools shall not be loaded until just prior to the intended firing time.
  - Loaded tools shall not be left unattended.
  - Fasteners shall not be driven into either very hard or brittle materials or into easily penetrated materials unless backing is provided.

- No fastener shall be driven into a spalled area caused by an unsatisfactory fastening.

- Tools shall not be used in an explosive or flammable atmosphere.

C.4 Abrasive Wheels and Tools

The following attributes are based on the requirements of 29 CFR 1926.303:

- Bench-mounted and floor stand grinders shall have the following attributes:

  - Safety guards with an angular exposure for the grinding wheel periphery and sides shall be provided. Design and operational requirements are found in 29 CFR 1926.303(c).

  - Rigidly supported adjustable work rests kept ≤1/8 in. from the wheel surface.

- A revolving cup or band-type guard shall protect cup-type wheels used for external grinding. All other abrasive wheels for external grinding shall have properly mounted guards with a maximum angular exposure of the grinding wheel periphery and sides not exceeding 180 degrees.

- Abrasive wheels for internal grinding shall be provided with properly sized and assembled protection flanges that will ensure wheel pieces be retained during accidental breakage.

- All abrasive wheels shall be closely inspected and ring-tested before mounting.

C.5 Woodworking Tools

The following attributes are based on the requirements of 29 CFR 1926.304:

- Fixed power-driven woodworking tools shall have locking disconnect switches.

- Portable power-driven circular saws shall be equipped with guards above and below the base plate.

- Guards for radial saws shall enclose the upper portion of the blade and protect the operator from flying debris. The lower portion shall guard the blade and automatically adjust to stock thickness.

- Hand-fed crosscut table saws and ripsaws guards shall automatically adjust and completely enclose the portion of the saw above the table or above the material being cut.

C.6 Jacks (lever, ratchet, screw and hydraulic)

The following attributes are based on the requirements of 29 CFR 1926.305:

- The manufacturer's rated capacity shall be legibly marked on jacks.
- Jacks shall have a positive stop to prevent over-travel.
- A wood block shall be placed between the jack metal cap and the load.
- After a load has been raised, it shall immediately be cribbed, blocked, or otherwise secured.
- Hydraulic jacks exposed to freezing temperatures shall be supplied with antifreeze.
- Jacks shall be inspected every six months, or when sent out and returned from shop for special work and after being subjected to abnormal load or shock.
- Jacks that are out of order shall be tagged accordingly and shall not be used.

C.7 Air Receivers

The following attributes are based on the requirements of 29 CFR 1926.306:

- Drains, hand holes, and manholes shall be easily accessible and, under no circumstances, shall an air receiver be buried underground or located in an inaccessible place.
- Drainpipe shall be installed at the lowest point for removal of excessive liquids; the drain valve opened and the receiver drained at intervals to prevent the accumulation of excessive liquid.
- Receivers shall have visible pressure gages and spring-loaded safety valves that are tested frequently.
- Safety appliances (e.g., safety valves, indicating and control devices) shall be constructed, located, and installed so that they cannot be rendered inoperative.

C.8 Training

The employer shall permit only those employees qualified by training or experience to operate equipment and machinery.

Appendix D. Excavation Inspection Attributes

D.1 Specific Excavation Requirements

The following attributes are based on the requirements of 29 CFR 1926.651:

- Estimated locations of underground utility installations (e.g., sewer, telephone, fuel, electric, and water) shall be determined prior to excavation. As excavation approaches the estimated locations, the exact locations shall be determined by safe and acceptable means.

- Structural ramps used for equipment access or egress shall be designed by a competent person qualified in structural design.

- A safe means of personnel access/egress (e.g., stairway, ladder, and ramp) shall be provided for excavations ≥4 ft. in depth, and employ lateral travel to reach an access/egress shall be ≤25 ft. Ensure that an onsite, competent person has made recent measurements of depth and distance to access/egress points.

- Employees exposed to vehicular traffic shall wear reflectors on high visibility material warning vests.

- Employees shall stand clear of loads being handled by lifting or digging equipment and vehicles being loaded or unloaded.

- Barricades, stop logs, hand or mechanical signals, or other warning devices shall be used to alert the operator of the edge when mobile equipment is required to approach excavations.

- Atmospheres in excavations ≥4 ft. in depth shall be tested before employees enter when oxygen deficient or hazardous atmosphere could reasonably be expected to exist. Ensure that a qualified individual has properly assessed the atmosphere.

- Support systems such as shoring, bracing, or underpinning shall be used to provide stability of adjoining buildings, walls, or other structures endangered by excavation operations.

- Adequate protection shall be provided from loose rock or soil that poses a hazard by falling or rolling.

- Materials or equipment shall be prevented from falling/rolling into excavations by keeping it at least 2 ft. from the excavation edge or by using suitable retaining devices.

- When employee exposure is reasonably possible, inspections of excavations and adjacent areas and protective systems shall be made by a competent person daily,

before work starts, as needed throughout the shift, and after every rainstorm. Exposed employees shall be immediately removed from the hazardous area when evidence of a hazardous condition exists.

- Walkways shall be provided where employees/equipment are required/permitted to cross excavations.

D.2 Requirements for Protective Systems

The following attributes are based on the requirements of 29 CFR 1926.652:

- NOTE: 29 CFR 1926.652(a) requires that employees in an excavation be protected from cave-ins by an adequate protective system except under the following conditions:

  - Excavations are made entirely in stable rock.

  - Excavations are less than 5 ft. in depth and examination of the ground by a competent person provides no indication of a potential cave-in.

- Because of the many variables and alternatives associated with design and construction of protective systems, the competent person should refer directly to 29 CFR 1926.652(b) and (c), and the following appendixes for specific guidance.

  - 1926. Subpart P, Appendix A – Soil Classification
  - 1926. Subpart P, Appendix B – Sloping and Benching
  - 1926. Subpart P, Appendix C – Timber Shoring for Trenches
  - 1926. Subpart P, Appendix D – Aluminum Hydraulic Shoring for Trenches
  - 1926. Subpart P, Appendix E – Alternatives to Timber Shoring
  - 1926. Subpart P, Appendix F – Selection of Protective Systems.

Appendix E. Signs and Barricades Inspection Attributes

E.1 General Requirements

The following attributes are based on the requirements of 29 CFR 1926.200:

- Accident prevention signs, tags, and barriers shall be strategically and prominently placed, visible at all times when work is being performed, and removed/covered when the hazard no longer exists.

- Danger signs shall be used only where an immediate hazard exists and shall have red as the predominate color for the upper panel, black outline on the borders, and a white lower panel for additional wording.

- Caution signs shall be used only to warn against potential hazards or caution against unsafe practices and shall have yellow as the predominate color, black upper panel and boarders, yellow lettering of "caution" on the black panel, and a lower yellow panel for additional wording.

- Exit signs shall have legible red letters, not less than 6 in. high with the principle stroke at least 0.75 in. wide on a white background.

- Safety instruction signs shall be white, have a green upper panel with white letters to convey the principal message, and black letters on a white background for additional wording on the sign.

- Directional signs, other than automotive traffic signs, shall be white with a black panel and a white directional symbol. Additional wording shall be black letters on the white background.

- Construction areas shall be posted with traffic signs at hazard points and shall conform to national standards.

- Accident prevention tags shall be used as a temporary way to warn employees of an existing hazard (e.g., defective tools and equipment) but shall not be used in place of accident prevention signs.

E.2 Signaling

The following attributes are based on the requirements of 29 CFR 1926.201:

- When operations are such that signs, signals, and barricades do not provide necessary protection on or adjacent to a highway or street, flaggers or other appropriate traffic controls shall be provided.

- When hand signaling, flaggers shall use red flags that are at least 18 in. square or sign paddles. In darkness, red lights shall be used. (Hoisting signals are not covered in this section.)

- Flaggers shall wear a red or orange warning garment while flagging, never stand in the path of an approaching vehicle, and not turn their backs to traffic. Reflective warning garments shall be worn at night.

E.3 Barricades

The following attributes are based on the requirements of 29 CFR 1926.202:

- Tape, rope, and barriers used to establish a safety boundary are yellow and black, indicating caution.

- Barricades for traffic control on a construction site shall conform to ANSI Standard D-6.1, "Uniform Traffic Control Devices."

Appendix F. Concrete and Masonry Inspection Attributes

F.1 General Requirements

The following attributes are based on the requirements of 29 CFR 1926.701:

- All protruding reinforcing steel shall be guarded to eliminate the impalement hazard.
- Except for personnel essential for post-tensioning operations, no employee shall be permitted behind the jack during tensioning operations. Signs and barriers shall limit employee access to post-tensioning areas during tensioning operations.
- No employee shall be permitted to ride concrete buckets or to work under concrete buckets.
- Elevated concrete buckets shall be routed so that no employee is exposed to falling hazards.
- Personnel applying cement, sand, and water mixtures through pneumatic hose shall be required to wear protective head and face equipment.

F.2 Equipment and Tools

The following attributes are based on the requirements of 29 CFR 1926.702:

- Bulk concrete storage bins, containers, and silos shall be equipped with conical/tapered bottoms and mechanical/pneumatic means of starting the flow of material.
- Employees shall not be allowed to enter storage facilities unless the ejection system is shut down, locked out, and tagged to indicate the system is not to be operated.
- Concrete mixers with loading skips ≥1 cubic yd shall be equipped with a mechanical device to clear the skip of materials and shall have guardrails on each side of the skip.
- Manually guided powered and rotating-type concrete troweling machines shall be equipped to shut off power automatically when the operators' hands are removed from the equipment handles.
- Concrete buggy handles shall not extend beyond the wheels on either side of the buggy.

- Concrete pumping system discharge pipes shall be provided with supports designed for 100% overload, and compressed air hoses used shall have positive fail-safe joint connectors.

- Concrete buckets with hydraulic or pneumatic gates shall have positive safety latches/devices that prevent premature/accidental dumping and shall be designed to prevent concrete from hanging up on the top or sides.

- Sections of tremies and similar concrete conveyances shall be secured with wire rope or equivalent in addition to the regular couplings or connections.

- Bull float handles shall be nonconductive if they might contact energized electrical conductors.

- Masonry saws shall be guarded with an enclosure over the blade designed to retain blade fragments.

- No employee shall be permitted to maintain or repair equipment where inadvertent equipment operation could occur unless the energy sources have been locked out and tagged.

F.3 Cast-in-Place Concrete

The following attributes are based on the requirements of 29 CFR 1926.703:

- Formwork shall be able to support all vertical and lateral loads that may reasonably be anticipated, and shoring equipment shall be inspected before it is erected.

- Drawings/plans/revisions for jack layout, forms, shoring, scaffolds, etc., shall be available at the job.

- Shoring and reshoring equipment shall be inspected immediately before, during, and after concrete placement. Shoring equipment found damaged or weakened shall be immediately replaced. In addition, the following attributes apply:

    - Shoring sills shall be able to carry the maximum intended load; base plates, shore heads, extension devices, and adjustment screws shall be in firm contact with the foundation/forms.

    - Eccentric loads on shore heads and similar members are prohibited unless designed for such use.

    - Single-post shores used on top of each other (tiered) shall be designed by a qualified designer, erected and inspected by a qualified structural engineer, vertically aligned and spliced to prevent misalignment, and adequately braced

in two mutually perpendicular directions at the splice level. Each tier shall also be diagonally braced.

- Single post shores to raise formwork shall not be adjusted after concrete placement.

- Reshoring shall be erected as original forms and shores are removed whenever the concrete is required to support loads in excess of its capacity.

- For vertical slip forms, the following attributes apply:

  - Steel rods/pipes on which jacks climb or by which forms are lifted shall be designed for that purpose and adequately braced where not encased in concrete.

  - Forms shall be provided with scaffolds or work platforms where employees work or pass.

  - Jacks or other lifting devices shall be provided with mechanical dogs or other automatic holding devices to support the forms whenever the power supply or lifting mechanism fails.

  - Form structures shall be maintained within design tolerances for plumb during jacking, and the predetermined safe rate of lift shall not be exceeded.

