

CHAPTER 39. SAFETY STANDARDS—GENERAL

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B.	ELECTRIC SAFETY	39.51
C.	HEAD AND EYE PROTECTION	39.551

Cross References

This Chapter cited in 34 Pa. Code § 23.123 (relating to lighting and fixtures); and 34 Pa. Code § 23.131 (relating to equipment).

Subchapter A. SAFE PRACTICES

GENERAL PROVISIONS

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Authority

The provisions of this Subchapter A issued under act of May 18, 1937 (P. L. 654, No. 174) (43 P. S. §§ 25-1—25-15), unless otherwise noted.

Source

The provisions of this Subchapter A adopted June 14, 1930, amended through August 1, 1968, unless otherwise noted.

GENERAL PROVISIONS**§ 39.1. Definition of “establishment.”**

When used in this subchapter, the work “establishment” shall mean any place within this Commonwealth where work is done for compensation, to whomever payable, supervision over which is given by statute to the Department.

§ 39.2. Applicability.

This subchapter applies to all establishments within this Commonwealth.

§ 39.3. Purposes.

This subchapter sets forth rules and recommendations to safeguard the lives, limbs, and health of workers in all establishments within this Commonwealth.

§ 39.4. Effect.

The safe practices described in this subchapter largely conform to common sense and are aimed at a considerable reduction of industrial accidents. Those requirements using the terminology “shall” rather than “should” are enforceable as mandatory requirements, subject to the penalty prescribed in § 39.5 (relating to penalty).

§ 39.5. Penalty.

Any person who violates this subchapter or any regulations of the Department or who interferes with the Department or its duly authorized representative in the enforcement of these provisions or regulations shall be subject to summary proceedings before an alderman, magistrate or district justice, and upon conviction shall be penalized under section 15 of act of May 18, 1937 (No. 174) (43 P. S. § 25-15).

Cross References

This section cited in 34 Pa. Code § 39.4 (relating to effect).

REQUIREMENTS**§ 39.11. Removal and replacement of guards.**

Under section 6 of act of May 18, 1937 (P. L. 654, No. 174) (43 P. S. § 25-6), no person shall remove or make ineffective any safeguard, safety appliance, or device attached to machinery or guarding a hazardous condition except to immediately make repairs or adjustments; and any person who removes or makes ineffective any such safeguard, safety appliance, or device, for repairs or adjustments, shall replace it or its equal immediately upon the completion of such repairs or adjustments.

§ 39.12. Operating rules.

- (a) The hand dressing of belts while they are driving machinery is prohibited.
- (b) Belts shall not be placed on pulleys or taken off pulleys by direct hand method while the pulleys are in motion.
- (c) The cleaning and oiling of machinery while in motion is prohibited in all places where exposure to hazardous contact is involved.

RECOMMENDATIONS**§ 39.21. Machinery—general precautions.**

- (a) No wrench or other tool should be left on a lathe chuck when the operator leaves a machine, as someone else may start the machine and be injured by the object flying off.
- (b) In order to avoid accidental injury, no employe should engage a fellow worker in conversation while either is operating a hazardous machine.
- (c) No employe should attempt to operate any machine or apparatus unless he is familiar with its operation, and has been so directed by the foreman or other authorized person.
- (d) Extra hazardous operations should have watchmen stationed to warn all persons who may be endangered, especially where overhead operations are being carried on.

§ 39.22. Yard and internal housekeeping.

- (a) *Clear travelways.* All roadways, walkways, aisles, or other foot, crane, or vehicular travelways should be clearly marked or otherwise well defined. They should be kept in good repair and free from all debris and obstacles. All walkways above the level of the ground shall be equipped with railings and toeboards in accordance with the provisions of Chapter 47, Subchapter G (relating to railings, toeboards, open-sided floors, platforms, and runways). All aisles, emergency exits, and other passageways should be kept clear of tools or material of any kind.
- (b) *Slipping hazards.* Puddles or drippings of oil, grease, water, or other liquids should be rendered harmless by mopping up and strewing sand or sawdust

on the floor until the floor is dry. Oil-soaked sawdust should be disposed of promptly to prevent spontaneous ignition. Drippings on floors should be prevented by eliminating the cause or by placing drip pans in position until the cause is eliminated.

(c) *Falling tools.* Workmen working at elevated levels should not strew their tools about carelessly. Tools should be carried in tool belts or kept in tool boxes when not in actual use. The practice of throwing tools from one level to another should be discouraged. They should be raised or lowered with light ropes or passed from hand to hand. The practice of working above unsheltered workmen should be actively discouraged at all times. Tools or material should never be piled or leaned against anything.

(d) *Piling of materials.* Materials should be piled as follows:

(1) *General.* All material needing to be piled should be carefully piled to prevent falling. When piling material near travelways, special care should be exercised to eliminate any possible hazard from piles being knocked over. Piles should not extend into travelways.

(2) *Light.* Piles of material should not interfere with the adequate distribution of natural or artificial light, but should comply with Chapter 27 (relating to lighting).

(3) *Height and extent.* Material should not be piled to a height which would render the pile unstable or which would interfere with the operation of a sprinkler system. Piles should not be placed so close to equipment as to hinder operators in the proper operation of their machines or expose them to hazard from slides or falls of material.

(4) *Binding.* Wherever possible the stability of piles should be increased by piling alternate layers crosswise or, in the case of long piles, by criss-crossing at the ends or using binder strips.

(5) *Round objects.* Piles of barrels, rolls of paper, pipe or other cylindrical material should be carefully blocked at the center and at both ends to prevent spreading.

(6) *Bags.* In piling heavy bagged material the first four end bags of each pile should be cross-tied and a step-back of one bag should be made at every fifth bag in height. All bags in the outer tiers should have the mouths facing the center of the pile so that if any bags break open at the neck the pile will sag toward the center. In unpling, the piles should be kept at an approximately even height and the necessary step-back maintained.

(7) *Retaining walls.* Walls or partitions should not be used to brace piled materials unless of sufficient known strength to withstand the pressure.

(8) *Piles of loose materials.* Substantial retaining walls or partitions should be provided for the storage of loose coal, sand, gravel, stone, or similar materials in restricted areas, and wherever possible, such loose materials and scrap should be kept in storage bins.

(9) *Sides and undermining.* Persons working about banks and piles of coal, sand, gravel, stone, or similar materials should avoid undermining to start slides and insure that no person is in danger from any slides of material. All overhanging ledges should be knocked down as soon as formed, especially in winter when the upper crusts are likely to become frozen.

(10) *Loading vehicles.* Material piled on vehicles for transportation should be limited to an amount which constitutes a safe load based on the distance it is to be transported, the type of equipment used, and the character of the surface over which it is to be transported. Material should be so piled and secured that it cannot be jarred loose by ordinary vibration. The load should not project to an extent which renders it liable to catch on buildings or projecting piles or which would cause the load to topple over. Highway motor vehicles should have all load projections which extend beyond the body of the vehicle in the front or the rear, conspicuously marked by a piece of red material in daylight and a red light at night attached at the farthest points of projection in front and rear. The combined overall length, width, height, and weight of motor vehicles and loads should conform to the 75 Pa.C.S. (relating to Vehicle Code).

(11) *Elevators and loaded trucks.* When loaded trucks are moved on or off an elevator, the elevator should be brought level with the floor and plates should be used to bridge the space between the elevator and the floor if such space creates a tipping hazard.

(e) *Clear travelways and work places.* Loose-board material and other objects or materials should not be permitted to remain strewn haphazardly on the floor or ground in places where persons have to walk or work, but should be piled up neatly. No loose material of any description should be permitted to remain unsecured in an overhead position.

(f) *Nails.* Nails should conform to the following:

(1) Loose nails should not be permitted to remain strewn on any floor, scaffold, working platform or other place where persons walk.

(2) All upturned or protruding nails should be withdrawn or clinched into the wood.

(3) After the head of a barrel is removed, all exposed or protruding nails around the top should be withdrawn.

(4) Pointless nails should be used for core room and foundry work.

(g) *Sharp edged scrap.* All objects with sharp edges, such as scraps of glass, tin, sheet metal, and the like, should not be thrown into waste baskets or other containers ordinarily used for other debris, but should be placed in separate containers. Neither should such material be permitted to remain on floors except during operations normally resulting in its creation. In such cases, containers should be provided to catch such waste material as it drops from machines or benches and the floors should be frequently cleaned up each day to prevent accumulations.

