

15.2: Protective Systems

Inspections

Daily inspections

One of the most important responsibilities that the designated competent person has for excavation operation is the daily inspection of the excavation, including adjacent areas and structures, protective systems, hazardous atmospheres and personal protective equipment. Inspections are required to be made prior to the start of work and throughout the entire work shift. It is important to remember that conditions in and around trenches can change quickly. Subpart P requires for example, that excavations be re-inspected after every rain storm or other hazard increasing occurrence.

The competent person has the responsibility for the day-to-day operations in and around the excavation. If he/she determines that a hazard exists or the potential for a hazard exists he/she must take immediate corrective action.

Fall Protection

Walkways and guardrails

Fall protection can also be an important part of the excavation plan. OSHA requires that walkways be provided when employees or equipment cross over excavations. If the walkways are over six ft. above the lower level, they shall be equipped with guardrails.

Barriers

Subpart P also requires that barriers or other means of physical protection be provided around all remotely located excavations. In addition, all wells, pits, shafts, etc., shall be covered. Temporary openings shall be back-filled immediately upon completion of the assigned operation.

Analysis of hazards and protective system

Prior to beginning the excavation, a determination will need to be made regarding the types of protective systems that will be used to protect the employees who must work in and around the excavations. OSHA regulations require that each employee in the excavation must be protected against cave-ins by one of the following types of protective systems: Sloping, Benching, Shielding or other Support Systems.

Sloping

Sloping is a protective system that protects employees within excavations and trenches by excavating the sides of the trench or excavation to form sides that slope away from the excavation so as to protect against cave-ins.

The required angle of the slope depends upon several factors. First and foremost are the soil types. Generally speaking, the more cohesive the soil, the greater the angle of the slope permitted.

The general rule for slope angle is not steeper than one and one-half horizontal to one vertical. This results in an angle of about 34 degrees. There are however options for sloping at greater angles when a determination has been made by a competent person that the soil type will permit the additional slope. Appendix B, of Subpart P provides alternates configurations for sloping systems.

Benching

Benching is a method used to provide protection for employees working in and around excavations. Benching means the sides of the excavation are excavated so as to form one or a series of horizontal levels or steps usually with vertical or near-vertical surfaces between the levels.

The permissible benching configurations are provided in Appendix B, of Subpart P and once again generally depend upon the soil classification. Benching is generally permitted in cohesive soil types only.

Shielding

Shielding is a protective system that employs shields or structures, which are capable of withstanding the force imposed on it by cave-ins and still protect the employees within the shield. By design, shields can be permanent structures or they can be portable and be moved along as the work progresses. Shields used in trenches are usually called trench shields or trench boxes.

Shields are permitted to be either pre-manufactured or job-built in accordance with tabulated data or a registered professional engineer design.

The design of shielding systems shall be done in accordance with one of the following: The Appendices A, C, and D, to Subpart P Manufacturers' Tabulated Data, Other Tabulated Data, or a Registered Professional Engineer's Design.

Shield systems shall not be subjected to loads exceeding those for which the system was designed.

Employees are not permitted in shields when they are being installed removed or moved vertically.

When shields are used in trenching excavations, the excavation of the earth is permitted to a level not greater than two ft. below the bottom of the shield only if the shield is designed to resist the forces calculated for the full depth of the trench, and there is no indication, while the trench is open, of a possible loss of soil from behind or below the bottom of the shield.

Support Systems

Support systems are a means of protection for employees working in excavations that utilize a structure such as underpinning, bracing or shoring. Such support systems provide support to an adjacent structure, underground installation, or the sides of an excavation. Shoring is a support system that utilizes a structure such as metal, hydraulic, mechanical or timber shoring system that supports the sides of an excavation to prevent cave-ins.

The members of the support system shall be securely connected together to prevent sliding, failing, kickouts, or other predictable failure.

Support systems shall be installed in a manner that protects the worker from cave-ins, structural collapse or from being struck by members of the support system.

Removal of support systems shall begin at, and progress from, the bottom of the excavation. Backfilling shall begin with the removal of the support system from the excavation.

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