- Reinforcing steel for walls, piers, columns, etc., shall be adequately supported to prevent overturning or collapse, and measures shall be taken to prevent unrolled wire mesh from recoiling.

- Form work shall not be removed until the concrete has gained sufficient strength based on plans/specifications stipulating conditions for removal of forms and shores, or the concrete has been properly tested with an appropriate standard test from the American Society for Testing and Materials.

F.4 Pre-cast Concrete

The following attributes are based on the requirements of 29 CFR 1926.704:

- Pre-cast concrete wall units and structural framing and tilt-up wall panels shall be adequately supported until permanent connections are completed.

- Lifting inserts for tilt-up pre-cast concrete members shall be able to support at least two times the maximum intended load.

- Lifting inserts for pre-cast concrete members other than tilt-up shall be able to support at least four times the maximum intended load.

- Lifting hardware shall be able to support at least five times the maximum intended load.

- Only employees required to erect pre-cast concrete members shall be permitted under such members.

F.5 Lift-Slab Construction Operations

The following attributes are based on the requirements of 29 CFR 1926.705. A registered engineer experienced in lift-slab construction shall design and plan lift-slab operations. This technical expert will ensure that the onsite competent person inspects and ensures the following:

- Jacks/lifting units are marked and used according to their rated capacity. Ensure that a competent person can provide verification of load jacking capability.

- Jacking equipment can support 2.5 times the load being lifted.

- Jacks/lifting units are designed/installed to prevent lifting or continuing to lift beyond their rated capacity.

- Jacking operations are synchronized to ensure even and uniform lifting (within 0.5 in. of the slab level).

- If leveling is automatically controlled, a device shall be installed to stop operations when the 0.5 in. tolerance is exceeded or when the jacking/lifting system malfunctions.

- If leveling is maintained manually, controls shall be located in a central location and attended by a competent person while lifting is in progress.

- No more than 14 jacks will be used per slab.

- Only employees essential to the jacking operation shall be permitted in the building/structure or in the immediate vicinity of the slab.

- When temporary connections are made to support slabs, wedges shall be tack-welded (or equivalent), and lifting rods shall not be released until the wedges at that column have been secured.

- A certified welder familiar with the welding requirements specified in the plans and specifications for the lift-slab operation shall perform all welding.

- Load transfer from jacks/lifting units to a building column shall not be executed until the welds of the column shear plates are cooled to air temperature.

- Jacks/lifting units shall be secured to building columns such that lifting rods cannot slip out of position.

F.6 Masonry Construction

The following attributes are based on the requirements of 29 CFR 1926.706:

- A limited access zone shall be established before construction is started for a masonry wall. The zone shall be equal to the height of the wall to be constructed plus 4 ft. and shall run the wall length on the side of the wall that will be unscaffolded.

- Only employees actively engaged in constructing the wall shall be permitted in the zone, and the zone shall remain in place until the wall is adequately supported to prevent it from overturning or collapsing.

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Appendix G. Tools - Electrical Safety Inspection Attributes

Refer to 29 CFR 1926.406 and 29 CFR 1910.306 for questions related to installing electrical equipment and wiring for use with cranes, hoists, runways, elevators, escalators, and moving walks.

Refer to 29 CFR 1926.407 and 403 and 29 CFR 1910.307 for wiring methods and equipment installation and maintenance in hazardous locations (e.g., flammable vapors, liquids or gases, or combustible dusts/fibers).

Refer to 29 CFR 1926.408 and 29 CFR 1910.308 for information for systems over 600 volts; Class 1, 2, or 3 remote control, signaling, and power-limited circuits; and communications systems.

G.1 General Requirements for Electrical Equipment/Installation Safety

The following attributes are based on the requirements of 29 CFR 1926.403 and 29 CFR 1910.303:

- Equipment shall be firmly mounted/installed and nothing shall interfere with cooling air circulation.
- Equipment that arcs in normal operations shall be enclosed or isolated from combustible material.
- Equipment shall have durable descriptive markings that identify the manufacturer and ratings data.
- Disconnects for motors, appliances, service feeders, and branch circuits shall be legibly marked.
- Adequate illumination shall be provided for all working spaces around electrical equipment.
- Electrical equipment operating at ≥50 volts but ≤600 volts shall have the following:
    - Access and working space around equipment is sufficient to permit safe operations and maintenance (3 to 4 ft. according to Table K-1 of 29 CFR 1926.403 and Table S-1 of 29 CFR 1910.303) and is not used for storage.
    - Working space above equipment, switchboards, or motor control centers is 6.25 ft.
    - The equipment is guarded by enclosures, rooms, vaults, screens, or partitions. Only qualified persons are allowed access.

- Entrances to locations containing energized components are marked with conspicuous warning signs forbidding unqualified persons to enter except as allowed when attended by a qualified person.

- Electrical equipment operating at >600 volts shall have the following:

  - Entrances to buildings, rooms or enclosures containing exposed energized components are locked or observed by a qualified person.

  - Access and working space of 3 to 12 ft. according to Tables K-2 and K-3 of 29 CFR 1926.403 and Tables S-2 and S-3 of 29 CFR 1910.303 is maintained and not used for storage.

G.2 Wiring Design and Protection

The following attributes are based on the requirements of 29 CFR 1926.404:

- Ground fault circuit interrupters (GFCI) or an Assured Equipment Grounding Conductor Program shall be used on construction sites.

- Disconnects for building electrical shall be readily accessible and located near the service entrance.

- For services >600 volts, high voltage warning signs shall be posted.

- The following shall be grounded: (1) metal components of fixed electrical equipment, appliances, and electrical enclosures; exposed metal parts of cord- or plug-connected equipment; and metal parts of frames; and (2) tracks of electrically operated cranes and frames, cables of elevators, and partitions/grill work enclosures around equipment >750 volts.

G.3 Wiring Methods, Components, and Equipment for General Use

The following attributes are based on the requirements of 29 CFR 1926.405 and 29 CFR 1910.305:

- Metal raceways, cable armor, and other electrical conductor metal enclosures shall be joined and connected to all boxes, fittings, and cabinets to ensure continuous electrical continuity.

- Wiring shall not be installed in ducts used to transport dust, flammable vapors, and cooking ventilation.

- Temporary wiring shall meet the following:
  - Have over-current protection and all receptacles grounded.
  - Use dedicated branch circuits for temporary lighting and have no receptacles used for other than lighting installed on these branch circuits.
  - Provide protection from breakage of lamps used for general illumination and have metal-cased socket enclosures grounded
  - Be either 12 or 120 volt with GFCI protection when supplying portable lighting
  - Not run through holes in walls, ceilings, or floors or be concealed by them. During construction activities only, cords and cables may run through doorways, windows, or similar openings if they are protected to avoid damage.
- Extension cords used with portable tools shall be three-wire and designed for hard usage.
- Conductors entering boxes, cabinets, or fittings shall be protected from abrasion, and all openings in the boxes, cabinets, or fittings shall be closed.

G.4 Training

The following attributes are based on the requirements of 29 CFR 1910.332:

- Both electrical and nonelectrical workers (e.g., painters, laggers, and pipefitters) who face a higher-than-normal risk of exposure to energized electrical parts of ≥50 volts must have specific training.

G.5 General Requirements/Work Practices and Use of Equipment

The following attributes are based on the requirements of 29 CFR 1926.416, 29 CFR 1910.333, and 29 CFR 1910.334:

- Employee shall not work near electrical circuits unless the circuits are de-energized/grounded or guarded.
- If the exact location of underground electrical power lines is unknown, employees working in the area with hand tools shall use insulated protective gloves. (Buried electrical line can be easily located by remote sensing devices. Once located, they must be visibly marked and either de-energized or avoided.)

- Appropriate personal protective equipment shall be provided and used commensurate with hazards.

- Appropriate signs and safety symbols shall be posted where necessary to warn of electrical hazards.

- Guarding shall be provided when energized parts of electrical equipment are exposed.

- Working spaces and walkways shall be kept clear of cords and other tripping hazards.

- Portable cords shall be inspected before they are used, and worn or frayed cords shall not be used.

- Extension cords shall not be fastened with staples, hung from nails, or suspended by wire.

G.6 Lockout and Tagging of Circuits

The following attributes are based on the requirements of 29 CFR 1926.417:

- Equipment/circuits de-energized for work shall have locks and tags at all points where such equipment or circuits can be energized. Tags shall plainly identify the equipment or circuits being worked on.

- Crafts shall apply and remove their own locks and tags. If the employee who attached the lock and tag is absent, a qualified designated person may remove them if the employer verifies that the employee who applied the lock and tag is not available and the employee is aware that the lock and tag has been removed before resuming work.

G.7 Environmental Deterioration of Equipment

The following attributes are based on the requirements of 29 CFR 1926.432:

- Unless identified for use in the operating environment, no conductors or equipment shall be located in damp or wet locations or exposed to gases, fumes, vapors, liquids, excessive temperatures, or other agents or conditions having a deteriorating effect.

- Equipment approved only for dry locations shall be protected from weather during construction.

- Metal components (e.g., raceways, cable armor and sheathing, boxes, cabinets, elbows, couplings, fittings, and supports) shall be made of materials appropriate to the environment in which they are installed.

G.8 Batteries and Battery Charging

The following attributes are based on the requirements of 29 CFR 1926.441:

- Unsealed batteries shall be located in enclosures with outside vents or in well-ventilated rooms.
- Battery racks and trays and room floors shall be treated or constructed to make them acid resistant.
- Face shields, aprons, and rubber gloves shall be provided/used when handling acids/batteries.
- Eyes/body quick drenching capability shall be provided within 7.62 m (25 ft.) of battery areas.
- Charging equipment shall be protected from damage by vehicles.

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Appendix H. Cranes, Hoists, Elevators, and Conveyors Inspection Attributes

Employers shall comply with manufacturer specifications/limitations, and the operator will follow the manufacturer's requirements. The vendor operating manuals will be onsite at all times and for mobile equipment shall be in the operating cab with the operator. Where not available, limitations shall be determined and documented by a qualified professional engineer competent in the field.

The inspector shall refer to the subject interpretations associated with 29 CFR 1926.550 for detailed equipment and hardware inspections. Other recommended materials include the Mobile Crane Inspection Guidelines for OSHA Compliance Officers (all appendixes).

H.1 Cranes

The following attributes are based on the requirements of 29 CFR 1926.550:

- Warnings and instruction shall be conspicuously posted on equipment and visible to the operator.
- Hand signals shall be posted, visible, and comply with the applicable American National Standards Institute standard for the crane.
- Equipment shall be inspected by a competent person and the dates and results recorded before being placed into service and at other times as required.
- Reciprocating, rotating, or other moving parts or equipment shall be guarded if exposed to contact.
- Swing radius of rotating superstructure shall be barricaded and employees kept clear of suspended loads and loads about to be lifted.
- Exhaust pipes shall be guarded/insulated when employee contact is possible. When equipment exhausts in enclosed spaces, tests shall be conducted and recorded to ensure that atmosphere and ventilation are adequate.
- Walkway surfaces shall be anti-skid and guardrails/steps/handholds allow easy access to cab/platforms.
- Fuel tank filler pipes shall not allow spill/overflow to run onto engine, exhaust, or electrical equipment.
- Fire extinguishers (≥10BC rating) shall be easily accessible in all equipment operator stations/cabs.

- Except where electrical distribution/transmission lines have been de-energized and visibly grounded or where insulating barriers have been erected, equipment operated near power lines shall have the following:

  - Clearances of 10 ft. between the lines and any part of crane/load for lines ≤50 kV; for lines >50 kV, 10 ft. plus 0.4 in. per 1 kV or twice the length of the line insulator

  - Clearances of ≥4 ft. for lines ≤50 kV, ≥10 feet for lines >50 kV but ≤345 kV, and ≥16 feet for lines >345 kV for transit (no load/boom lowered)

  - Timely warning provided by a designated person observing equipment clearance for all operations where the operator has difficulty visually maintaining the desired clearance.

- Overhead wire shall be considered energized until the owner or utility indicates it is de-energized and the line is visibly grounded.