(h) *Cleaning up debris.* All rags, waste paper, bits of broken lumber, excelsior, packing materials and other inflammable debris should be cleaned up daily from under workbenches, behind machines, and all other spaces, and be kept in suitably covered containers.

(i) *Gummed or caked surfaces.* Surfaces which become gummed or caked with accumulated dirt, paint, grease or other material creating a slipping hazard, should be scraped or otherwise kept clean. Snow and ice should be promptly removed from all walkways and work places. Icicles hanging over walkways and work places should be knocked down.

(j) *Dust elimination.* Dry sweeping in workrooms should be permitted only where there is no dust hazard or where the nature of the work performed precludes the use of other methods; otherwise, all floors should be sprinkled with water before sweeping. The use of disinfecting solutions in the water is also recommended. The practice of using damp sawdust or other wetted materials is acceptable in lieu of sprinkling water, especially around electric equipment where the use of water might create a hazard.

(k) *Spitting.* In order to prevent the spread of infection, the practice of spitting on the floor, on piles of material, in waste products, in corners, or in reservoirs of machine cutting oils or compounds should not be permitted. All machine-cutting oils or compounds should be frequently sterilized by boiling or by the addition of a germ-killing solution. Persons subject to sores or susceptible to skin irritations, should not operate a machine using cutting oils or compounds.

(l) *Refuse containers.* Covered refuse cans or boxes should be provided at convenient points and workmen required to deposit all refuse in such cans or boxes. Such cans or boxes should be emptied frequently enough to prevent overflow or the creation of obnoxious odors. Separate containers equipped with gravity closing lids should be provided for oily waste. Oily waste should be burned only by an authorized person equipped with a long handled tool or shovel for handling such waste.

§ 39.23. Handtools.

(a) *General.* Handtools should only be used if in a safe condition. If unsafe conditions are discovered, they should be immediately reported to the foreman, who shall have them corrected.

(b) *Handles.* Wooden handles of handtools should be of the best straight-grained material. Handles which become excessively burned or worn, or which are cracked or badly splintered should be removed from service. Reference should also be made to subsection (e).

(c) *Heads.* When repaired in the shop where used, the heads of all handtools requiring handles, except blacksmith tools, should be substantially fastened to the handles by experienced persons in order to eliminate the hazard of improperly

fastened heads flying off. No tools or stencils with mushroomed heads should be permitted in service. This applies to tools owned by the workmen themselves as well as company tools.

(d) *Storage.* No handtools should be permitted to lie on the floor, ground, or working platform when not in use for any length of time, but should be kept in the proper receptacles or storage places. Axes, hatchets, adzes or knives should be placed in receptacles provided for the purpose. For temporary purposes only, the cutting edge of the tool should be driven into a flat in places where persons will not trip over them or lodged vertically in corners or racks where they timber far enough to hold the tool in an upright position.

(e) *Specific tools.* Specific tools should also conform to the following:

(1) *Striking handtools.* Handtools should always be struck with wooden, soft metal, rawhide or rubber hammers or mallets if the part receiving the blow is case hardened or tempered. Such hammers or mallets should also be used where inflammable or explosive gases or vapors are present. Sheets of brass or other soft metal may be used to receive blows, but should not be battered to an extent which would create a hazard of flying particles. Hand striking tools which show any signs of cracking should be removed immediately from service. Hammers and hatchets with corrugated driving faces for driving flat-headed nails should not be used for driving brads or nails with rounded heads because of the increased hazard of flying nails. A machinist's hammer should not be used for driving nails, and a carpenter's hammer should not be used for machine work.

(2) *Wrenches.* Wrenches should conform to the following:

(i) All wrenches should properly fit the nuts, bolts, or other objects they are used to turn. Unless closed wrenches are used, the practice of using thin pieces of material as shims to make an oversize wrench fit should not be permitted. A wrench should be put on so that the jaws do not spread and cause slippage.

(ii) Wrenches should not be used as hammers.

(iii) The use of wrenches which have excessively worn threads, nuts, or pawls, or battered or defective jaws or handles should be prohibited.

(iv) The practice of tightening bolts, nuts, clamps or other fixtures on moving machine parts with wrenches while the machine is in motion should be prohibited.

(v) Monkey wrenches should always be placed on the objects to be turned so that the wrench faces forward in the same direction that the handle is to turn.

(vi) Safety release or ratchet-type wrenches should be used only in opening drop bottom cars or wagons.

(3) *Keen edged or pointed tools.* Care should be exercised in the use of adzes or draw knives to insure that no part of the body is close enough to the point being worked on to be endangered by a slip of the tool. When cutting

with a hand knife, the direction of the cut should always be away from the body. Keen edged or pointed tools, such as axes, hatchets, adzes, saws, knives, chisels, bits, lineman climbers, or similar tools should not be carried in a manner which endangers the bearer or persons passing him, nor should a long screw driver or other pointed tool project from a pocket when carried.

(4) *Files*. All hand files should be provided with handles. The tine of a file should not be used as a center punch.

(5) *Wood chisels*. Wood chisels should be provided with substantial handles. If struck with mallets, a metal or leather band should be placed at the end of the handle to prevent spreading.

(6) *Screwdrivers*. Screwdrivers of proper sizes should be used at all times by workmen requiring them. Screwdrivers should not be used for purposes for which they were not intended. Those which are bent, or which have rounded corners or splintered handles should be removed from service. A screwdriver should never be held in one hand and the material being worked on in the other, as it may slip and injure hands.

(7) *Picks, shovels, forks, bars, rakes, and hoes*. Picks and shovels should always be stacked or struck into the ground so that the handles stand upright; horizontal storing should be permitted only where it creates no tripping hazard. The handle of a shovel should never be pushed on with one's body, as this may cause one to rupture himself. Forks should be stacked or stuck into the ground so that the handles stand upright. They may also be hung, handles down, in pegs on walls. Rakes and hoes should always be stood or hung with the head off the ground and the handle pointing downward. Crowbars should always be laid flat in places where persons will not trip over them or else lodged vertically in corners or racks where they cannot fall over. Ordinary crowbars should not be used to move cars; specially adapted bars should be provided for this purpose. All dull or broken ended crowbars should be removed from service. When using a crow or pinchbar to move weights, the hands should be so placed that they cannot strike other objects as the bar moves under pressure.

(8) *Compressed air tools*. In the use of compressed air tools, care should be used to prevent the tool from being shot from the gun. When momentarily out of use, the gun should be laid in such position that the tool cannot fly out if the pressure is accidentally released. When not in use, all tools should be removed from the gun. In disconnecting a compressed air tool from the air line, care should be exercised first to shut off the pressure and then to operate the tool to exhaust the pressure remaining in the hose. Compressed air hose or guns should not be pointed at or brought into contact with any person.

§ 39.24. Machine tools.

(a) *Punch presses*. Punch press operators should not remove any safeguards without the permission of the foreman. The driving motor on punch presses shall be shut down before dies are changed, and power shears should be shut down

before any adjustments are made on them. The motor of any machine should be shut down when unattended.

(b) *Lathes*. No chuck or face plate should be put on a lathe by power, nor should any chuck wrench or key be left in a chuck. When filing on a lathe, the file should be held so that if it is forced back it will not be forced against the user, but to one side. Filing should be left-handed with the right hand across stock when filing near the chuck end of a lathe.

(c) *Drills*. Any material to be drilled should be securely fastened, but never held by hand. Hands, cotton waste or rags should never be used to brush borings away from the work; a brush should always be employed for this purpose.

(d) *Grinders*. Any material to be ground should be held firmly against the steady rest in front of the wheel. Such steady rest should be properly adjusted and as near to the wheel as possible. The sides of emery wheels should never be used for grinding unless they are designed for side grinding.

(e) *Air hammer*. No air hammer should be laid down until the tool is removed from such hammer, unless the tool is held in place by a safety catch. It should be ascertained that the coupling of the air hose is secure.

§ 39.25. Apparel.

(a) *General*. Superfluous material and loose fitting clothing should be avoided in the presence of a hazard from moving machine parts. Excessively wide or long aprons should not be worn around moving machinery. Aprons should never be tied on with wire and should be but lightly secured, so that they may be easily torn loose by hand. In the presence of a fire hazard, aprons of non-flammable material should be used.

