

Excavation, Tunneling and Shoring

Description:

The standard sets out cave-in and other protection measures for personnel involved in certain excavation and backfilling operations.

Regulatory Reference

29 CFR Subpart P

29 CFR § 1926.650 Scope, application, and definitions applicable to this subpart

29 CFR § 1926.651 Specific excavation requirements

29 CFR § 1926.652 Requirements for protective systems

Applies to:

These OSHA standards apply to employers and employees involved in excavation and backfilling operations that exceed 4 feet in depth from the original surface profile. The standard applies to all open excavations made in the earth's surface. Excavations are defined to include trenches.

General Requirements:

- (1) The estimated location of utility installations, such as sewer, telephone, fuel, electric, water lines, or any other underground installations that reasonably may be expected to be encountered during excavation work, shall be determined prior to opening an excavation. Utility companies or owners shall be contacted within established or customary local times, advised of the proposed work, and asked to establish the location of the utility underground installations prior to the start of actual excavation. When utility companies or owners cannot respond to a request to locate underground utility installations within 24 hours (unless a longer period is required by state or local law), or cannot establish the exact location of these installations, the employer may proceed, provided the employer does so with caution, and provided detection equipment or other acceptable means to locate utility installations are used.
- (2) While the excavation is open, underground installations shall be protected, supported or removed as necessary to safeguard employees.
- (3) Structural ramps that are used solely by employees as a means of entering or exiting from excavations shall be designed by a competent person. A stairway, ladder, ramp or other safe means of egress shall be located in trench excavations that are 4 feet or more in depth so as to require no more than 25 feet of lateral travel for employees. Structural ramps used for inserting or removing equipment shall be designed by a competent person qualified in structural design, and shall be constructed in accordance with the design.
- (4) *Exposure to vehicular traffic.* Employees exposed to public vehicular traffic shall be provided with, and shall wear, warning vests or other suitable garments marked with or made of reflectorized or high-visibility material.
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- (6) *Warning system for mobile equipment.* When mobile equipment is operated adjacent to an excavation, or when such equipment is required to approach the edge of an excavation, and the operator does not have a clear and direct view of the edge of the excavation, a warning system shall be utilized such as barricades, hand or mechanical signals, or stop logs. If possible, the grade should be away from the excavation.
- (7) *Hazardous atmospheres.* Where oxygen deficiency (atmospheres containing less than 19.5 percent oxygen) or a hazardous atmosphere exists or could reasonably be expected to exist, such as in excavations in landfill areas or excavations in areas where hazardous substances are stored nearby, the atmospheres in the excavation shall be tested before employees enter excavations greater than 4 feet in depth. Adequate precautions shall be taken to prevent employee exposure to atmospheres containing less than 19.5 percent oxygen and other hazardous atmospheres, including providing proper respiratory protection or ventilation.
- Adequate precaution shall be taken such as providing ventilation, to prevent employee exposure to an atmosphere containing a concentration of a flammable gas in excess of 20 percent of the lower flammable limit of the gas.
- (8) *Emergency rescue equipment.* Emergency rescue equipment, such as breathing apparatus, a safety harness and line, or a basket stretcher, shall be readily available where hazardous atmospheric conditions exist or may reasonably be expected to develop during work in an excavation. This equipment shall be attended when in use.
- (9) *Protection from hazards associated with water accumulation.* Employees shall not work in excavations in which there is accumulated water, or in excavations in which water is accumulating, unless adequate precautions have been taken to protect employees against the hazards posed by water accumulation. The precautions necessary to protect employees adequately vary with each situation, but could include special support or shield systems to protect from cave-ins, water removal to control the level of accumulating water, or use of a safety harness and lifeline. A competent person to ensure proper operation shall monitor the water removal equipment and operations if water is controlled or prevented from accumulating by the use of water removal equipment.
- (10) *Protection of employees from loose rock or soil.* Adequate protection shall be provided to protect employees from loose rock or soil that could pose a hazard by falling or rolling from an excavation face. Such protection shall consist of scaling to remove loose material; installation of protective barricades at intervals as necessary on the face to stop and contain falling material; or other means that provide equivalent protection. Employees shall be protected from excavated or other materials or equipment that could pose a hazard by falling or rolling into excavations. Protection shall be provided by placing and keeping such materials or equipment at least 2 feet (.61 m) from the edge of excavations, or by the use of retaining devices that are sufficient to prevent materials or equipment from falling or rolling into excavations, or by a combination of both if necessary.
- (11) *Inspections.* Daily inspections of excavations, the adjacent areas, and protective systems shall be made by a competent person for evidence of a situation that could result in possible cave-ins, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions. An inspection shall be conducted by the competent person prior to the start of work and as needed throughout the shift. Inspections shall also be made after every rainstorm or other hazard-increasing occurrence. These inspections are only required when employee exposure can be reasonably anticipated. Where the competent person finds evidence of a situation that could result in a possible cave-in, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions,

exposed employees shall be removed from the hazardous area until the necessary precautions have been taken to ensure their safety.

- (12) *Requirements for Protective Systems* The OSHA regulations requiring Protective Systems do not normally apply to typical trenching and excavations for the purpose of installation of small diameter (less than 4 feet) ASME underground LP-gas tanks or small diameter buried vapor distribution lines. Protective Systems are expressly not required for excavations less than 5 feet in depth where the examination of the ground by a competent person provides no indication of a potential cave-in.

In deeper excavations Protective Systems may consist of:

- sloping and benching systems constructed according to criteria given in the OSHA standard, or designed by a registered professional engineer
- support systems, shield systems or other protective systems designed by equipment manufacturers and installed according to manufacturer instructions, or those designed by a registered professional engineer.

- (13) If Protective Systems are required for an excavation, written documentation of their design, strength of materials, installation and removal procedures, and other information concerning the Protective Systems must be kept at the jobsite throughout the excavation process.

Training Requirements:

There are no prescribed training requirements for this standard. Company executives may determine that company operations justify a specific standard operating procedure for extraordinary situations such as new plant construction involving underground tank installations, commercial or industrial installations or any job that may call for excavations deeper than 4 to 5 feet or in locations where employees may encounter unstable soil or water table conditions.

Under such conditions, appropriate manager and supervisory training on the company standard operating procedure and the OSHA excavation standard, especially competent person training, would be in order. Consideration should also be given to training underground tank and buried piping installers regarding utility and other underground installations location requirements.

Maintenance and Review

Company operations involving unusual installations should be periodically reviewed to assure that the standards are considered and applied as may be necessary

Additional Information and Resources

Appendix A to Subpart P-Soil Classification, 29 CFR 1926

Appendix B to Subpart P-Sloping and Benching, 29 CFR 1926

Appendix C to Subpart P-Timber Shoring for Trenches, 29 CFR 1926

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