- Before work is done near transmitter towers, the transmitter shall be de-energized or tests conducted to ensure an electrical charge is not present and appropriate precautions are taken to dissipate induced voltages.

- Modifications of equipment shall not be made without the manufacturer's written approval; and instruction plates, tags, or decals shall be changed according to manufacturer's requirements.

- Adequate clearance shall be maintained between crane moving/rotating structures and fixed objects.

- Guardrails or a personal fall arrest system shall be used to protect employees working on horizontal booms.

- Overhead and gantry cranes shall have the rated load plainly marked on each side of each crane hoist.

- An audible warning signal shall be provided for cranes equipped with a power-traveling mechanism.

H.2 Suspended Personnel Platforms

The following attributes are based on the requirements of 29 CFR 1926.550(g):

- Using a crane to hoist employees on a platform is prohibited unless using a conventional method to reach the work site would be more hazardous or is not possible. If required, hoisting shall be performed in a slow, controlled, and cautious manner. Further, the

operating requirements for "power down" and other mechanical features must be assessed.

- Load lines shall be able to support seven times the maximum intended load and ten times the maximum intended load if rotation resistant line is used.

- Locking devices shall be engaged when an occupied personnel platform is in a stationary position.

- Cranes shall be uniformly level and on firm footing, and outriggers fully deployed when hoisting.

- The total weight of a loaded personnel platform and related rigging shall be ≤50% of the rated capacity for the radius and configuration of the crane and conspicuously posted with weight and load capacity.

- Machines having live booms (lowering controlled by a brake only) are prohibited.

- Variable-angle boom cranes shall be equipped with an angle indicator that is readily visible to the operator.

- Telescoping boom cranes shall indicate to the operator the boom's extended length, or the load radius during the lift shall be determined before personnel are hoisted.

- A device or system shall prevent contact between the load block and boom tip (two-blocking).

- The load-line hoist drum shall use a device, other than the hoist brake, to regulate rate of speed.

- Personnel platform systems shall be designed by a qualified engineer and shall have the following attributes:

  - Have a grab rail inside the perimeter and, except for guardrails (refer to Subpart M) and fall arrest system anchorages, be able to support its own weight plus five times the maximum intended load

  - Be enclosed from toe board to mid-rail, have overhead protection when exposed to falling objects, and allow employees to stand upright in the platform

  - Have gates that prevent accidental opening and do not swing outward during hoisting.

- When a wire rope bridle is used, each bridle leg shall be connected to ensure the load is evenly divided.

- Hooks on attachment assemblies shall have lock capabilities that eliminate the hook throat opening.

- All eyes in wire rope slings shall be fabricated with thimbles.

- Prior to hoisting employees, the following shall be done:

  - A trial lift of the unoccupied personnel platform, loaded to the anticipated lift weight, shall be made from where employees enter the platform to each location the platform is to be hoisted and positioned. The crane rigging, personnel platform, and base support/ground shall then be visually inspected by a competent person and any defects corrected.

  - The operator shall determine if all systems, controls, and safety devices are functioning properly; no interference exists; and all configurations necessary to reach work locations will allow the operator to remain under the 50% limit of the hoist's rated capacity.

  - Before initial hoisting and after repair/modification, the system shall be proof-tested to 125% of rated capacity. This testing may be done concurrently with the trial lift. A competent person shall then inspect the platform and rigging. If deficiencies occur, they shall be corrected and another proof test conducted.

  - The platform shall be hoisted a few inches and inspected to ensure it is secure and properly balanced. Employees shall not be hoisted unless hoist ropes are free of kinks and twists and the primary attachment is centered over the platform.

- Except for the employee performing signaling duties, employees shall keep all parts of their body inside the platform when it is raised, lowered, and positioned.

- Before an employee enters or exits the platform, hoisted platforms shall be secured to the structure unless that creates an unsafe condition.

- Tag lines shall be used unless their use creates an unsafe condition.

- The crane operator shall remain at the controls when the platform is occupied.

- Hoisting will be terminated for dangerous weather or other impending danger.

- Employees being hoisted should remain in continuous sight of, and in direct communication with, the operator or signal person. If this is not possible, radio communication alone may be used.

- Employees shall use fall restraints attached to the lower load block, overhaul ball, or structural member.

- Crane travel while hoisting employees is permitted only when crane travel is restricted to a fixed track or runway and limited to the load radius of the boom. In addition, the boom must be parallel to the direction of travel, a trial run of the travel route must be performed, and tire condition/air pressure must be checked if the crane is on a rubber tired-carrier.

- A meeting attended by the crane operator, signal person(s), employee(s) to be lifted, and the person responsible for the task shall be held prior to trial lift for each location and repeated for new employees.

H.3 Overhead Hoists

The following attributes are based on the requirements of 29 CFR 1926.554:

- Safe working loads shall be indicated on the hoist.

- Hoist support shall provide for free movement and not restrict aligning hoist and load.

- Installation shall permit the operator to stand clear of the load at all times.

- Air-operated hoist air supplies shall be positively connected and sufficient to safely operate hoist.

H.4 Conveyors

The following attributes are based on the requirements of 29 CFR 1926.555:

- Conveyors shall be equipped with an audible warning signal that activates before the conveyors start.

- Conveyors shall have emergency stop switches that prevent restart until the switch has been reset.

- Screw conveyors shall be guarded to prevent employee contact with turning flights.

- Conveyors over work areas/aisles/thoroughfares shall have guards that protect personnel below.

- Conveyors shall be locked/tagged when operation is hazardous to employees performing maintenance.

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Appendix I. Personal Protective Equipment Inspection Attributes

I.1 General Criteria for Personal Protective Equipment (PPE)

The following attributes are based on the requirements of 29 CFR 1926.95 and 29 CFR 1910.132:

- Protective equipment shall be provided, used, and maintained in a sanitary and reliable condition. Where employees provide their own protective equipment, the employer shall be responsible to ensure its adequacy, including proper maintenance and sanitation.

- A written certification shall verify that a workplace hazard assessment has been performed.

- Each employee required to use PPE shall be trained on what PPE is; when PPE is necessary; how to don, doff, adjust and wear PPE; what the proper care and maintenance is; and what the useful life is for PPE. Written certification is required to verify that each employee has received and understood the training.

- Visitors, spectators, etc., will be required to use PPE as applicable to the areas visited and directed by the site manager.

I.2 Hand Protection

The following attribute is based on the requirements of 29 CFR 1910.138:

- Appropriate hand protection shall be used when hands are exposed to hazards (e.g., absorption of harmful substances, severe cuts/abrasions, punctures, chemical or thermal burns, and extreme temperatures).

I.3 Foot Protection

The following attribute is based on the requirements of 29 CFR 1926.96 and 29 CFR 1910.136:

- Protective or substantial foot wear shall be worn in areas (determined based on a hazard assessment) with a danger of foot injuries due to falling or rolling objects or objects piercing the sole and where employees' feet are exposed to electrical shock.

I.4 Head Protection

The following attribute is based on the requirements of 29 CFR 1926.100 and 29 CFR 1910.135:

- Employees working in areas with a possible danger of head injury from an impact, from falling or flying objects, or from electrical shock and burns shall wear protective helmets.

I.5 Hearing Protection

The following attributes are based on the requirements of 29 CFR 1926.101:

- Whenever the noise levels or duration of exposures to those specified in Table J.1 cannot be reduced (from Table D-2 of 29 CFR 1926.52), approved ear protective devices shall be provided and used.

Table I- 1. Minimum Noise Levels and Duration Without Hearing Protection

Duration per day, hr	8	6	4	3	2	1½	1	½	≤¼
Sound level dBA (slow response)	90	92	95	97	100	102	105	110	115

I.6 Eye and Face Protection

The following attributes are based on the requirements of 29 CFR 1926.102 and 29 CFR 1910.133:

- The employer shall ensure that each employee uses appropriate eye and face protection when required.

- Eye and face protection equipment shall be kept clean, in good repair, and free of optical defects.

Guidance for face and eye protection includes 11 different equipment types applicable to numerous applications. For detailed information on using specific types of eye and face protection for a particular application, see 29 CFR 1926.102.

I.7 Respiratory Protection

The following attributes are based on the requirements of 29 CFR 1926.103 and 29 CFR 1910.134:

- Whenever respiratory protection is required, the employer shall implement a written respiratory protection program with work-site-specific procedures.

- When respiratory protection (excluding dust masks) is voluntary, refer to 29 CFR 1910.134(c)(2).

- Respirators shall be cleaned and disinfected as necessary to maintain sanitation if issued for exclusive use or after each use if being worn by different individuals.

- Respirators shall be packed and stored to protect them from damage, contamination, dust, sunlight, extreme temperatures, excessive moisture, chemicals, and deformation.

- Evaluations of respiratory protection programs shall be performed and documented.

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Appendix J. Fall Protection Inspection Attributes

Requirements relating to fall protection for employees working on scaffolds, cranes and derricks, steel erection, tunneling operations equipment, electric transmission and distribution lines and equipment, and stairways and ladders are provided in 29 CFR 1926, subparts L, M, N, R, S, V, and X, respectively.

J.1 Duty to Have Fall Protection

The following attributes are based on the requirements of 29 CFR 1926.501:

- Where the potential exists for personnel to fall ≥6 ft. to a lower level, fall protection systems shall be used for the following hazardous conditions or situations:
  - Walking/working surfaces with unprotected edges
  - Employees constructing leading edges or in an area where leading edges are under construction
  - Hoist areas
  - Around holes or skylights or where tripping, stepping, or falling through holes or skylights is possible.
  - Employees on formwork or reinforcing steel
  - Ramps, runways, and other walkways
  - Edges of excavations
  - Wells, pits, shafts, or similar excavations
  - Employees working above dangerous equipment
  - Employees performing overhand bricklaying work
  - Employees reaching ≥10 in. below a walking/working surface
  - Employees engaged in low-slope roofing activities with unprotected sides
  - Employees working on a steep roof with unprotected sides
  - Employees engaged in pre-cast concrete erection work

- Employees working near wall openings, where the outside bottom edge of the opening is ≥6 ft. above lower levels and the inside bottom edge of the opening is <39 in. above the walking/working surface.

- Employees exposed to falling objects shall wear hard hats and one of the following shall be implemented:

  - Toe boards, screens, or guardrail systems are used to prevent objects from falling from higher levels.

  - A protective canopy is erected, and potential falling objects are kept far enough from the edge of the higher level so they would not go over the edge if they were accidentally displaced.

  - The area where objects could fall is barricaded; employees are prohibited from entering the barricaded area; and objects that could fall are kept far enough away from the edge so they would not go over the edge if accidentally displaced.

J.2 Fall Protection Systems Criteria and Practices

The following attributes are based on the requirements of 29 CFR 1926.502:

- Fall protection systems shall be installed before work is started.

- Guardrail systems (refer to 29 CFR 1926.502 for design, construction dimensions, and load bearing requirements) shall comply with the following:

  - The top edge of the top rail is ~3.5 ft. above the walking/working surface.

  - Mid-rails, screens, mesh, and intermediate vertical members are installed between the guardrail system top edge and walking/working surface when there is no wall or parapet. Attributes of this protection are as follows:

    - Mid-rails are midway between the top edge of the guardrail system and the walking/working surface.

    - Screens/mesh extend from the top rail to the walking/working surface along the entire opening.

    - Intermediate vertical members (e.g., balusters) are set a specified distance apart.

    - Criteria for other structural members are specified in 29 CFR 1926.502 b(iv) and b(3) – b(9).

- Guardrail systems will be of sound and sturdy construction, capable of withstanding the force of workers in an outward or downward direction.

- Mid-rails, screens, mesh, intermediate vertical members, and solid panels will be able to withstand a force of occupants without failure applied in any downward or outward direction.

- Surfaces prevent injury from punctures or lacerations and snagging of clothing.

- Ends of top rails and mid-rails do not constitute a projection hazard.

- If wire rope is used, the diameter or thickness of top- and mid-rails is ≥0.25 in., and steel or plastic banding is not used.

- Wire rope, if used for top rails, is flagged at ≤6 ft. intervals with high-visibility material.