(b) *Head coverings*. Persons working in shops around machinery which presents a hair-catching hazard should wear caps or other types of head covering. Caps should also be worn if there is danger of the hair-catching fire. Caps with metal buttons or metal visors should not be worn around electrical hazards. Women working about machines should wear caps at all times.

(c) *Footwear*. For normal shop wear, shoes with unbroken soles and low or medium height broad heels should be used. If there is a possibility of heavy objects dropping on the feet, the toes should be boxed or reinforced. For hazardous occupations, such as the handling of hot metal, acids, caustics, electric current, and hot substances, or other objects offering a burning hazard to the feet, specially adapted types of footwear are available and should be worn.

(d) *Leg protection*. Protective leg covering (clothing or devices) should be worn when handling hot metals, acids, caustics or other hot or cold substances offering a burning or scalding hazard. The material of which they are made should be determined by the nature of the product being handled. Full length leg or body protection should be used if the nature of the operation presents a full length leg or body hazard. The method of fastening all protective leg covering should be such as to permit instantaneous removal.

(e) *Hand or arm protection.* Unless the hands come close to rotating or otherwise moving machine parts, gloves, mitts, hand pads, or other hand or arm protection should be worn when handling objects with sharp edges or which contain splinters, fins, slivers, or similar dangerous projecting parts. The material used and the shape and style of the gloves, mitts, or hand pads should be determined by the nature of the operation and the hazard against which it is desired to protect. Gloves or other hand or arm protection against heat or fire, hot or corrosive substances, electricity or similar hazards, such as the handling of plates of glass, should be long enough to cover the space between the wrist and the end of the shirt or coat sleeve.

(f) *Flammable attire.* Articles of wearing apparel or personal adornment, including spectacle rims, collars, eye shades, or cap visors, composed principally of some form of cellulose should not be worn in the presence of a spark or fire hazard. Clothing rendered quickly flammable by grease or other substances should also not be worn by persons exposed to a fire hazard.

(g) *Head and eye protection.* Goggles or other forms of head and eye protection should be worn during the performance of all operations involving hazard to the head or eyes. Subchapter C (relating to head and eye protection) should also be complied with.

(h) *Sterilization before interchange.* The interchange of personal protective devices among employes without first having been sterilized should be avoided.

(i) *Lifebelts.* All persons working aloft should be required to wear lifebelts properly secured when exposed to a falling hazard.

(j) *Special requirements for women.* All industrial plants employing women should conform to the following, in addition to the other requirements of this section:

(1) Work dresses should suit the job to be safe.

(2) Jewelry should be prohibited on the job.

(3) Correct footwear should include well-fitted shoes with low heels and good soles. If the job requires it, safety shoes should be worn.

(4) Any industry employing women where exposures to hazard such as corrosive substances, alkalies, or acids, cuts, dermatitis, falling objects, falls or slips, flying particles, hot liquids, hot materials, moisture, punctures and blows, rough, sharp objects, or spark explosions exist should consult the Department in regard to proper clothing for their workers.

§ 39.26. Electrical hazards.

(a) *General.* Hands and tools should be kept away from all electric circuits and apparatus.

(b) *Grounding for static.* If static electricity exists, belts and rapidly moving parts of machines should be grounded. In the presence of explosive or flammable gases or dust, no metal lacings or metal plates for fastening belts should be used.

(c) *Sparking motors.* In gaseous or dusty locations, the hazard from sparking commutators should be eliminated by using an induction type of motor, or a type approved by the United States Bureau of Mines as explosion-proof.

(d) *Drop and portable installations.* Only heavy, reinforced cords, known in the trade as packing house or brewery cord, should be used in connection with portable lamps or tools. They should be kept well insulated and be so laid or strung as not to create a tripping or catching hazard. All electrical handtools and other drop or portable installations should be well insulated. They should be frequently inspected and tested for current leaks. All frayed cords or other unserviceable and hazardous parts should be immediately removed from service. Portable extension lights should be equipped with guards for the bulbs and sockets.

(e) *Connected equipment.* Electrically connected equipment should not be installed, repaired, or removed, except by trained electricians or workmen under their immediate personal supervision. If electrical hazards are encountered in the course of other work, such work should be stopped immediately until a trained electrician is available to supervise such work until the electrical hazards are removed.

(f) *Pole and high tension work.* Electricians working on poles or other places where a falling hazard exists should always wear safety belts. On high tension work rubber gloves should also be worn. The gloves should be tested to detect the presence of holes before each use.

(g) *Open switch protection.* If possible, no work should be performed on high voltage electrical equipment until the current is turned off. Switches which are opened for that purpose should be locked or blocked open and a suitable warning device placed on the switch.

(h) *Water contact.* No stream of water used for extinguishing a fire, cleaning, or other purposes should be permitted to come in contact with electrical equipment at any time. This does not apply to water-cooled bearings or similar equipment.

(i) *Pulling fuses.* Fuses should not be pulled with the bare hands. Rubber gloves or fibre fuse pullers should be used for this purpose.

(j) *Rubber mats.* Rubber mats should be placed in front of all switchboards and panelboards.

(k) *Jokes.* The dangerous practice of playing “electrical jokes” on fellow workers should be prohibited. Reference should be made to Subchapter B (relating to electric safety).

§ 39.27. Handling objects by hand.

(a) Material of length, such as pipe, lumber or ladders, when carried by one man, should be so carried that the front end is high enough to avoid striking persons approaching from around corners or from other projections.

(b) The carrying of very heavy objects by a gang of men should be personally supervised by the foreman or gang leader, who should be prepared at all

times to assist, instruct, and prevent injury to new or inexperienced men in the gang. He should be responsible for developing distinct and separate signals for simultaneously lifting or dropping heavy objects by the gang.

(c) Heavy objects should not be handled on an incline without the use of ropes or other tackle in addition to the necessary chocks or wedges.

§ 39.28. Cranes.

(a) Employes should keep from under a load being swung, hoisted, lowered, or backed up. No person should ride on top of a crane bridge or carriage or on the load. A craneman should not move cranes with chains swinging full length, or while hookmen or others are in the way. The crane cable should not be held above the sheave block, as the fingers of the holder may be drawn into the block.

(b) The limit switch should not be depended on to stop the motor; the motor should be under control at all times. All controllers should be in the "off" position before opening or closing the main switch. If the power goes off, the controllers should be moved to the "off" position. When leaving the cab, an operator should throw the controllers to the "off" position and open the main switch.

§ 39.29. Conveyors, hand and automotive vehicles.

(a) *Defective wheels.* Vehicles with wheels or other parts that are broken, cracked, or otherwise defective should be removed from service until the defective parts have been repaired or replaced with parts free from defects.

(b) *Wheel mounting.* Whenever practical, the wheels of vehicles should be mounted on axles inside the frame of the vehicle or inside the bearing which attaches them to the vehicle.

(c) *Hand trucks.* Two-wheeled handtrucks should always be parked in a vertical position at racks which will prevent them from falling over or in a horizontal position at locations not used for travelways. Truck handles should not be left extended on the floor. Whenever the construction permits, they should be secured in an upright position by means of springs, weights or retaining hooks or latches.

(d) *Suspended loads.* The practice of working under suspended vehicles supported only by a light chain, rope or single block should not be permitted. Working or walking under any suspended load should also not be permitted.

(e) *Magnets.* Working or walking under a load suspended by an electric magnet is prohibited pursuant to the provisions of Chapter 25, Subchapter B (relating to cranes, booms and hoists).

(f) *Counterweights.* Where the possibility of contact with persons exists, all counterweights shall be enclosed sufficiently to prevent fouling or striking persons.

(g) *Blocking.* All trucks or other vehicles being loaded should be properly chocked or blocked if there is a possibility of the vehicle moving by gravity or from jars.

(h) *Securing loads.* All loads not fully contained or supported by the vehicle carrying them should be secured to the vehicle by chains, cables, ropes, blocks, chocks or other effective devices.

(i) *Runways or ramps.* Runways or ramps on which wheelbarrows and handtrucks are operated should be so constructed that the wheels run on solid boards and not on cracks between boards. Workmen should not be permitted or required to operate wheelbarrows or handtrucks over runways or ramps which have the entire surface cleated to prevent slipping. Sufficient smooth space should be left for the passage of the wheels.

