

**WAC 296-45-365 Testing and test facilities.** (1) Application.

This section provides for safe work practices for high-voltage and high-power testing performed in laboratories, shops, and substations, and in the field and on electric transmission and distribution lines and equipment. It applies only to testing involving interim measurements utilizing high voltage, high power, or combinations of both, and not to testing involving continuous measurements as in routine metering, relaying, and normal line work.

Note: Routine inspection and maintenance measurements made by qualified electrical employees are considered to be routine line work and are not included in the scope of this section, as long as the hazards related to the use of intrinsic high-voltage or high-power sources require only the normal precautions associated with routine operation and maintenance work required in the other subsections of this section. Two typical examples of such excluded test work procedures are "phasing-out" testing and testing for a "no-voltage" condition.

(2) General requirements.

(a) The employer must establish and enforce work practices for the protection of each worker from the hazards of high-voltage or high-power testing at all test areas, temporary and permanent. Such work practices must include, as a minimum, test area guarding, grounding, and the safe use of measuring and control circuits. A means providing for periodic safety checks of field test areas must also be included.

(b) Employees must be trained in safe work practices upon their initial assignment to the test area, with periodic reviews and updates provided as required by subsections of this section.

(3) Guarding of test areas.

(a) Permanent test areas must be guarded by walls, fences, or barriers designed to keep employees out of the test areas.

(b) In field testing, or at a temporary test site where permanent fences and gates are not provided, one of the following means must be used to prevent unauthorized employees from entering:

(i) The test area must be guarded by the use of distinctively colored safety tape that is supported approximately waist high and to which safety signs are attached;

(ii) The test area must be guarded by a barrier or barricade that limits access to the test area to a degree equivalent, physically and visually, to the barricade specified in this section; or

(iii) The test area must be guarded by one or more test observers stationed so that the entire area can be monitored.

(c) The barriers required by this section must be removed when the protection they provide is no longer needed.

(d) Guarding must be provided within test areas to control access to test equipment or to apparatus under test that may become energized as part of the testing by either direct or inductive coupling, in order to prevent accidental employee contact with energized parts.

(4) Grounding practices.

(a) The employer must establish and implement safe grounding practices for the test facility.

(i) All conductive parts accessible to the test operator during the time the equipment is operating at high voltage must be maintained at ground potential except for portions of the equipment that are isolated from the test operator by guarding.

(ii) Wherever ungrounded terminals of test equipment or apparatus under test may be present, they must be treated as energized until determined by tests to be deenergized.

(b) Visible grounds must be applied, either automatically or manually with properly insulated tools, to the high-voltage circuits after they are deenergized and before work is performed on the circuit

or item or apparatus under test. Common ground connections must be solidly connected to the test equipment and the apparatus under test.

(c) In high-power testing, an isolated ground-return conductor system must be provided so that no intentional passage of current, with its attendant voltage rise, can occur in the ground grid or in the earth. However, an isolated ground-return conductor need not be provided if the employer can demonstrate that both the following conditions are met:

(i) An isolated ground-return conductor cannot be provided due to the distance of the test site from the electric energy source; and

(ii) Employees are protected from any hazardous step and touch potentials that may develop during the test.

Note: See Appendix B of this chapter for information on measures that can be taken to protect employees from hazardous step and touch potentials.

(d) In tests in which grounding of test equipment by means of the equipment grounding conductor located in the equipment power cord cannot be used due to increased hazards to test personnel or the prevention of satisfactory measurements, a ground that the employer can demonstrate affords equivalent safety must be provided, and the safety ground must be clearly indicated in the test set up.

(e) When the test area is entered after equipment is deenergized, a ground must be placed on the high-voltage terminal and any other exposed terminals.

(i) High capacitance equipment or apparatus must be discharged through a resistor rated for the available energy.

(ii) A direct ground must be applied to the exposed terminals when the stored energy drops to a level at which it is safe to do so.

(f) If a test trailer or test vehicle is used in field testing, its chassis must be grounded. Protection against hazardous touch potentials with respect to the vehicle, instrument panels, and other conductive parts accessible to employees must be provided by bonding, insulation, or isolation.

(5) Control and measuring circuits.

(a) Control wiring, meter connections, test leads and cables cannot be run from a test area unless they are contained in a grounded metallic sheath and terminated in a grounded metallic enclosure or unless other precautions are taken that the employer can demonstrate as ensuring equivalent safety.

(b) Meters and other instruments with accessible terminals or parts must be isolated from test personnel to protect against hazards arising from such terminals and parts becoming energized during testing. If this isolation is provided by locating test equipment in metal compartments with viewing windows, interlocks must be provided to interrupt the power supply if the compartment cover is opened.

(c) The routing and connections of temporary wiring will be made secure against damage, accidental interruptions and other hazards. To the maximum extent possible, signal, control, ground, and power cables must be kept separate.

(d) If employees will be present in the test area during testing, a test observer must be present. The test observer must be capable of implementing the immediate deenergizing of test circuits for safety purposes.

(6) Safety check.

(a) Safety practices governing employee work at temporary or field test areas must provide for a routine check of such test areas for safety at the beginning of each series of tests.

(b) The test operator in charge must conduct these routine safety checks before each series of tests and must verify at least the following conditions:

(i) That barriers and guards are in workable condition and are properly placed to isolate hazardous areas;

(ii) That system test status signals, if used, are in operable condition;

(iii) That test power disconnects are clearly marked and readily available in an emergency;

(iv) That ground connections are clearly identifiable;

(v) That personal protective equipment is provided and used;

(vi) That signal, ground, and power cables are properly separated.

[Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, 49.17.060 and chapter 49.17 RCW. WSR 19-13-083, § 296-45-365, filed 6/18/19, effective 8/1/19; WSR 16-10-082, § 296-45-365, filed 5/3/16, effective 7/1/16. Statutory Authority: RCW 49.17.010, [49.17].040, [49.17].050 and [49.17].060. WSR 98-07-009, § 296-45-365, filed 3/6/98, effective 5/6/98.]