- When hoisting operations are not taking place, a chain, gate, or removable guardrail section is across access openings used for hoisting operations.

- Guardrails used at holes are erected on all unprotected sides. When holes are used for access, the guardrail is provided with a gate or is offset such that a person cannot walk directly into the hole.

- Safety net systems shall comply with the following:

  - The systems are installed as close under walking/working level as practicable but not >30 ft. (3 stories) below such level.

  - The systems extend outward from the outermost projection of the work surface as shown in Table K.1.

  - At least once a week and after any occurrence that could affect integrity, the systems are inspected for wear, damage, and deterioration. Defective components shall be removed from service.

  - Items falling into a safety net are removed as soon as possible and at least before the next work shift.

  - Net mesh openings are ≤36 $in.^2$ and ≤6 in. in length on any side. The breaking strength of webbing border rope is 5000 lb minimum, and connections between safety net panels meet the same requirements as the netting. (Drop test requirements are specified in 29 CFR 1926.502(c)(3).)

Table J- 1. Safety Net Projection Lengths

Vertical Distance – Working Level to Horizontal Plane of Net	Horizontal Distance – Outer Edge of Net to Edge of Working Surface
Up to 5 ft.	8 ft.
≥5 ft. to ≤10 ft.	10 ft.
>10 ft.	13 ft.

- Personal fall arrest systems shall comply with the following:
  - Body harness attachment points are located in the center of the wearer's back near shoulder level or above the wearer's head.
  - Anchorages used for attachment are independent of anchorage used to support/suspend platforms, and attachment to guardrail systems or hoists is prohibited except as specifically allowed by 29 CFR 1926.502.
  - Equipment shall only be used for employee protection, not to hoist materials.
  - When used at hoist areas, personal fall arrest systems shall be rigged to allow the employee to move only as far as the edge of the walking/working surface.
- Positioning device systems shall be rigged such that an employee cannot free fall >2 ft.
- Warning line systems shall comply with the following:
  - When mechanical equipment is not being used, warning lines are erected ≥6 ft. from roof edges, around all sides of roof work areas.
  - When mechanical equipment is being used, warning lines are erected ≥6 ft. from the roof edge parallel to the direction of equipment operation and ≥10 ft. from the roof edge perpendicular to the direction of equipment operation.
  - Access points and material handling/storage/hoisting areas are connected to the work area by access paths formed by two warning lines. When the work areas are not in use, rope, wire, chain, or other barricades, equivalent in height and strength to the warning line, shall be installed where the path intersects the work area warning line. The path may also be offset to prevent someone from walking directly into the work area.
  - Warning lines consisting of ropes, wires, or chains, and supporting stanchions shall be erected as follows:
    - Flagged at ≤6 ft. intervals with high-visibility material.

- Employees are prohibited in the area between a roof edge and a warning line unless performing work and under the watch of a competent person.

- Mechanical equipment on roofs shall be used or stored only in areas where employees are protected by warning lines, guardrails, or personal fall arrest system.

- Controlled access zones (refer to 29 CFR 1926.502(g) for dimensional criteria and design requirements) shall comply with the following:

  - Control lines shall be $\geq$6 ft. but $\leq$25 ft. and extend the entire length and approximately parallel to, the unprotected/leading edge and connected to a guardrail system or wall.

  - For pre-cast concrete members being erected, control lines shall be ≥6 ft. but ≤60 ft. or half the length of the member being erected, whichever is less.

  - Control lines for overhand bricklaying are established and approximately parallel to, the working edge. Only employees performing overhand bricklaying or related work are permitted in the controlled zone.

  - Control lines shall consist of substantial ropes, wires, tapes, or equivalent materials supported by clearly marked stanchions.

  - Enclose all points of access and material handling/storage areas for overhand bricklaying operations where guardrail systems are not in place before beginning such operations.

  - Where guardrail systems are in place but need to be removed to allow overhand bricklaying or leading edge work to take place, only that portion necessary to accomplish that day's work shall be removed.

- Safety monitoring systems shall comply with the following:

  - A competent person shall be designated to monitor the safety of other employees. The monitor shall warn employees when they may be unaware of a hazard, are acting in an unsafe manner, are on the same walking/working surface, are in visual sight, and are close enough to communicate orally.

  - The monitor shall have no other responsibilities that could distract from the monitoring function.

  - For low-sloped roofing operation where safety monitoring is being used, mechanical equipment shall not be used or stored; and no employee, other than those engaged in the roofing work or covered by a fall protection plan, shall be allowed in an area.

- Covers for holes in floors, roofs, and other walking/working surfaces shall comply with the following:

  - Be able to support twice the weight of employees, equipment, and materials that may be applied and be able to support twice the maximum axle load where vehicles may be expected to cross.

  - Be color-coded or marked with the word "hole" or "cover."

- Falling object protection shall comply with the following:

  - Toe boards shall be constructed of substantial material.

  - Where tools, equipment, and materials are piled higher than the toeboard, paneling or screening shall be erected from the walking/working surface or toeboard to the guardrail system's top or mid-rail.

  - Guardrail systems, when used as falling object protection, shall have openings small enough to prevent passage of potential falling objects.

  - During overhand bricklaying work, only masonry and mortar shall be stored within 4 ft. of the working edge, and all debris shall be removed at regular intervals to keep the work area clear.

  - During roofing work, materials/equipment shall not be stored within 6 ft. of a roof edge unless guardrails are erected at the edge, and piled/stacked materials near the edge should be stable/self-supporting.

  - All canopies used shall be strong enough to prevent collapse and penetration by potential falling objects.

- Fall protection plans for leading edge or pre-cast concrete erection work shall comply with the following:

  - Be prepared by a qualified person specifically for the designated work, be maintained up to date and have changes approved by a qualified person, and be maintained with approved changes at the job

  - Be implemented under the supervision of a competent person

  - Document why uses of conventional fall protection systems are infeasible or could create greater hazard and discuss other measures that will be taken to reduce or eliminate the fall hazard

  - Identify each location where conventional fall protection methods cannot be used, classify these locations as Controlled Access Zones, and apply appropriate criteria; identify each employee designated to work in the controlled access zones (no other employees may enter)

- Include a safety monitoring system (employing a competent person) where no other alternative measure has been implemented and if a serious event occurs, the employee will stop, investigate, and change the procedure as required.

J.3 Training Requirements

The following attributes are based on the requirements of 29 CFR 1926.503:

- Employees who might be exposed to fall hazards shall be trained by a competent person on the following:
  - The nature of the fall hazards in the work area; the use and operation of fall protection systems; the requirements of 29 CFR 1926, Subpart M; the role of the employee in the safety monitoring system, when used; and the development of fall protection plans
  - Procedures for erecting, maintaining, disassembling, and inspecting fall protection systems to be used and for handling and storing equipment and materials for overhead protection.
- Employers shall verify compliance with 29 CFR 1926.503(a) – Training Program, by preparing a written certification record that identifies the employee, the date(s) trained, and signature of the person or employer conducting the training.
- Retraining shall be provided when the employer has reason to believe that a trained employee does not have the understanding and skills required.

J.4 Harness, Belts, Lifelines, and Lanyards

The following attributes are based on the requirements of 29 CFR 1926.104(b) and (c) for design criteria of anchors for support and lanyards:

- Lifelines shall be secured above the point of operation to an approved support.
- Safety harness/belt lanyards shall be ≥0.5 in. with a maximum length of ≤6 ft.
- Safety harness/belt and lanyard hardware shall be smooth and free of sharp edges.

J.5 Training

The employer is responsible to instruct employees on the proper inspection and use of fall protection equipment and devices.

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Appendix K. Welding and Cutting Inspection Attributes

K.1 Gas Welding and Cutting

The following attributes are based on the requirements of 29 CFR 1926.350:

- When transporting, moving, and storing compressed gas cylinders, the following attributes apply:
  - Valve protection caps are in place and secured.
  - Cylinders are hoisted using cradles, sling boards, or pallets. (Cylinders shall not be hoisted using choker slings or magnets, and cylinder protection caps shall not be used for vertical lifting.)
  - Cylinders are moved by tilting and then rolling them on bottom edges.
  - Regulators are removed and valve protection caps are in place before cylinders are moved unless they are firmly secured in a special carrier intended for this purpose.
  - A cylinder truck with chain, brackets, or other steadying device is used to keep cylinders from being knocked over.
  - Cylinder valves are closed when the work is finished, when cylinders are empty, or when cylinders are moved.
  - Compressed gas cylinders shall be secured in an upright position except while being hoisted/carried.
  - Oxygen cylinders in storage are separated from fuel-gas cylinders or combustible materials (especially oil or grease) by a minimum distance of 20 ft. or by a 5-ft.-high noncombustible wall.
  - Cylinders shall be stored in a well-protected, well-ventilated, dry location, that is at least 20 ft. from any highly combustible materials. The cylinders shall be stored away from elevators and stairs and located such that they will not be knocked over by passing or falling objects or subject to tampering.
- When placing cylinders, the following attributes apply:
  - Cylinders are far enough away from welding or cutting operations so sparks, hot slag, or flames will not reach them and they are not subject to other sources of artificial heat.

- Cylinders are placed where they cannot become part of an electrical circuit. Electrodes shall not be struck against a cylinder to strike an arc.

- Cylinders containing oxygen, acetylene or other fuel gas shall not be taken into confined spaces.

- When working with cylinders, the following attributes apply:

  - Cylinders (full or empty) shall not be used as rollers or supports, and damaged or defective cylinders shall not be used.

  - A cylinder's contents cannot be used for purposes other than those intended by the supplier.

  - No one except the owner or authorized vendor of the cylinder shall refill a cylinder.

  - Oxygen cylinders and fittings shall be kept away from and clean of oil or grease.

  - Cylinders, cylinder caps and valves, couplings, regulators, hose, hose fittings, and apparatus shall be kept free from oil or greasy substances and shall not be handled by oily hands or gloves.

  - Oxygen shall not be directed at oily surfaces, greasy clothes, or into a storage tank or vessel.

- When using fuel gas, the following attributes apply:

  - The employer shall thoroughly instruct employees on the safe use of fuel gas.

  - Before a regulator is installed, the cylinder valve is opened slightly (cracked) and immediately closed to clear the valve of dust and dirt. The person cracking the valve shall stand to one side of the outlet.

  - The fuel gas cylinder valve shall not be cracked where the gas would reach welding work, sparks, flames, or other sources of ignition.

  - When a special wrench is required, it shall be left in position on the valve stem while the cylinder is in use for emergency shutoff. Manifolded or coupled cylinders shall have at least one wrench available.

  - Nothing shall be placed on top of a fuel gas cylinder in use that may damage the safety device or interfere with quick closing of the valve.

  - Fuel gas shall not be used from cylinders without reducing the pressure through a regulator.

- When using fuel gas and oxygen manifolds, hoses, and gauges, the following attributes apply:

  - Fuel gas and oxygen manifolds bear the name of the substance they contain in letters at least 1 in. high and either painted on the manifold or on a permanently attached sign.

  - Fuel gas and oxygen manifolds are in a safe, well-ventilated, easily accessible location.

  - Adapters shall not be used to permit the interchange of hoses from fuel gas and oxygen. They will not be interchanged and shall be distinguishable from each other.

  - When not in use, manifold and header hose connections shall be capped.

  - Nothing shall be placed on a manifold that will cause damage or interfere with quick valve closing.

- When working with hoses, the following attributes apply:

  - Not more than 4 in. out of every 12 in. shall be covered when parallel sections of oxygen and fuel gas hose are taped together.

  - All hoses carrying any gas or substance that may ignite, enter into combustion, or could be harmful to employees in any way shall be inspected each working shift.

  - Hose in defective or questionable condition or showing signs of severe wear (e.g., cutting or scraping) or damage shall not be used.

  - Hose couplings shall not be capable of disconnect by a straight pull but must require a rotary motion.

  - Boxes used for storing a gas hose shall be ventilated.

  - Hoses, cables, and other equipment shall be kept clear of passageways, ladders, and stairs.

- When working with torches, the following attributes apply:

  - Torches shall be inspected at the beginning of each working shift. Defective torches shall not be used.