(j) *Exhaust from engines.* Internal combustion engines should not be started or permitted to run in spaces which are not thoroughly ventilated unless the exhaust is piped to the outside air.

(k) *Filling procedure.* When filling the tank of any internal combustion engine, the nozzle of the hose should always be kept in direct contact with the tank being filled, and the engine should be stopped during the operation.

(l) *Walking on conveyors.* All persons should be forbidden to ride or walk on mechanical or gravity conveyors at any time, except that workmen engaged in repairing such conveyors should be permitted to mount them in the performance of their work if such conveyors are stopped. Separate oiling platforms should be required at all points requiring lubrication.

§ 39.30. Dusts, gases, and volatile liquids.

(a) *Dusts.* If dusts are likely to be present, there should be compliance with the following:

(1) The striking of matches; the smoking of cigars, cigarettes, or pipes; the use of open flames, open fire, open lights or arc-forming electrical equipment in the presence of explosive or inflammable gases or explosive organic or metallic dusts should not be permitted. The use of materials creating such dusts around electrical equipment should not be permitted unless such equipment is properly protected.

(2) All electric light globes shall be protected by a vapor-proof globe and guard in the presence of an inflammable or explosive dust hazard, as provided in Subchapter B (relating to electric safety).

(3) Extreme care should be exercised by all persons to prevent the introduction of metal parts into conveyor or disposal systems where an explosive dust hazard exists.

(4) Explosive metallic or organic dust should not be allowed to accumulate on floors, rafters, beams, machinery or other loading places from which it may be blown by vibration or air currents.

(b) *Gases.* If gases are present, there should be compliance with the following:

(1) The provisions of subsection (a)(1).

(2) Gas leaks should not be sought with matches, candles, or other open flame lights. Soapy water is an excellent detector of gas leaks.

(3) Where oxygen, acetylene, or similar gases piped from a central point are used in quantity at permanent work places, they should be piped to the point of usage in permanent tubing or piping.

(4) Grease or oil should not be used to lubricate the valves or joints of compressed gas containers. Acetylene should not be used at more than 15 pounds pressure per square inch. The valves of all containers should be tightly closed at all times when not actually in use, especially when connected with torches or other apparatus and particularly at the end of the daily work and on all supposedly empty containers.

(5) Containers of compressed gas should not be subjected to dropping, bumping, rough handling or temperature in excess of normal atmosphere. Such containers should always be maintained in a horizontal position unless cribs or racks are provided to prevent them from falling if maintained in an upright position.

(6) Compressed gas containers should not be permitted to remain in direct contact with sunlight during warm weather.

(c) *Volatile liquids.* The use of volatile liquids should conform to the following:

(1) The use of matches, cigars, cigarettes, pipes, open flame or fire-producing equipment should be prohibited in all places where inflammable or explosive volatile liquids or oils are stored, handled, or used. Leaky gasoline containers should not be soldered until all traces of gasoline vapor have been removed.

(2) Adequate ventilation should be applied to operations where toxic volatile liquids are used in cleaning or degreasing operations, particularly carbon tetrachloride, perchlorethylene and trichloroethylene. This requirement is not applicable if nonhazardous liquids or materials are used and it is strongly recommended that substitute safe means be employed.

(3) Tanks, pipes or drums used in the storage, handling or use of inflammable or explosive volatile liquids or oils should be properly grounded to carry off any static electricity which may be generated.

§ 39.31. Elevators.

(a) All landing doors or gates at the entrances to shaftways should be closed and locked when the car is not at such landings. This shall be accomplished in accordance with the requirements of Chapter 7 (relating to elevators, lifts, escalators, dumbwaiters, hoists and tramways). Any door or gate not so arranged is a serious hazard which should be corrected immediately.

(b) All shaftway and car enclosures should be maintained in perfect condition.

(c) Material should not be piled outside of a shaftway higher than the enclosure, nor should any material be stored in a shaftway or on the top of a car.

(d) No elevator should be operated with the car gate open if a gate is provided.

(e) The applicable provisions of Chapter 7 (relating to elevators, lifts, escalators, dumbwaiters, hoists and tramways) should be followed.

§ 39.32. Explosives.

(a) *Caps.* Blasting caps and electric blasting caps are copper shells which protect and contain a very sensitive explosive which will explode from shock, heat, or by friction or by spark. The explosive contained in caps should not be touched, picked or disturbed in any manner. No caps or other explosives should be carried in pockets, nor should they be left in a place where children or others may meddle with them.

(b) *Storage.* The storage of explosives should conform to the following:

(1) Explosives should not be stored, used, or handled in or near any place of residence.

(2) No vehicle containing explosives should be left unattended, unless the brake is set, the engine is stopped, and the vehicle is left in gear.

(3) A competent person should always be in charge of explosives and magazines in which explosives are stored. Such person should keep the magazine key and should be responsible for seeing that all proper safety precautions are taken.

(4) If artificial lighting is required, only an electric flashlight or electric lantern should be used. Oil-burning or chemical lamps, lanterns, candles, or matches should not be used.

(5) The ground around magazines should be kept clear of leaves, grass, trash, stumps, or other debris, in order to minimize the likelihood of fire reaching the explosives.

(6) Explosives should not be stored in any dwelling, blacksmith shop, barn, or any other place where loss of life or property damage might occur, in the event of an accident.

(c) *Operating rules.* Only wooden tamping sticks should be used to tamp explosives. A wooden wedge and soft metal mallet should be used to open explosives. Magazine rules should be conspicuously posted in each installation.

§ 39.33. Construction.

(a) *Trenches and excavations.* There shall be compliance with all the provisions of Chapter 33 (Reserved) if work is performed in trenches and excavations.

(b) *Construction and demolition.* All work involving construction shall be performed in accordance with Chapter 47, Subchapter G (relating to railings, toeboards, open-sided floors, platforms, and runways), and Chapter 21 (relating to

ladders). In demolition work, care should be taken at all times to observe the fundamental rules of safety, such as precaution against collapse, proper disposal of debris, avoidance of traps in floors and protection against nail punctures by the wearing of good shoes and gloves and guarding against contact with upturned nails. Scaffolds, if used, shall be constructed in accordance with the provisions of Chapter 47, Subchapter G.

§ 39.34. Report of accidents.

(a) All injuries should be reported at once to the dispensary or hospital for treatment.

(b) Under act of July 19, 1913 (No. 408) (43 P. S. § 12), all accidents incurred in the course of employment and causing disability in excess of the working shift or turn in which the injury was received shall be reported by the employer to the Department within 15 days from the date of the injury, except that injuries resulting in the death of an employe shall be reported within 48 hours from the time of the injury.

Subchapter B. ELECTRIC SAFETY

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Authority

The provisions of this Subchapter B issued under act of April 27, 1927 (P. L. 465, No. 299) (35 P. S. §§ 1221—1235.1), unless otherwise noted.

Source

The provisions of this Subchapter B adopted July 1, 1917; amended through January 1, 1965, unless otherwise noted.

Cross References

This Subchapter cited in 34 Pa. Code § 7.34 (relating to lighting and electric wiring); 34 Pa. Code § 7.145 (relating to pipes and wiring); 34 Pa. Code § 7.185 (relating to pipes and wiring); 34 Pa. Code § 7.261 (relating to electric wiring); 34 Pa. Code § 13.26 (relating to electrical equipment); 34 Pa. Code § 35.111 (relating to general requirements); 34 Pa. Code § 39.26 (relating to electrical hazards); 34 Pa. Code § 39.30 (relating to dusts, gases, and volatile liquids); and 34 Pa. Code § 43.1 (relating to definitions).

GENERAL PROVISIONS**§ 39.51. Definitions.**

The following words and terms, when used in this subchapter, have the following meanings, unless the context clearly indicates otherwise:

Alive or live—Electrically connected to a source of potential differences or electrically charged so as to have a potential different from that of the earth.

This term may be used in place of the term “current-carrying” where the intent is clear, to avoid repetitions of the longer term.

Apparent sag (at any point)—The departure of the wire at the particular point in the span from the straight line between the two points of support of the span, at 60°F with no wind loading.

Apparent sag of a span—The departure of the wire in a given span from the straight line between the two points of support of the span, at 60°F with no wind loading. If the two supports are at the same level this shall be the normal sag.

Authorized—Qualified.

Automatic—Self-acting, operating by its own mechanism when actuated by some impersonal influence, as for example, a change in current strength, not manual, without personal intervention. Remote control which requires personal intervention is not automatic, but manual.

Cable vault—Manhole.

Chief operator—The official in charge of safeguarding operations.

Circuit—A conductor or system of conductors through which an electric current is designed to flow, and connected equipment.

Climbing space—The vertical space reserve along the side of a pole structure to permit ready access for linemen to equipment and lines located on the pole structure.

Conductor—A metallic conducting material, usually in the form of a wire or cable, suitable for carrying an electric current, not including bus bars.

Conflicting—If applied to a pole line, this term shall mean a line so situated with respect to a second line, except at crossings, that the overturning of the first line will result in contact between its poles or conductors and the conductors of the second line, assuming that no conductors are broken in either line. Lines on opposite sides of a highway, street or alley are not considered as conflicting if separated by a distance not less than 60% of the height of the taller pole line, but in no case less than 20 feet.

Conduit—If used in reference to underground work, this term shall mean a group of any number of ducts for underground cables.

Current-carrying part—A part intended to be connected in an electric circuit to a source of voltage. Noncurrent-carrying parts are those not intended to be so connected.

Cutout—Any device, such as a fuse or circuit breaker, by which the electrical continuity of a conductor may be automatically broken by changes in current or voltage.

Dead—Free from any electrical connection to a source of potential difference and from electrical charge; not having a potential different from that of the earth. This term is used only with reference to current-carrying parts which are sometimes alive.

Disconnect—A switch intended to open a circuit only after the load has been thrown off by some other means. Manual switches designed for opening

circuits are usually installed in circuit with disconnectors to provide a safe means for opening the circuit under load.

Duct—If used in reference to underground work, this term shall mean a single tubular runway for underground cables.

Electrical supply equipment—Equipment which produces, modifies, regulates, controls, or safeguards a supply of electrical energy. Similar equipment is excluded if used in connection with signaling systems when the voltage does not exceed 150 or when the voltage is between 150 and 400 and the power transmitted does not exceed three kilowatts.

Electrical supply lines—Those conductors and their necessary supporting or containing structures which are located entirely outside of buildings and are used for transmitting a supply of electrical energy. This shall not include open wiring on buildings in yards or similar locations where spans are less than 20 feet, and all the precautions required for stations or utilization equipment, as the case may be, are observed. Railway signal lines above 400 volts to ground are always supply lines within the meaning of this subchapter and those below 400 volts may be considered as supply lines, if so run and operated through-out.

Electrical supply station—Any building, room or separate space within which is located electrical supply equipment and which is generally accessible only to properly qualified persons. Included are generating stations and substations and generator, storage battery, and transformer rooms, but not manholes and isolated transformer vaults on private premises.

Enclosed—In locations where inflammable flyings, inflammable dust or explosives are present in dangerous quantities; an inclosure which will not admit accumulations of flying or dust, nor transmit sparks or flying particles to the accumulation outside.

Explosion-proof—In locations where the presence of inflammable gas makes the atmosphere explosive in character, an enclosure which will withstand, without injury and without transmitting flame to the outside, any explosion of gas which may occur in the enclosures.

Exposed—Able to be inadvertently touched or approached nearer than a safe distance by any person, as applied to objects not suitably guarded or isolated.

Grounded—Connected to earth or to some extended conducting body which serves instead of the earth, whether the connection is intentional or accidental.

Grounded system—A system having a permanent and effective electrical connection to earth. Such ground connection may be at one or more points. “Effective,” as used in this definition, means a connection to earth of sufficiently low resistance and high current-carrying capacity to prevent any current in the ground wire from causing a harmful voltage to exist between the grounded conductors and neighboring exposed conducting surfaces which are in good contact with the earth, or with neighboring surfaces of the earth itself, under the most severe conditions liable to arise in practice.

Guarded—Covered, shielded, fences, enclosed or otherwise protected by means of suitable covers or casings, barrier rails or screens, mats, or platforms, to remove the liability of dangerous contact or approach by persons or objects to a point of danger.

Handhole—An opening in an underground system into which workmen reach but do not enter.

Insulated—Separated from other conducting surfaces by a dielectric substance or air space permanently offering a high resistance to the passage of current, and to disruptive discharge through the substance or space, in suitable manner for the conditions to which it is subjected; otherwise within the purpose of these rules, it is uninsulated. Insulating covering of conductors is one means of making conductors insulated.

Insulating—If applied to the covering of a conductor or to clothing, guards, rods, and other safety devices, this term shall mean that a device, when interposed between a person and current-carrying parts, protects the person making use of it against electric shock from the current-carrying parts with which the device is intended to be used.

Isolated—Not readily accessible to persons unless special means for access are implemented.

Isolated by elevation—Elevated sufficiently so that persons may safely walk underneath.

Lateral conductor—A wire or cable extending in a general horizontal direction approximately at right angles to the general direction of the line conductors (in pole wiring work).

Lateral working space—The space reserved for working between conductor levels outside the climbing space, and to its right and left.

Line conductor—A wire or cable carrying electric current supported by poles, towers, or other structures, but not including vertical or lateral connecting wire.

Manhole or cable vault or splicing chamber—An opening in an underground system which workmen or others may enter for the purpose of installing cables, transformers, junction boxes, and other devices, and for making connections and tests.

Manual—Operated by personal intervention.

Normal sag—The difference in elevation between the highest point of support of a span and the lowest point of the conductor in such span, or in the curve of the conductor in the span produced, at 60°F with no wind loading.

Open lines—Overhead lines not in conduits, and consisting of single conductors or of individual twisted pairs, as opposed to multiple conductor cables.

Panelboard—A single panel containing busses, fuses and switches to control lights, fan motors and similar devices of small individual as well as aggregate capacity, placed in or against a wall or partition and accessible only from the front.

Permanently grounded—An effectively grounded connection to the earth, by use of an underground system of metallic pipe mains or other suitable means.

Pole face—That side of a pole on which crossarms are attached, or which is so designated by the utilities owning or operating the pole.

Qualified or authorized—Properly qualified or authorized to perform specified duties under the conditions existing. Responsibility for the authorization and decision as to the qualifications of employees rests with the employer or his agent.

Reconstruction—Replacement of any portion of an existing installation by new equipment or construction, not including ordinary maintenance replacements.

Rural districts—All places not urban, usually in the country, but in some cases within city limits.

Service—The connecting conductors by which a supply of electrical energy is carried from a supply line to the building or premises served.

Signal lines—Lines for public or private signal or communication service and devoted exclusively to the transmission of signals or intelligence, which operate at less than 400 volts to ground or 750 volts between any two points of the circuit, and the transmitted power of which does not exceed 150 watts. Below 150 volts no limit is placed on the capacity of the system. Included are telephone, telegraph, messenger-call, clock, fire, or police alarm, and other systems conforming with these requirements. Lines used for signaling purposes, but not included under this definition, are considered as supply lines of the same voltage and shall so conform. Signal lines not for public use coming under this definition may be run and operated as supply lines if desired, and if constantly so run.

Splicing chamber—anhole.

Substantial—Constructed and arranged to be of adequate strength and durability for the service to be performed under the prevailing conditions.

Switch—A device for opening, closing or changing the connection of a circuit manually. In this subchapter, a switch shall be always considered manually operated, unless otherwise stated.

Switchboard—A large single panel or assembly of panels on which are mounted, partly on the face and partly on the back, switches, fuses, busses and usually instruments, and accessible both in front and in rear. Circuits and machinery of relatively large capacity are controlled from these boards.

Tags—Tags of distinctive appearance, indicating that the equipment or lines marked are being worked on.

Transformer vault—An isolated, fireproof enclosure, either above or below ground, in which transformers and the devices necessary for their operation are installed, and which is not continuously under attendance during operation.

Urban districts—Thickly settled communities, whether in cities or suburbs, where congested traffic often occurs. A highway, though in the country, on which the traffic is often very heavy, is considered urban.

Utilization equipment—Equipment, devices, and connected wiring, which utilize electrical energy for mechanical, chemical, heating, lighting, testing or similar purposes and are not a part of supply equipment, supply lines or signal lines.

Vertical conductor—A wire or cable extending in approximately vertical direction, in pole wiring work.