  - Only friction lighters or other approved devices shall be used for lighting torches. Matches or other hot work shall not be used.

  - Oxygen and fuel gas regulators and gauges shall be in proper working order.

K.2 Arc Welding and Cutting

The following attributes are based on the requirements of 29 CFR 1926.351:

- When working with manual electrode holders, the following attributes apply:
  - Only arc welding and cutting electrode holders of proper current-carrying capacity shall be used.
  - Current-carrying parts of welder grips and the outer surfaces of the jaws shall be fully insulated.
- When working with welding cables and connectors, the following attributes apply:
  - Arc welding/cutting cables shall be insulated and flexible. Cables in need of repair shall not be used.
  - Repairs/splices shall be >10 ft. from cable ends or insulated cable connectors shall be used.

NOTE: Refer to 29 CFR 1926.351(b) for questions concerning splices and repairs to welding cables.

- When working with ground returns and machine grounding, the following attributes apply:
  - The ground return cable shall have a current-carrying capacity greater than or equal to the maximum output capacity of the arc welding or cutting unit that it services. When a single ground return cable services more than one unit, its safe current-carrying capacity shall be greater than or equal to the total maximum output capacities of all the units it services. The frames of arc welding and cutting machines shall be properly grounded
  - Gas and flammable liquid pipelines and electrical conduit shall not be used as a ground return.
- The following attributed apply to operating instructions for arc welding and cutting:
  - Employers shall instruct employees in arc welding and cutting safety.
  - When electrode holders are unattended, the electrodes shall be removed and the holders placed or protected such that they cannot make electrical contact with employees or conducting objects.
  - Electrode holders shall not be dipped in water.

- Arc welding/cutting machines shall be turned off when unattended for appreciable lengths of time.

- Shielding has the following attribute:

  - Whenever practicable and applicable, all arc welding and cutting operations shall be shielded by noncombustible or flameproof screens to protect employees and other persons in the vicinity.

K.3 Fire Prevention

The following attributes are based on the requirements of 29 CFR 1926.352:

- Objects to be welded, cut, or heated shall be moved to a safe location or fire hazards in the vicinity shall be removed. If neither is possible, positive means shall be taken to confine the heat, sparks, and slag.

- No welding, cutting, or heating shall be done where flammable paints might be applied, other flammable compounds are present, or heavy dust concentrations create a hazard.

- Suitable fire extinguishing equipment shall be available in the work area. If normal fire prevention precautions are not sufficient, additional personnel shall be assigned to guard against fire while performing the welding, cutting, or heating operation. A formal "firewatch" shall be provided where required.

- When welding, cutting, or heating is performed on walls, floors, and ceilings, fire precautions shall be taken on the opposite side where the work is being performed.

- For work in enclosed spaces, supply valves to the torch shall be positively shut off at a point outside the enclosed space whenever the torch is not in use or is left unattended. During overnight and change of shift periods, the torch and hose shall be removed from the confined space. See 29 CFR 1926.21(b)(6)(ii) for a description of what constitutes a confined or enclosed space.

NOTE: Special precautions listed in 29 CFR 1926.352(i) are required when working on containers that have contained toxic or flammable substances.

K.4 Ventilation and Protection in Welding, Cutting, and Heating

The following attributes are based on the requirements of 29 CFR 1926.353:

- Mechanical ventilation has the following attributes:

- Mechanical ventilation shall be sufficient to provide the number of air changes necessary to maintain welding fumes and smoke within safe limits. There should be a basis for the safe limits determined. (Applies to enclosed welding operations such as shop welding.)

- Contaminated air shall be exhausted into the open air and clear of the source of intake air. Intake air, replacing air exhausted, shall be clean and respirable. (Normally applied to shop welding.)

- Welding, cutting, and heating in confined spaces have the following attributes:

  - When sufficient ventilation cannot be obtained without blocking the means of access, employees in the confined space shall be protected by supplied air and escape respirators, and an employee shall be assigned immediately outside the confined space to maintain communications.

  - Lifelines and rescue tending should be appropriately used as described in 29 CFR 1926.353(b)(3).

- Welding, cutting, or heating of metals of toxic significance have the following attributes:

  - Refer to 29 CFR 1926.353(c) for special precautions for welding, cutting, or heating involving the following metals of toxic significance:

    - Zinc-bearing base or filler metals or metals coated with zinc-bearing materials

    - Lead base metals or metals containing lead, other than as an impurity, or metals coated with lead-bearing materials

    - Cadmium- or chromium-bearing base metals, filler metals, or metals coated with cadmium- or chromium-bearing materials

    - Metals coated with mercury-bearing metals

    - Beryllium-containing base or filler metals.

- Inert-gas metal-arc welding has the following attributes. NOTE: The process involves the production of ultra-violet radiation of intensities up to 30 times that produced during shielded metal-arc welding.

  - Chlorinated solvents shall be kept at least 200 ft. from the exposed arc, unless shielded; and surfaces prepared with chlorinated solvents shall be dry before welding.

- Persons in the area shall be protected by shield screens or appropriate filter lenses. When two or more welders are exposed to each other's arc, additional safety precautions are required.

- The skin of all persons exposed shall be completely covered.

- Inert-gas welding of stainless steel creates dangerous concentration of nitrogen dioxide, and appropriate precautions as referenced in 29 CFR 1926.353(c) for toxic metals shall be implemented.

- General welding, cutting, and heating have the following attributes:

  - Welding, cutting, or heating not involving confined spaces, metals of toxic significance, or inert gases may normally be done without mechanical ventilation or respiratory protective equipment unless unusual physical or atmospheric conditions create an unsafe accumulation of contaminants.

  - Employees performing any type of welding, cutting, or heating shall use suitable eye protection.

K.5 Welding, Cutting, and Heating in Way of Preservative Coatings

The following attributes are based on the requirements of 29 CFR 1926.354:

- Before welding, cutting, or burning on any surface covered by a preservative coating whose flammability is not known, a test by a competent person shall be made. When coatings are determined to be highly flammable, the coating shall be stripped from the area.

- In enclosed spaces, toxic preservative coating shall be stripped at least 4 in. from the area of heat application, or air supplied respiratory protection shall be used.

- In open air, appropriate respirator protection shall be worn as required by management.

K.6 Training

If employees must enter permit-required confined space they must be trained in accordance with 29 CFR 1926.21(b)(6)(i).

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Appendix L. Fire Protection and Prevention Inspection Attributes

L.1 Fire Protection

The following attributes are based on the requirements of 29 CFR 1926.150:

- A fire protection program shall be developed and followed throughout all phases of construction. An alarm system (e.g., phone or siren) shall be established to alert site employees and local fire department of emergencies, and reporting instructions shall be conspicuously posted at phones and entrances.

- A ≥2A-rated fire extinguisher, or equivalent, shall be provided for each 3000 $ft.^2$ of building. Travel distance from any point to the nearest fire extinguisher shall be ≤100 ft. Multi-story buildings shall have at least one fire extinguisher on each floor, located adjacent to the stairway.

- A 10B-rated fire extinguisher shall be within 50 ft. of 5 gal of flammable or combustible liquids or 5 lb of flammable gas. Motor vehicle fuel tanks are excluded.

- Automatic sprinkler system installation should closely follow construction and be expeditiously placed in service following completion of each story.

- Sprinkler control valves shall be operated by authorized persons only and shall be checked at close of daily work to verify that protection is in service.

- Standpipes shall be functional as soon as possible and maintained as construction progresses. Standpipes shall have at least one hose connection at each floor and a conspicuously marked double connection outside the structure at grade level.

- Fire walls, fire doors, automatic closing devices, and exit stairways shall have construction priority and shall be retained in buildings undergoing any alteration.

L.2 Fire Prevention

The following attributes are based on the requirements of 29 CFR 1926.151:

- Operations that constitute a fire hazard shall be conspicuously posted "No Smoking or Open Flame."

- Hose nozzles used to clean or ventilate tanks containing hazardous concentrations of flammable vapors shall be bonded to the tank. Bonding devices shall not be attached/removed in hazardous concentrations of flammable gases or vapors.

- Temporary buildings shall not adversely affect any means of exit and when located within another building/structure, shall be noncombustible, or shall have a fire resistance time of at least one hour.

- Temporary buildings/structures ≤2000 ft.^{2} in aggregate, located outside and not used for storing, handling, or using flammable gases or similar hazardous materials, shall be located ≥10 ft. from another building/structure.

- Outdoor storage areas shall have the following attributes:

  - Combustible materials piled, considering stability and in no case >20 ft. high

  - Driveways ≥15 ft. wide around combustible storage piles, free of rubbish or other materials and spaced so the maximum grid system unit is 50 x 150 ft.

  - Free from weeds, grasses, and other unnecessary combustible materials

  - No combustible materials stored within 10 ft. of a building or structure

  - Fire extinguishers rated ≥2A provided at convenient, conspicuously accessible locations ≤100 ft.

- Indoor storage areas shall have the following attributes:

  - Combustible materials stored, handled, and piled considering fire characteristics and non-compatible materials segregated by at least a 1-hr fire barrier

  - Storage not adversely affecting the means of exit

  - Material stored in a stable manner that minimizes the spread of fire, permits convenient access, and allows aisles to safely accommodate the widest vehicle that may be used for fire fighting

  - Clearance maintained ≥36 in. between top of stored material and sprinkler deflectors and adequate clearance maintained around lights and heating units

  - Combustible material stored ≥3 ft. from fire doors and a clearance of ≥24 in. maintained around the path of fire door travel unless a barricade is provided.

L.3 Flammable and Combustible Liquids

The following attributes are based on the requirements of 29 CFR 1926.152:

- Approved safety cans or Department of Transportation approved containers shall be used for flammable liquids in quantities ≤5 gal. Extremely hard to pour (highly viscous) flammable liquid is excepted, and the original shipping container may be used.

- Flammable or combustible liquids shall not be stored in exits, stairways, or areas for personnel passage.

- Flammable and combustible liquid >25 gal shall be stored in approved storage cabinets. No more than 60 gal of flammable or 120 gal of combustible liquid shall be stored in any one cabinet. No more than three cabinets may be located in a single area. Larger quantities shall be stored in an approved inside storage room.

- Approved inside storage rooms for flammable and combustible storage shall have the following attributes:

  - Materials that react with water, creating a fire hazard, prohibited from being stored in the same room with flammable or combustible liquids

  - Clear aisles ≥3 ft. wide maintained

  - Containers >30 gal. stacked one on the other prohibited

  - A ≥20B rated fire extinguisher located outside of, but ≤10 ft. from, the door into any room used for storing >60 gal. of flammable or combustible liquids.

- Outside storage areas for flammable and combustible liquids in excess of that permitted in inside storage rooms shall have the following attributes:

  - Containers limited to ≤60 gal. and each group of containers limited to ≤1,100 gal

  - Free of weeds, debris and other combustible material not necessary for storage

  - Container groups separated by 5 ft. and no group <20 ft. from a building

  - A 12-ft.-wide access way within 200 ft. of each container group

  - Graded to divert spills away from buildings or be surrounded by a 1-ft.-high curb or earth dike with proper provisions for draining, drain termination, and access

  - A ≥20B rated fire extinguisher located ≥25 ft. but ≤75 ft. from the storage area.

- Outdoor flammable tank storage shall have the following attributes:
  - ≥20 ft. from any building
  - Tanks with combined capacity >2,200 gal or individual portable tanks >1,100 gal separated by a 5-ft. clear area
  - A 12-ft.-wide access way within 200 ft. of each portable tank
  - Emergency venting and other devices on portable tanks.
- A ≥20B/C-rated fire extinguisher shall be located on all tank trucks or vehicles used for transporting and/or dispensing flammable or combustible liquids.
- Areas where flammable or combustible liquids are transferred in quantities >5 gal shall be separated from other areas by 25 ft. or by a fire resistant barrier, have spill control, and have ventilation adequate to maintain flammable vapor to ≤10% of the lower flammable limit. (Acceptance assessment of facility is made by the site contractor.)
- Containers shall be bonded (electrically interconnected) when transferring flammable liquids from one container to another, and the nozzles/dispensing devices shall be of an approved type.
- Flammable liquids shall be kept in closed containers when not in use.
- Leaks and spills of flammable liquids shall be remediated promptly and safely.
- Flammable liquids shall not be used within 50 ft. of open flames or other ignition sources.
- Temporary heating devices shall be installed according to manufacturer's specifications on the unit. If specifications are not listed, clearance to combustible material of not less than the distances listed in Table L-1 shall be provided.
- Heaters used in the vicinity of combustible tarpaulins, canvas, or similar coverings shall be ≥10 ft. from the coverings and the coverings shall be securely fastened.
- Heaters shall be set horizontally level unless otherwise permitted by manufacturer markings.
- Solid fuel heaters (salamanders) are prohibited in buildings and on scaffolds.