Voltage or volts—The highest effective voltage between the conductors of the circuit concerned, except that in grounded multiwire circuits not exceeding 750 volts between outer conductors it means the highest effective voltage between any wire of the circuit and the ground. In ungrounded low-voltage circuits “voltage to ground” means the voltage of the circuit. If one circuit is directly connected to another circuit of higher voltage as in the case of an autotransformer, both are considered to be of the higher voltage, unless the circuit of lower voltage is permanently grounded. Direct connection implies electrical connection as distinguished from connection merely through electromagnetic or electrostatic induction.

Wire gauges—The American Wire Gauge (A.W.G.), otherwise known as Brown & Sharpe (B. & S.) is the standard gauge for copper, aluminum, and other conductors, excepting steel, for which the Steel Wire Gauge (Stl. W. G.) is used throughout this Subchapter.

Cross References

This section cited in 34 Pa. Code § 39.472 (relating to live electrical parts).

§ 39.52. Penalty.

Any person who violates this subchapter or any regulations of the Department or who interferes with the Department or its duly authorized representative in the enforcement of these provisions or regulations will be deemed guilty of a misdemeanor and may, upon conviction thereof, be punished by fine or imprisonment, or both under act of April 27, 1927 (P. L. 465, No. 299) (35 P. S. §§ 1221—1235.1).

METHODS OF PROTECTIVE GROUNDING

§ 39.61. Applicability.

The provisions of §§ 39.61—39.70 (relating to methods of protective grounding) apply to all installations within this Commonwealth, whether existing, new, reconstructions, extensions, or the like except as modified or waived as provided in § 39.63 (relating to modification or waiver of provisions).

Cross References

This section cited in 34 Pa. Code § 39.62 (relating to scope); 34 Pa. Code § 39.63 (relating to modification of waiver provisions); 34 Pa. Code § 39.103 (relating to protective grounding); 34 Pa. Code § 39.183 (relating to ground wires); 34 Pa. Code § 39.197 (relating to grounding); 34 Pa. Code § 39.219 (relating to grounding or isolating service conduits); 34 Pa. Code § 39.292 (relating to grounding noncurrent-carrying parts); and 34 Pa. Code § 39.304 (relating to grounding of arresters for signaling systems).

§ 39.62. Scope.

The provisions of §§ 39.61—39.70 (relating to methods of protective grounding) are specifically directed to all lightning arrester grounding and to the grounding of all circuits, equipment, or wire runways when the grounding is intended to be a permanent and effective protective measure. Such provisions do not require that grounding be done, but cover the methods for protective grounding. The rules requiring groundings are included under parts one, three, and four of the National Electrical Safety Code. Such provisions do not apply to the grounding of arresters on signal circuits, to the grounded return of trolley or third rail systems, nor to the grounding of lightning protection wires if these are not connected to electrical circuits or equipment.

Cross References

This section cited in 34 Pa. Code § 39.61 (relating to applicability); 34 Pa. Code § 39.63 (relating to modification or waiver of provisions); 34 Pa. Code § 39.103 (relating to protective grounding); 34 Pa. Code § 39.183 (relating to ground wires); 34 Pa. Code § 39.197 (relating to grounding); 34 Pa. Code § 39.219 (relating to grounding or isolating service conduits); 34 Pa. Code § 39.292 (relating to grounding noncurrent-carrying parts); and 34 Pa. Code § 39.304 (relating to grounding of arresters for signaling systems).

§ 39.63. Modification or waiver of provisions.

The provisions of § 39.61—39.70 (relating to methods of protective grounding) may be modified or waived by the proper administrative authority or its authorized agents in the following instances:

- (1) If application of provisions involve expense not justified by the protection secured, or for any other reason where application of provisions is shown to be impracticable.
- (2) If equivalent or safer construction may be more readily provided by other means.
- (3) In certain instances where temporary installations or installations are shortly to be dismantled or reconstructed.
- (4) In cases of emergency or pending decision of the administrator the person responsible for the installation may decide as to modification or waiver of any rule, subject to review by proper authority.
- (5) If other methods of construction and installation than those specified in this chapter are used as experiments to obtain information, if done where the supervision may be given by the proper administrative authority.

Cross References

This section cited in 34 Pa Code § 39.61 (relating to applicability); 34 Pa. Code § 39.62 (relating to scope); 34 Pa. Code § 39.103 (relating to protective grounding); 34 Pa. Code § 39.183 (relating to ground wires); 34 Pa. Code § 39.197 (relating to grounding); 34 Pa. Code § 39.219 (relating to grounding or isolating service conduits); 34 Pa. Code § 39.292 (relating to grounding noncurrent-carrying parts); and 34 Pa Code § 39.304 (relating to grounding of arresters for signaling systems).

§ 39.64. Time for compliance.

The time allowed for bringing existing installations into compliance with the rules shall be determined by the proper administrative authority.

Cross References

This section cited in 34 Pa. Code § 39.61 (relating to applicability); 34 Pa. Code § 39.62 (relating to scope); 34 Pa. Code § 39.63 (relating to modification or waiver of provisions); 34 Pa. Code § 39.103 (relating to protective grounding); 34 Pa. Code § 39.183 (relating to ground wires); 34 Pa. Code § 39.197 (relating to grounding); 34 Pa. Code § 39.219 (relating to grounding or isolating service conduits); 34 Pa. Code § 39.292 (relating to grounding noncurrent-carrying parts); and 34 Pa. Code § 39.304 (relating to grounding of arresters for signaling systems).

§ 39.65. Ground conductor.

(a) *Material and continuity.* The ground conductor shall be of copper or of other metal which will not corrode excessively under the existing conditions and, if practicable, shall be continuous. Joints shall be made and maintained so as to conform to the resistance and current-carrying capacity requirements of § 39.69 (relating to ground resistance). Ground connections from circuits should not be made to jointed piping within buildings, except that water piping outside of meters and beyond any point which is liable to disconnection, may be used. Reference should also be made to § 39.68 (relating to methods of ground connection). No automatic cutout shall be inserted in the ground conductor or connection except in a ground connection from equipment where its operation will immediately result in the automatic disconnection from all sources or energy of the equipment so grounded; no switch shall be so inserted except in plain sight, provided with distinctive marking and effectively isolated from unqualified persons. Reference should also be made to § 39.67 (relating to attachment of ground conductor).

(b) *Size and number.* The size and number of ground conductors shall be as follows:

- (1) For grounding circuits the ground conductors shall have a combined cross section and current capacity sufficient to insure the continuity of the ground connection and its continued compliance with § 39.69, under conditions of excess current caused by accidental grounding of any normally ungrounded conductor of the circuit. No individual ground conductor for electrical circuits shall have less current capacity than that of a No. 6 copper wire, except that for additional grounds after the first on any circuit, smaller ground

wires may be used, provided that they are in no case smaller than the conductor to which they are attached nor smaller than No. 10 copper.

(2) For lightning arrester ground connections the ground conductor or conductors shall have a current carrying capacity sufficient to insure continuity of the ground connection under conditions of excess current caused by or following discharge of the arrester. No individual ground conductor shall be smaller than a No. 6 wire.

(3) Electrical equipment shall conform to the following:

(i) For electrical equipment the current-carrying capacity of a ground conductor shall be not less than that provided by a copper wire of the size indicated in the following table:

<i>Capacity of Nearest Automatic Cutouts (in amperes)</i>	<i>Required Size of Ground Conductor A.W.G.</i>
200—500	4
100—200	6
30—100	10
10—30	14

(ii) If there is no cutout protecting the equipment, the size of ground conductor shall be determined by the design and operating conditions of the circuit.

(iii) In the portable cord to portable equipment protected by fuses not greater than 10-ampere capacity, a No. 18 ground wire may be used.

(c) *Mechanical protection and guarding against contact.* Mechanical protection and guarding against contact shall be provided as follows:

(1) If exposed to possible mechanical injury the ground conductor shall be protected by substantial conduit or other guard.

(2) Guards for the ground conductors of the lightning arresters should be of nonmagnetic material unless the ground conductor is electrically connected to both ends of the guard.

(3) If resistance of the ground connection is in excess of the values in § 39.69, for water pipe grounds, the ground conductor, except in rural districts, shall be protected and guarded by being enclosed in insulating conduit or molding to protect persons from injury by coming into contact with it. A high resistance may exist where artificial grounds are necessarily permitted in lieu of the preferable grounds to buried metallic water piping systems.

(4) Mechanical protection and insulating guards should extend for a distance of not less than 8 feet above any ground, platform, or floor from which ground conductors are accessible to the public, however, the following precautions are recommended:

(i) Insulating mechanical protection is advisable for single arrester grounds, even when the connection is made to a water piping system, and has therefore a low resistance, since a single connection is liable to be accidentally broken.

(ii) Even where ground connections have a resistance not exceeding that specified in § 39.69, and no guard is therefore provided, or, as an additional protection to persons even where guards are used artificial grounds may be arranged to minimize the potential gradient along the surface of the earth by use of radial connecting wires underneath the earth surface or by other suitable means.

(5) A circuit ground conductor shall be guarded as required for current-carrying conductors of the circuit, unless the ground conductor is entirely outside buildings, has strength and current capacity not less than that of No. 6 copper wire, and the circuit is elsewhere grounded by other ground conductors, except that in stations substantial bare ground busses may be used.

(d) *Underground conductors.* Wires used for ground conductors, if laid underground shall, unless otherwise mechanically protected, be laid slack to prevent their being readily broken, and shall have joints carefully painted or otherwise protected against corrosion.

Cross References

This section cited in 34 Pa. Code § 39.61 (relating to applicability); 34 Pa. Code § 39.62 (relating to scope); 34 Pa. Code § 39.63 (relating to modification or waiver of provisions); 34 Pa. Code § 39.66 (relating to nature of ground connection); 34 Pa. Code § 39.68 (relating to methods of ground connection); 34 Pa. Code § 39.103 (relating to protective grounding); 34 Pa. Code § 39.183 (relating to ground wires); 34 Pa. Code § 39.197 (relating to grounding); 34 Pa. Code § 39.219 (relating to grounding or isolating service conduits); 34 Pa. Code § 39.292 (relating to grounding noncurrent-carrying parts); and 34 Pa. Code § 39.304 (relating to grounding of arresters for signaling systems).

§ 39.66. Nature of ground connection.

(a) *Permanence.* The ground connections shall be permanent and effective and made as indicated in subsection (b), if possible, or else as prescribed in subsection (c), (d) or (e). Reference should also be made to § 39.69 (relating to ground resistance).

(b) *Piping system.* For circuits, equipment, and arresters at supply stations, connections shall be made to all available active continuous metallic underground water piping systems between which no appreciable difference of potential normally exists, and to one such system if appreciable differences of potential do exist between them. At other places connections shall be made to at least one such system, if available. Gas piping shall not be used. References should be made to §§ 39.65 and 39.68 (relating to ground conductor; methods of ground connection). The term "available," as used in this rule, shall mean ordinarily within 500 feet for stations. The protective grounding of electrical circuits and

equipment to water pipe systems in accordance with this Subchapter shall always be permitted, since such grounding offers the most efficient protection to life and property and is not injurious to the piping systems.

(c) *Alternate methods.* If underground metallic piping systems are not available, other methods which will secure the desired permanence and conductance may be permitted. Where available, metal well casings, local metal drain pipes, and similar buried metal structures of considerable extent may be used in lieu of extended buried water-piping systems. Ground connection may be made to the steel frame of a building containing the grounded circuits or equipment, to which frames of machines and other noncurrent-carrying surfaces should also then be connected. In such cases the building frame shall be itself well grounded by effective connection to the ground which may require artificial grounding for steel frame buildings supported on masonry or unreinforced concrete footings.

(d) *Artificial grounds.* If resort to artificial grounds is necessary, their number shall be determined by the following requirements:

(1) No more than one artificial ground is required for lightning arresters, except for large current capacity. At least two grounds are required for low voltage alternating current distribution circuits at transformers or elsewhere.

(2) If no part of the circuit or equipment protected may be reached by persons while they are standing on the ground or damp floors, or by persons while touching any metallic piping to which the ground wire is not effectively connected, a single artificial ground may be used even if its resistance exceeds that specified in § 39.69. In such cases guards should be provided for the ground conductor in accordance with § 39.65(c) wherever it is otherwise accessible, or to provide insulating mats or platforms so located that persons cannot readily touch the ground conductor without standing on such mats or platforms.

(e) *Grounds to railway returns.* Protective ground connections shall not be made to railway negative return circuits when other effective means of grounding are available, except ground connections from electric railway lightning arresters. When ground connections are necessarily made to the grounded track return of electric railways, they shall be made in such a manner as not to afford a metallic connection between the railway return and other grounded conducting bodies. This provision shall not prohibit the making of drainage connections which are not protective grounds between piping systems and railway negative return circuits for the prevention of electrolysis. Multiple protective ground connections from other circuits to railway returns shall be avoided, and if multiple artificial grounds are made on such other circuits near such railway returns, they shall be so arranged as to prevent the flow of any considerable current in and between such connections, thus reducing their effectiveness, or causing other damage.

Cross References

This section cited in 34 Pa. Code § 39.61 (relating to applicability); 34 Pa. Code § 39.62 (relating to scope); 34 Pa. Code § 39.63 (relating to modification or waiver of provisions); 34 Pa. Code § 39.67 (relating to attachment of ground conductor); 34 Pa. Code § 39.68 (relating to methods of ground connection); 34 Pa. Code § 39.69 (relating to ground resistance); 34 Pa. Code § 39.103 (relating to protective grounding); 34 Pa. Code § 39.183 (relating to ground wires); 34 Pa. Code § 39.197 (relating to grounding); 34 Pa. Code § 39.219 (relating to grounding or isolating service conduits); 34 Pa. Code § 39.292 (relating to grounding noncurrent-carrying parts); and 34 Pa. Code § 39.304 (relating to grounding of arresters for signaling systems).

§ 39.67. Attachment of ground conductor.

(a) *Direct current distributing systems.* The neutral of three-wire direct current systems shall be grounded at one or more supply stations, but not at individual services nor within buildings served. One side of a two-wire direct current system may be grounded, but at one station only. In three-wire systems the neutrals entering any junction box should be bonded together, but the box should not be specially grounded. In two-wire systems the grounded side of the circuit should be insulated from ground except at the station ground connection.

(b) *Alternating current distribution systems.* All secondary distribution systems shall be grounded at the building services or near the transformer (or transformers) either by direct ground connection or by the use of a system ground wire to which are connected the grounded conductors of many secondary mains and which is itself effectually grounded at intervals which fulfill, for any secondary utilizing the system ground wire, the resistance and current carrying requirements of § 39.69 (relating to ground resistance). Single-phase, three-wire distribution systems shall be grounded at the neutral conductor. Two-wire, single-phase systems shall be grounded at the neutral point or on either conductor. Two-wire, single-phase and two or three phase systems shall, in general, be grounded at that point of the system which brings about the lowest voltage from ground of unguarded current carrying parts of connected devices and also permits most convenient grounding. If one phase of a two or three phase system is used for lighting, that phase should be grounded and at the neutral conductor, if one is used. In the absence of direct grounds at all building services, ground connections shall be made to the grounded neutral or other grounded conductor of a secondary system supplying more than one utilization equipment, at intervals that will fulfill the resistance and current-carrying requirements of § 39.69. If the secondaries of transformers are supplying a common set of mains, the fuses shall be installed only at such points as will not cause the loss of the ground connections after the fuses in the transformer circuits or mains have been blown. Multiple grounds are preferable in all cases, because of the assurance provided against loss of the protection afforded by the chance disconnection of any ground connection. Grounds other than the single ground connection at the building service shall not be made to alternating current secondaries within buildings. Reference should be made to § 39.66 (relating to nature of ground connection).

(c) *Lightning arresters.* The connection to a lightning arrester shall be at such a point that its ground conductor is as short and straight as practicable. Ground conductors for lightning arresters shall not pass through iron or steel conduits unless electrically connected to both ends of such conduits.

(d) *Equipment and wire runways.* The point at which the ground conductor is attached to equipment or wire runways shall, if practicable, be readily accessible.

Cross References

This section cited in 34 Pa. Code § 39.61 (relating to applicability); 34 Pa. Code § 39.62 (relating to scope); 34 Pa. Code § 39.63 (relating to modification or waiver of provisions); 34 Pa. Code § 39.65 (relating to ground conductor); 34 Pa. Code § 39.103 (relating to protective grounding); 34 Pa. Code § 39.183 (relating to ground wires); 34 Pa. Code § 39.197 (relating to grounding); 34 Pa. Code § 39.219 (relating to grounding or isolating service conduits); 34 Pa. Code § 39.292 (relating to grounding noncurrent-carrying parts); and 34 Pa. Code § 39.304 (relating to grounding of arresters for signaling systems).