Table L- 1 Minimum Distance for Combustible Material from Heating Devices

Appliance Type	Sides	Rear	Chimney Connector
Circulating	12 in.	12 in.	18 in.
Radiant	36 in.	36 in.	18 in.

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Appendix M. Electrical Transmission and Distribution Inspection Attributes

Any metal tower construction, tower-footing excavation, cable stringing operation, conductor removal, etc., will be performed by the utility personnel responsible for providing the power. Refer to 29 CFR 1926.955(b) through (e) for guidance.

If the Hanford Electrical Dispatch Center is involved in the activities below, all lock and tag and line clearances will be directed from that point.

M.1 General Requirements

The following attributes are based on the requirements of 29 CFR 1926.950:

- Electrical equipment shall be considered energized until tested and determined to be de-energized or grounded.
- Before anyone works on or near energized lines or equipment, operating voltages shall be determined.
- No employee shall approach or take any conductive object closer to exposed energized parts than the minimum working distances listed in Table M-1 unless the employee or energized part is properly insulated or guarded.
- For live-line, bare-hand work, employees shall be isolated, insulated, or guarded from conductive objects.
- Minimum working and clear hot-stick distances stated in Table M-1 shall not be violated.

Table M-1 Minimum Working and Clear Hot-Stick Distances

Voltage Range (phase to phase in kVs)	Minimum Working and Clear Hot-Stick Distance
2.1 to 15	2 ft. 0 in
15.1 to 35	2 ft. 4 in
35.1 to 46	2 ft. 6 in
46.1 to 72.5	3 ft. 0 in
72.6 to 121	3 ft. 4 in
138 to 145	3 ft. 6 in
161 to 169	3 ft. 8 in
230 to 242	5 ft. 0 in
345 to 362	7 ft. 0 in
500 to 552	11 ft. 0 in
700 to 765	15 ft. 0 in

- When lines and equipment operated at >600 volts are de-energized, the following provisions apply:

  - The line/equipment shall be clearly identified and all voltage sources isolated.

  - All switches/disconnects providing energy to lines and equipment shall be verified to have been de-energized, and they shall be plainly tagged indicating work is ongoing.

  - All lines and equipment shall be inspected and tested to ensure they are de-energized.

  - Protective grounds shall be installed on disconnected lines and equipment to be worked on.

  - Guards and barriers shall be erected adjacent to energized lines as necessary.

  - When more than one crew requires the same line or equipment to be de-energized, the person in charge of each crew shall place a prominent tag on the line or equipment. If Hanford Dispatch is in control, their line clearance procedure will prevail.

  - After completing the work, the person in charge of each crew shall determine that all employees in the crew are clear and that protective grounds installed by that crew are removed and shall report to the designated authority that all tags protecting that crew may be removed.

- Employers shall provide training or require employees to be knowledgeable and proficient in emergency procedures and first-aid fundamentals including resuscitation. In lieu of this and in the absence of an infirmary, clinic, hospital, or physician within a reasonable time/distance, a person with a valid certificate in first-aid shall be available at the work site.

- Spot or portable emergency lighting shall be provided as needed at night to perform work safely.

- Insulating-type hydraulic fluids shall be used for insulated sections of trucks, aerial lifts, and hydraulic tools used on or around energized lines and equipment.

- Refer to 29 CFR 1926.104 through 29 CFR 1926.106 for work near and over water.

M.2 Tools and Protective Equipment

The following attributes are based on the requirements of 29 CFR 1926.951:

- Rubber protective equipment shall be approved by the American National Standards Institute (ANSI) and visually inspected, and rubber gloves air tested before they are used. Material other than rubber shall provide equal or better electrical and mechanical protection.

- Employees exposed to falling objects, electric shock, or burns shall wear ANSI-approved protective hats.

- Body belts and safety straps (fall arrest equipment) shall meet the requirements of 29 CFR 1926.959, be worn by employees working at elevated locations, be inspected before each use, and be free from metal hooks and tool loops except as permitted by 29 CFR 1926.959.

- Portable metal or conductive ladders shall not be used near energized lines or equipment. Refer to 29 CFR 1926.951(c)(1) for specialized work exception.

- Live-line tools shall be wiped clean and visually inspected before they are used each day. Refer to 29 CFR 1926.951(d)(1) for manufacturer and certification requirement.

- Measuring tapes/ropes that contain metal or conductive strands shall not be used near energized systems.

- Portable electric hand tools shall be properly grounded or double insulated; hydraulic and pneumatic tools used around energized lines or equipment shall use non-conducting hoses designed for the operating pressures; and supply air compressors shall have moisture collection.

M.3 Mechanical Equipment

The following attributes are based on the requirements of 29 CFR 1926.952:

- Visual inspection and testing shall be performed each day equipment is used. Equipment shall be in good condition with brakes and operating systems in proper working order.

- Vehicles with obstructed rear views shall have reverse signal alarms or use an observer for safe backing.

- When working near energized lines or equipment, aerial lift trucks shall be grounded, barricaded, and considered as energized equipment or insulated for the work being performed. Nothing shall be passed between a pole/structure and an aerial lift while an employee working from the basket is within reaching distance of unprotected energized conductors or equipment.

- Mechanical equipment shall not be operated closer to any energized line or equipment than the clearances set forth in Table M-6 unless an insulated barrier is installed between

the energized part and the mechanical equipment or the mechanical equipment is grounded, insulated, or considered as energized.

M.4 Material Handling

The following attribute are based on the requirements of 29 CFR 1926.953:

- Refer to 29 CFR 1926.953 for unloading of material, pole hauling, storage, tag line use, or working with oil-filled equipment.

M.5 Grounding for Protecting Employees

The following attributes are based on the requirements of 29 CFR 1926.954:

- Bare wire communications conductors on power poles or structures shall be treated as energized.
- De-energized conductors and equipment, which are to be grounded, shall be tested for voltage.
- When grounds are being attached, the ground end shall be attached first and the other end attached to the line or equipment using insulated tools. When removing grounds, the grounding device shall first be removed from the line or equipment using insulated tools.
- Grounds shall be placed between the work location and all sources of energy, as close as practicable to the work location. If work is to be performed at more than one location in a line section, the section must be grounded and short circuited at one location and grounded at each work location.
- The minimum distance shown in Table M-1 shall be maintained from ungrounded conductors.
- When grounding is not practical or a greater hazard would result than working on the lines or equipment without grounding, the grounds may be omitted; but the line or equipment shall be worked as energized.
- Extreme caution shall be exercised when temporarily removing grounds for testing.
- Grounding to a tower requires using a tower clamp that can conduct the anticipated fault current.
- When grounding electrodes are used, they shall have a resistance to ground low enough to remove the danger of harm to personnel or permit prompt operation of protective devices.

- Tower or driven ground leads shall be able to conduct the anticipated fault current.

M.6 Overhead Lines

The following attributes are based on the requirements of 29 CFR 1926.955:

- Poles, ladders, scaffolds, and other elevated structures shall not be climbed unless they are inspected and determined safe or are made safe by guying, bracing, or other adequate means.

- Strains to which poles and structures will be subjected shall be considered—and appropriate action taken—before wire or cable is installed or removed.

- The minimum distance shown in Table M-1 shall be maintained for equipment/machinery operating near energized lines or equipment. Lifting equipment shall be grounded or considered energized and barricaded. Employees on the ground shall avoid contact unless appropriate protective equipment is used.

- Pole holes shall not be left unattended or unguarded in areas where employees are working.

- Nonconductive tag lines shall be used near energized lines.

M.7 Underground Lines

The following attribute is based on the requirements of 29 CFR 1926.956:

- Refer to 29 CFR 1926.956 for guidance on working on underground lines and in manholes and on trenching and excavating in working on underground lines.

M.8 Construction in Energized Substations

The following attributes are based on the requirements of 29 CFR 1926.957:

- When work is performed in an energized substation, the facilities that are energized and the necessary protective equipment and precautions shall be determined.

- Barricades/barriers shall be installed and signs posted to prevent contact with energized lines/equipment. The minimum distances shown in Table M-1 shall be maintained.

- Precautions shall be taken to prevent accidental operation of relays when working near control panels.

- Mobile cranes shall be grounded when being moved or operated near energized lines or equipment, or they shall be considered energized and appropriate precautions taken.

- An adequately grounded temporary fence shall be provided when a substation fence is expanded or removed for construction and the site is unattended. Gates to unattended substations shall be locked.

- Excavations for auger, pad, and piling type footings shall be sloped to the angle of repose or shored if entry is required, the material is unstable, and the footings are ≥5 ft. deep. No employee shall be permitted to enter an unsupported auger-type excavation in unstable material for any purpose.

M.9 External Load Helicopters

These criteria are not expected to apply to the Contractor. For requirements, refer to 29 CFR 1926.958.

M.10 Lineman's Body Belts, Safety Straps, and Lanyards

The following attributes are based on the requirements of 29 CFR 1926.959:

- Body belts, safety straps and lanyards shall have smooth surfaces and be free of sharp edges. The cushion part of the body belt shall contain no exposed rivets on the inside.

- Refer to 29 CFR 1926.559 for detailed design, manufacturing, strength, testing, and wear indicator requirements.

M.11 Definitions

Refer to 29 CFR 1926.960 for definitions applicable to this subpart.

Appendix N. Occupational Health and Industrial Hygiene Inspection Attributes

N.1 Medical Services/First Aid

The following attributes are based on the requirements of 29 CFR 1926.23 and 29 CFR 1926.50:

- First aid services and provisions for medical care shall be made available by the employer for every employee covered by these regulations. Regulations prescribing specific requirements for first aid, medical attention, and emergency facilities are contained in Subpart D in 29 CFR 1926.50.

- The employer shall ensure that medical personnel are available for advice and consultation on matters of occupational health.

- Before a project begins, provisions shall be made for prompt medical attention in case of serious injury.

- If an infirmary (treatment facility), clinic, hospital, or physician is not reasonably accessible, in terms of time and distance to the worksite, a person who has a valid certificate in first-aid training from the U.S. Bureau of Mines, the American Red Cross, or equivalent training that can be verified by documentary evidence, shall be available at the worksite to render first aid.

- First aid supplies shall be easily accessible when required. (See 29 CFR 1926.50, Appendix A, for details, guidance on "blood borne" first aid protection, and adequacy of supplies and equipment.)

- 29 CFR 1926.50(d)(2) provides requirements for storing first aid supplies.

- 29 CFR 1926.50(e) requires a system for transporting injured personnel.

- 29 CFR 1926.50(f) requires immediate telephone call system and emergency number posting.

- 29 CFR 1926.50(g) requires quick drenching or flushing in cases of corrosive material exposure.

N.2 Crystalline Silica

Refer to 29 CFR 1926.55, Appendix A, for silica exposure limits (sampling and employee monitoring).

N.3 Sound Level

The following attributes are based on the requirements of 29 CFR 1926.52:

- Protection against the effects of noise exposure shall be provided when the sound levels exceed those shown in Table I-1 of this procedure when measured on the A-scale of a standard sound level meter at slow response.

- When employees are subjected to sound levels exceeding those listed in Table I-1 of this procedure, feasible administrative or engineering controls shall be used. If such controls fail to reduce sound levels within the levels of the table, personal protective equipment as required in Subpart E, shall be provided and used to reduce sound levels within the levels of the Table.

- In all cases where the sound levels exceed the values shown herein, a continuing, effective hearing conservation program shall be administered. (Refer to Table I-1 in Appendix I, "Personal Protective Equipment," for sound level per time limits.)

  - 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. Exposure to different levels for various periods of time shall be computed according to the following formula.

    F(e)=(T(1)divided by L(1))+(T(2)divided by L(2))+ ... + (T(n) divided by L(n))

    where:

    F(e) = The equivalent noise exposure factor.

    T = The period of noise exposure in hours at any essentially constant level.

    L = The duration of the permissible noise exposure at the constant level in hours (from Appendix I, Table I-1 or 29 CFR 1926.52 Table D-2).

  - If the value of F(e) exceeds unity (1), the exposure exceeds permissible levels.

- Exposure to impulsive or impact noise should not exceed 140 dBA peak sound pressure level.

N.4 Housekeeping

The following attributes are based on the requirements of 29 CFR 1926.25 and 29 CFR 1926.51:

- During construction, alteration, or repairs, form and scrap lumber with protruding nails and all other debris shall be kept cleared from work areas, passageways, and stairs in and around buildings or other structures.

- Combustible scrap and debris shall be removed at regular intervals during construction. Safe means shall be provided to facilitate such removal.

- Containers shall be provided for collecting and separating waste, trash, oily and used rags, and other refuse. Containers used for garbage and other oily, flammable, or hazardous wastes, such as caustics, acids, and harmful dusts, shall be equipped with covers. Garbage and other waste shall be disposed of at frequent and regular intervals.

- Every enclosed workplace shall be constructed, equipped, and maintained, as reasonably as is practicable, to prevent the entrance or harborage of rodents, insects, and other vermin. A continuing and effective extermination program shall be instituted where the presence of vermin is detected.

  NOTE: Good housekeeping in trailers and storage areas is the prime prevention for vermin!

N.5 Miscellaneous

The following attributes are based on the requirements of 29 CFR 1926.33 and 29 CFR 1926.51:

- When temporary sleeping quarters are provided, they shall be heated, ventilated, and lighted.

- The requirements applicable to access employee exposure and medical records within construction operations are covered in 29 CFR 1910.1020.

- Whenever employees are required by a particular standard to wear protective clothing because of the possibility of contamination with toxic materials, change rooms equipped with storage facilities for street clothes and separate storage facilities for the protective clothing shall be provided.

N.6 Gases, Vapors, Fumes, Dust, and Mist Identification, Assessment, and Control

The following attributes are based on the requirements of 29 CFR 1926.55:

- Exposure of employees to inhalation, ingestion, skin absorption, or contact with any material or substance at a concentration above those specified in the "Threshold Limit Values of Airborne Contaminants for 1970" of the American Conference of Governmental Industrial Hygienists, shall be avoided. See Appendix A to 29 CFR 1926.55. (The Inspector shall verify that Contractor is monitoring employee exposures in accordance with this section.)

- Administrative or engineering controls must first be implemented whenever feasible. When such controls are not feasible to achieve full compliance, protective equipment or other protective measures shall be used to keep the exposure of employees to air contaminants within the limits prescribed in this section. Any equipment and technical measures used for this purpose must first be approved for each particular use by a competent industrial hygienist or other technically qualified person. Whenever respirators are used, their use shall comply with 29 CFR 1926.103.

These attributes do not apply to employee exposure to airborne asbestos, tremolite, anthophyllite, or actinolite dust. If an employee experiences such exposure, the requirements of 29 CFR 1910.1101 or 29 CFR 1926.58 shall apply.

These attributes do not apply to the exposure of employees to formaldehyde. If such exposure occurs, the requirements of 29 CFR 1910.1048 shall apply.

N.7 General HAZCOM Requirements

The following attributes are based on the requirements of 29 CFR 1926.59 and the Occupational Safety and Health Act, Section 5. NOTE: The requirements applicable to construction work in 29 CFR 1926.59 are identical to those in 29 CFR 1910.1200.

- Workplaces shall be free from recognized hazards that are causing or are likely to cause death or serious physical harm to employees.

- The hazards of all chemicals produced or imported are to be evaluated. The hazard information is to be transmitted to employers and employees by a comprehensive hazard communication (HAZCOM) program that includes, but is not limited to, the following:

  - Developing and maintaining a written HAZCOM plan, including lists of hazardous chemicals present

  - Labeling onsite and "to be shipped" containers and other forms of warning

  - Preparing and distributing Material Safety Data Sheets (MSDS) that are readily and easily available to employees and downstream employers

  - Developing and implementing employee training programs on the hazards of chemicals and protective measures.

- As a result of the above requirement, all employers shall provide their employees with information about the hazardous chemicals to which they are exposed: all chemicals in the workplace currently and in the foreseeable future. NOTE: 29 CFR 1926.59(b)(5) covers the chemicals that are not required to be labeled, and 29 CFR 1926.59(b)(6) covers the chemicals that do not apply under HAZCOM.

- Employers shall identify and evaluate individual chemicals and chemical mixtures as health hazards and/or carcinogens as specified in 29 CFR 1926.59. Evaluations of chemical exposure hazards will be included in the written program.

N.8 Labels and Other Forms of Warning

The following attributes are based on the requirements of 29 CFR 1926.59:

- For solid metal (e.g., a steel beam or a metal casting), solid wood, or plastic items that are not exempted as articles because of their downstream use, the required label may be transmitted to the customer at the time of the initial shipment and does not need to be included with subsequent shipments to the same employer unless the information on the label changes:

  - The label may be transmitted with the initial shipment itself or with the MSDS that is to be provided before or at the time of the first shipment.

  - This exception to requiring labels on every container of hazardous chemicals is only for the solid material itself and does not apply to hazardous chemicals used in conjunction with, or known to be present with, the material and to which employees handling the items in transit may be exposed (e.g., cutting fluids).

- If the hazardous chemical is regulated by OSHA in a substance-specific health standard, the employer shall ensure that the labels or other forms of warning used are according to the requirements of that standard.

- Except as provided in 29 CFR 1926.59(f)(6) and (7), the employer shall ensure that each container of hazardous chemicals in the workplace is labeled, tagged, or marked with the following information:

  - Identity of the hazardous chemical(s) contained therein

  - Appropriate hazard warnings, or alternatively, words, pictures, symbols, or combinations thereof, that provide at least general information on the chemicals' hazards and that, in conjunction with the other information immediately available to employees under the HAZCOM program, will provide employees with the specific information on the physical and health hazards of the hazardous chemical

  - The employer may use signs, placards, process sheets, batch tickets, operating procedures, or other such written materials instead of affixing labels to individual stationary process containers if the alternative method identifies the containers to which it is applicable and conveys the information required by 29 CFR 1926.59(f)(5) on a label. The written materials shall be readily accessible to the employees in their work area throughout each work shift.

- The employer is not required to label portable containers into which hazardous chemicals are transferred from labeled containers or containers that are intended only for the immediate use of the employee who performs the transfer.

- The employer shall not remove or deface existing labels on incoming containers of hazardous chemicals unless the container is immediately marked with the required information.

- The employer shall ensure that labels or other forms of warning are legible, in English, and prominently displayed on the container or readily available in the work area throughout each work shift. NOTE: Employers having employees who speak other languages may add the information in that language(s) if the information also is presented in English.

- The employer does not need to affix new labels to comply with this section if existing labels already convey the required information.

- Employers who become newly aware of any significant information on the hazards of a chemical shall revise the labels for the chemical within three months of becoming aware of the new information. Labels on containers of hazardous chemicals shipped after that time shall contain the new information. If the chemical is not currently produced or imported, the employer shall add the information to the label before the chemical is shipped or introduced into the workplace again.

N.9 MSDSs

The following attributes are based on the requirements of 29 CFR 1926.59:

- Employers shall have an MSDS in the workplace for each hazardous chemical they use.

- Each MSDS shall be in English (although the employer may maintain copies in other languages as well) and shall contain at least the following information.

    - The identity of the chemical used on the label and the following:

        - If the hazardous chemical is a single substance, its chemical and common name(s).

        - If the hazardous chemical is a mixture that has been tested as a whole to determine its hazards, the chemical and common name(s) of the ingredients that contribute to these known hazards, and the common name(s) of the mixture itself.

        - If the hazardous chemical is a mixture that has not been tested as a whole, the following is done:

  - The chemical and common name(s) of all ingredients that have been determined to be health hazards and chemicals that compose 1% or greater of the composition, except chemicals identified as carcinogens under paragraph (d) of 29 CFR 1926.59, which shall be listed if the concentrations are 0.1% or greater.

  - The chemical and common name(s) of all ingredients determined to be health hazards and composing less than 1% (0.1% for carcinogens) of the mixture if evidence exists that the ingredient(s) could be released from the mixture in concentrations that would exceed an established permissible exposure limit by OSHA or the American Conference of Governmental Industrial Hygienists' (ACGIH's) Threshold Limit Value or could present a health risk to employees.

  - The chemical and common name(s) of all ingredients that have been determined to present a physical hazard when present in the mixture.

- Physical and chemical characteristics of the hazardous chemical (e.g., vapor pressure and flash point).

- The physical hazards of the hazardous chemical, including the potential for fire, explosion, and reactivity.

- The health hazards of the hazardous chemical, including signs and symptoms of exposure, and any medical conditions that are generally recognized as being aggravated by exposure to the chemical.

- The primary route(s) of entry.

- The OSHA permissible exposure limit, the ACGIH Threshold Limit Value, and any other exposure limit used or recommended by the chemical manufacturer, importer, or employer preparing the MSDS, where available.

- Whether the hazardous chemical is listed in the National Toxicology Program's Annual Report on Carcinogens (latest edition) or has been found to be a potential carcinogen in the International Agency for Research on Cancer Monographs (latest editions) or by OSHA.

- Any generally applicable precautions for safe handling and use that are known to the chemical manufacturer, importer, or employer preparing the MSDS, including appropriate hygienic practices, protective measures during repair and maintenance of contaminated equipment, and procedures for cleanup of spills and leaks.

- Any generally applicable control measures that are known to the chemical manufacturer, importer or employer preparing the MSDS, such as appropriate engineering controls, work practices, or personal protective equipment.

- Emergency and first aid procedures.

- The date the MSDS was prepared or the last change to it.

- The name, address, and telephone number of the chemical manufacturer, importer, employer, or other responsible party preparing or distributing the MSDS, who can provide additional information on the hazardous chemical and appropriate emergency procedures, if necessary.

- If no relevant information is found for any given category on the MSDS, the chemical manufacturer, importer, or employer preparing the MSDS shall mark it to indicate that no applicable information was found.

- Where complex mixtures have similar hazards and contents (i.e., the chemical ingredients are essentially the same, but the specific composition varies from mixture to mixture), the chemical manufacturer, importer, or employer may prepare one MSDS to apply to all of these similar mixtures.

- The chemical manufacturer, importer, or employer preparing the MSDS shall ensure that the information recorded accurately reflects the scientific evidence used in determining the hazard. If the chemical manufacturer, importer, or employer preparing the MSDS becomes aware of any significant information on a chemical's hazards or ways to protect against the hazards, this new information shall be added to the MSDS within three months.

- Chemical manufacturers or importers shall ensure that distributors and employers are provided an appropriate MSDS with their initial shipment and with the first shipment after an MSDS is updated.

- The chemical manufacturer or importer shall either provide MSDSs with the shipped containers or send them to the distributor or employer before or at the time of the shipment.

- If the MSDS is not provided with a shipment that has been labeled as a hazardous chemical, the distributor or employer shall obtain an MSDS from the chemical manufacturer or importer as soon as possible.

- The chemical manufacturer or importer shall provide distributors or employers with an MSDS upon request.

- Distributors shall ensure that MSDSs and updated information are provided to other distributors and employers with their initial shipment and with the first shipment after an MSDS is updated.

- The distributor shall either provide MSDSs with the shipped containers or send them to the other distributor or employer before or at the time of the shipment.

- Retail distributors selling hazardous chemicals to employers having a commercial account shall provide an MSDS to such employers upon request and shall post a sign or otherwise informing them that an MSDS is available.

- Wholesale distributors selling hazardous chemicals over-the-counter may also provide MSDSs, upon the request of the employer at the time of the over-the-counter purchase and shall post a sign or otherwise inform such employers that an MSDS is available.

- If an employer without a commercial account purchases a hazardous chemical from a retail distributor not required to have MSDSs on file (i.e., the retail distributor does not have commercial accounts and does not use the materials), the retail distributor shall provide the employer, upon request, with the name, address, and telephone number of the chemical manufacturer, importer, or distributor from whom an MSDS can be obtained.

- Wholesale distributors shall also provide MSDSs to employers or other distributors upon request.

- The employer shall maintain in the workplace, copies of the required MSDSs for each hazardous chemical and shall ensure that they are readily accessible during each work shift to employees when they are in their work area(s). (Electronic access, microfiche, and other alternatives to maintaining paper copies of the MSDSs are permitted as long as no barriers to immediate employee access in each workplace are created by such options.)

- When employees must travel between workplaces during a workshift (i.e., their work is carried out at more than one geographical location), the MSDSs may be kept at the primary workplace facility. In this situation, the employer shall ensure that employees can immediately obtain the required information in an emergency.

- MSDSs may be kept in any form, including operating procedures, and may be designed to cover groups of hazardous chemicals in a work area where it may be more appropriate to address the hazards of a process rather than individual hazardous chemicals. However, the employer shall ensure that in all cases the required information is provided for each hazardous chemical and is readily accessible during each work shift to employees in their work area(s).

- MSDSs shall also be made readily available, upon request, to designated representatives and to the Regulatory Unit (RU) according to the requirements of 29 CFR 1910.1020(e). The RU staff shall also be given access to MSDSs in the same manner.

N.10 Employee Information and Training

The following attributes are based on the requirements of 29 CFR 1926.59:

- Employers shall provide employees with effective information and training on hazardous chemicals in their work area at the time of their initial assignment and whenever a new physical or health hazard for which the employees have not previously been trained is introduced into their work area. Information and training may be designed to cover categories of hazards (e.g., flammability or carcinogenicity) or specific chemicals. Chemical-specific information must always be available through labels and MSDSs.

- Employees shall be informed of the following:

  - The requirements of 29 CFR 1926.59

  - Any operations in their work area where hazardous chemicals are present

  - The location and availability of the written HAZCOM program, including the required list(s) of hazardous chemicals and MSDSs required by this section.

- Employee training shall include, at a minimum, the following:

  - Methods and observations that may be used to detect the presence or release of a hazardous chemical in the work area (e.g., monitoring conducted by the employer, continuous monitoring devices, and 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

  - The details of the HAZCOM program developed by the employer, including an explanation of the labeling MSDS system, and how employees can obtain and use the appropriate hazard information.

  - If harmful plants or animals are present and employees may be exposed, they must be informed of the risk, how best to avoid injury, and the first aid procedure in accordance with 29 CFR 1926.21(b)(4).

Appendix O. Employee Egress and Emergency Action Plan Inspection Attributes

O.1 General Requirements

General requirements are found in 29 CFR 1926.34.

O.2 Alarm System

The following attributes are based on the requirements of 29 CFR 1926.35:

- The employer shall establish an employee alarm system that complies with 29 CFR 1926.159.
- If the employee alarm system is used for alerting fire brigade members or for other purposes, a distinctive signal for each purpose shall be used. Any other Hanford-related alarms impacting the construction operations will also be included.

O.3 Training

The following attributes are based on the requirements of 29 CFR 1926.35:

- Before implementing the emergency action plan, the employer shall designate and train enough people to assist in the safe and orderly emergency evacuation of employees.
- The employer shall review the plan with each employee covered by the plan at the following times:
  - Initially when the plan is developed.
  - Whenever the employee's responsibilities or designated actions under the plan change.
  - Whenever the plan is changed.
- The employer shall review with each employee at their initial assignment, the parts of the plan that the employee must know to protect themselves in the event of an emergency.

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Appendix P. Steel Erection Inspection Attributes

P.1 General Requirements

- The significant industrial safety control attributes are based upon a composite of regulations from 29 CFR 1926.750, 29 CFR 1926.105(a), 29 CFR 1926.104, and 29 CFR 1926.1076)(c) and (f). Additionally, the OSHA general duty clause, OSH Act Section 5(a)(1), also has been applied in the field enforcement of fall protection issues related to steel erection.

- The credible risks requiring employee protection are:

  - Falls from elevated heights.
  - Crushing and pinching.
  - Structural collapse resulting in personnel injuries.

- The single most significant and confounding issue regarding the vertical standard relating to fall protection is where and when it must be provided.

- The RPP-WTP is not anticipated to be a tiered unit thereby requiring fall protection both interior and exterior for fall hazards of ≥ 25 feet. Additionally, regional enforcement information and directives have invoked (under certain situations) the general duty clause, for employees working at elevations under that required by 29 CFR 1926.105(a).

NOTE: It is prudent that the RPP-WTP Contractor have a management approved fall protection plan for steel erection, in order to minimize unnecessary risk and work stoppages.

P.2 Flooring Requirements

The following attributes are based on the requirements of 29 CFR 1926.750:

- Permanent flooring-skeleton steel construction in tiered buildings:

  - The permanent floors shall be installed as the erection of structural members progresses.

  - At no time shall there be more than four floors or 48 feet of unfinished bolting or welding above the foundation or uppermost permanently secured floor.

- Temporary flooring-skeleton steel construction in tiered buildings:

  - The derrick or erection floor shall be solidly planked or decked over its entire surface except for access openings. Planking or decking of equivalent strength shall be of proper thickness to carry the working load. Planking shall be not less than 2 inches thick full size undressed, and shall be laid tight and secured to prevent movement.

- Safety nets shall be installed and maintained whenever the potential fall distance exceeds two stories or 25 feet. The nets shall be hung with sufficient clearance to prevent contacts with the surface of structures below.

- Floor periphery-safety railing. A safety railing of 1/2-inch wire rope or equal shall be installed, approximately 42 inches high, around the periphery of all temporary-planked or temporary metal-decked floors of tier buildings and other multi-floored structures during structural steel assembly.

- When gathering and stacking temporary floor planks, the planks shall be removed successively, working toward the last panel of the temporary floor so that the work is always done from the planked floor.

- When gathering and stacking temporary floor planks from the last panel, the employees assigned to such work shall be provided fall protection.

- Flooring-other construction.

  - In the erection of a building having double wood floor construction, the rough flooring shall be completed as the building progresses, including the tier below the one on which floor joists are being installed.

  - For single wood floor or other flooring systems, the floor immediately below the story where the floor joists are being installed shall be kept planked or decked over.

P.3 Structural Steel Assembly

The following attributes are based on the requirements of 29 CFR 1926.751:

- During the final placing of solid web structural members, the load shall not be released from the hoisting line until the members are secured with not less than two bolts, or the equivalent at each connection and drawn up wrench tight.

- Open web steel joists shall not be placed on any structural steel framework unless such framework is safely bolted or welded.

- In steel framing, where bar joists are utilized, and columns are not framed in at least two directions with structural steel members, a bar joist shall be field-bolted at columns to provide lateral stability during construction.

- Where longspan joists or trusses, 40 feet or longer, are used, a center row of bolted bridging shall be installed to provide lateral stability during construction prior to slacking of hoisting line.

- No load shall be placed on open web steel joists until these security requirements are met.

- Tag lines shall be used for controlling loads.

P.4 Bolting, Riveting, Fitting-Up, and Plumbing-Up

The following attributes are based on the requirements of 29 CFR 1926.752:

- Containers shall be provided for storing or carrying rivets, bolts, and drift pins, and secured against accidental displacement when aloft.
- Pneumatic hand tools shall be disconnected from the power source, and pressure in hose lines shall be released, before any adjustments or repairs are made.
- Airline hose sections shall be tied together except when quick disconnect couplers are used to join sections.
- Eye protection shall be provided in accordance with 29 CFR 1926 Subpart E.
- Bolting:
  - When bolts or drift pins are being knocked out, means shall be provided to keep them from falling.
  - Impact wrenches shall be provided with a locking device for retaining the socket.
- Riveting:
  - Riveting shall not be done in the vicinity of combustible material unless precautions are taken to prevent fire.
  - When rivet heads are knocked off, or backed out, means shall be provided to keep them from falling.
  - A safety wire shall be properly installed on the snap and on the handle of the pneumatic riveting hammer and shall be used at all times. The wire size shall be not less than No. 9 (B&S gauge), leaving the handle and annealed No. 14 on the snap, or equivalent.
- Plumbing-up:
  - Connections of the equipment used in plumbing-up shall be properly secured.
  - The turnbuckles shall be secured to prevent unwinding while under stress.
  - Plumbing-up guys shall be removed only under the supervision of a competent person.

- Wood planking shall be of proper thickness to carry the working load, but shall be not less than 2 inches thick full size undressed, exterior grade plywood, at least 3/4-inch thick, or equivalent material.
- Metal decking of sufficient strength shall be laid tight and secured to prevent movement.
- Planks shall overlap the bearing on each end by a minimum of 12 inches.
- Wire mesh, exterior plywood, or equivalent, shall be used around columns where planks do not fit tightly.
- Provisions shall be made to secure temporary flooring against displacement.
- All unused openings in floors, temporary or permanent, shall be completely planked over or guarded in accordance with 29 CFR 1926 Subpart M.

P.5 Safety Nets

The following attributes are based on the requirements of 29 CFR 1926.753

- For all information regarding safety net requirements see 29 CFR 1926.105.

Appendix Q. Powered Industrial Trucks

This list of attributes applies to industrial trucks only and does not apply to earthmoving machines or over-the road hauling units.

Q.1 General Requirements

The following attributes are based upon requirements of 29 CFR 1910.178:

- Powered Industrial Trucks shall meet the design and construction requirements of the American National Standard for Powered Industrial Trucks, B56.1.

- All trucks shall have labels or identification indicating that the truck is accepted by a nationally recognized testing laboratory.

- No truck modifications will be made without the manufacturer's written approval.

- If the truck is equipped with front end attachments, other than factory installed devices, the user will mark the truck showing the attachments and the approximate weight (with truck and attachments) at maximum elevation with load laterally centered (Attachment may include a special device for drum hauling).

- The above reference lists eleven separate truck types by alphabetical designation. The designation is based upon the type of fuel/power source used and the type of electrical safeguards provided. Certain trucks are restricted from use in some environments due to their ignition risk (Refer to 1910.178, Table N-1, Summary Table on Use of Industrial Trucks in Various Locations).

- High lift rider trucks will be fitted with an overhead guard to protect from falling small objects.

- If the load presents a hazard, a backrest extension shall be provided.

- When dock-boards are required for loading or unloading highway trucks and railroad cars, they shall be secured from movement while the dock-boards are in place. They (the highway trucks or railroad cars) will be set and the wheels choked/stopped while boarding with the industrial truck.

- The truck and rail car beds/floors will be checked to look for breaks or weaknesses prior to operations.

- Sufficient headroom must be available to operate the industrial truck.

- No person will stand under or pass under an elevated load.

- No operator will allow arms or legs to extend between uprights of mast or the running lines of the truck.

- Any unattended truck will have the load fully lowered, power off, brakes set, and wheels blocked (if on an incline). An unattended truck is one which is not within the view of the operator or is further than 25 ft. from the operator.

- Whenever a truck is equipped with vertical only, or vertical and horizontal, controls which are elevated with the lifting carriage or forks for lifting personnel, the following personnel protective measures must be taken:

  - Safety platform is firmly secured to carriage and/or mast
  - Means by which platform personnel can shut off truck power
  - Protection from falling objects as indicated by conditions.

- During operation, passing another truck is not permitted.

- Grades shall be descended or ascended slowly.

- Loads shall be tilted back when moving on a grade.

- An engaged load shall not be tilted forward except when the load is to be deployed.

- All trucks shall be properly maintained/serviced, inspected, and repaired if defects are noted.

Q.2 Training and Certification Requirements

Training and certification requirements for operators are found in 29 CFR 1910.178(l).