§ 39.68. Methods of ground connection.

(a) Ground connections to metallic piping systems shall be made on the street side of water meters, which might interrupt the continuity of the underground metallic pipe systems, unless otherwise provided in subsection (b), but connections may be made immediately inside building walls to secure accessibility for inspection and test. When water meters are located outside buildings or in concrete pits within buildings where piping connections are inbedded in concrete flooring, the ground connection may be made on the building side of the meters, if they are suitably shunted.

(b) When the making of a ground to a piping system outside the meter or other device would involve a long run, connection for equipment or wire runways, not for circuits, may be made to the water piping system at a point near the part to be protected, if there are no insulating joints in the pipe to prevent a good ground. In such cases care shall be taken to electrically connect all parts of the piping system liable to create a hazard, if they become alive, to shunt the pipe system where necessary around meters, and so forth, in order to keep the connection with the underground piping system continuous. Gas piping systems within buildings shall not be used for purposes of this rule, except that gas piping need not be insulated from otherwise well-grounded electrical fixtures and if the making of another ground connection for a fixture would involve a long run and the fixture is, therefore, not within reach of plumbing or plumbing fixtures, the gas piping may for small fixtures be utilized as the sole ground connection. If so used the gas piping and water piping systems within the building shall be grounded at their points of entrance. Reference should also be made to §§ 39.65 and 39.66 (relating to ground conductor; and nature of ground connection).

(c) The ground connection to metallic piping systems shall be made by sweating the ground wire into a lug attached to an approved clamp and firmly bolting the clamp to the pipe, after all rust and scale have been removed, or by

soldering the ground connection into a brass plug which has been tightly screwed into a pipe fitting or, where the pipe is of sufficient thickness, screwed into a hole in the pipe itself, or connection may be made by other equivalent means. The point of connection shall be as readily accessible as possible, and the position should be recorded. With bell and spigot joint pipe it may be necessary to connect to several lengths where circuits or equipment of large current-carrying capacity are being grounded.

(d) Artificial grounds shall be located, where practicable, below permanent moisture level, or failing this at least 6 feet deep. Each ground should present not less than 2 square feet surface to exterior soil. Areas where ground water level is close to the surface shall be used when available.

Cross References

This section cited in 34 Pa. Code § 39.61 (relating to applicability); 34 Pa. Code § 39.62 (relating to scope); 34 Pa. Code § 39.63 (relating to modification or waiver of provisions); 34 Pa. Code § 39.65 (relating to ground conductor); 34 Pa. Code § 39.66 (relating to nature of ground connection); 34 Pa. Code § 39.69 (relating to ground resistance); 34 Pa. Code § 39.103 (relating to protective grounding); 34 Pa. Code § 39.183 (relating to ground wires); 34 Pa. Code § 39.197 (relating to grounding); 34 Pa. Code § 39.219 (relating to grounding or isolating service conduits); 34 Pa. Code § 39.292 (relating to grounding noncurrent-carrying parts); and 34 Pa. Code § 39.304 (relating to grounding of arresters for signaling systems).

§ 39.69. Ground resistance.

(a) *Limits.* It is recommended that the combined resistance of the ground wires and connections of any grounded circuit, equipment or lightning arrester should not exceed the values given below, if grounded connections made according to § 39.66 (relating to nature of ground connection) will sufficiently limit the resistance. It will frequently be impracticable with artificial grounds to obtain resistances in dry or other high resistance soils as low as the values given below for ordinary soils. In such cases two grounds shall be used as defined in § 39.68 (relating to methods of ground connection), and no requirement shall be made as to resistance. Reference should also be made to § 39.66. The current stated opposite the different resistances in the table is either the current capacity of a circuit from which leakage may occur to the ground circuit, or the continuous current capacity to which the grounded equipment or arrester is limited by design or by automatic cutouts. If the secondary is exposed only through transformer windings, this current capacity shall be that of the primary fuse of the transformer. If the secondary is exposed by the conductors of conflicting or crossing high voltage circuits, the current capacities shall be those of the automatic cutouts in such circuits. The product of the corresponding numbers in the first and second columns shall never be greater than 150, that is, the potential difference due to the stated current is never greater than 150 volts, if connections are made to water pipes. If more than one ground is made on the same circuit, equipment or arrester, in the same vicinity, all such grounds shall be considered collectively

in respect to meeting the requirements of this section:

<i>Amperes</i>	<i>Water pipe grounds (in ohms)</i>	<i>Artificial grounds ordinary soils (in ohms)</i>
less than 10	15	1025
10 to 25	6	25
25 and above	less than 6	25

(b) *Checking.* The resistance of station grounds shall be checked when made. With artificial grounds this check may be made by measuring the voltage between the grounded point of the circuit, or the grounded frame of the equipment or the grounded point of the lightning arrester and an auxiliary metal reference rod or pipe driven into the ground, while a measured current is flowing through the ground connection and any exposed metal piping or other artificial ground in the vicinity, but not within 20 feet. If the station ground is to water piping, the check may be made with current flowing through the water piping and some independent piping system or artificial ground in the vicinity, but not within 20 feet. The auxiliary rod or pipe shall be at least ten feet from any artificial ground or piping systems through which the measured current is made to flow. All ground connections shall be inspected periodically. Ground connections on distribution circuits shall, when installed, be tested for resistance unless multiple grounding to water piping systems is used.

Cross References

This section cited in 34 Pa. Code § 39.61 (relating to applicability); 34 Pa. Code § 39.62 (relating to scope); 34 Pa. Code § 39.63 (relating to modification or waiver of provisions); 34 Pa. Code § 39.65 (relating to ground conductor); 34 Pa. Code § 39.66 (relating to nature of ground connection); 34 Pa. Code § 39.67 (relating to attachment of ground conductor); 34 Pa. Code § 39.103 (relating to protective grounding); 34 Pa. Code § 39.183 (relating to ground wires); 34 Pa. Code § 39.197 (relating to grounding); 34 Pa. Code § 39.219 (relating to grounding or isolating service conduits); 34 Pa. Code § 39.292 (relating to grounding noncurrent-carrying parts); and 34 Pa. Code § 39.304 (relating to grounding of arresters for signaling systems).

§ 39.70. Joint use of grounds and ground conductors for different systems.

(a) *Ground conductors.* Ground conductors shall be run separately to the ground or to a sufficiently heavy grounding bus or system ground cable which is well connected to ground at more than one plate from equipment and circuits of each of the following classes:

- (1) Lightning arresters.
- (2) Secondaries connected to low voltage lighting or power circuits.
- (3) Secondaries of current and potential transformers and cases of instruments on these secondaries.
- (4) Frames of direct current railway equipment and of equipment operating in excess of 750 volts.

(5) Frames of utilization equipment or wire runways other than covered by paragraph (4).

(b) *Grounds*. Lightning arrester ground connections shall not be made to the same artificial ground such as driven pipes or buried plates as circuits or equipment, but should be well spaced and, where practicable, at least 20 feet from other artificial grounds.

Cross References

This section cited in 34 Pa. Code § 39.61 (relating to applicability); 34 Pa. Code § 39.62 (relating to scope); 34 Pa. Code § 39.63 (relating to modifications or waiver of provisions); 34 Pa. Code § 39.66 (relating to nature of ground connection); 34 Pa. Code § 39.103 (relating to protective grounding); 34 Pa. Code § 39.183 (relating to ground wires); 34 Pa. Code § 39.197 (relating to grounding); 34 Pa. Code § 39.219 (relating to grounding or isolating service conduits); 34 Pa. Code § 39.292 (relating to grounding noncurrent-carrying parts); and 34 Pa. Code § 39.304 (relating to grounding of arresters for signaling systems).

INSTALLATION AND MAINTENANCE OF ELECTRICAL SUPPLY STATION AND EQUIPMENT

§ 39.81. Applicability.

This section and §§ 39.82—39.90 apply to installations within this Commonwealth, whether existing, new, reconstructions, extensions, or the like, except as waived or modified by § 39.83 (relating to modification or waiver of provisions).

Cross References

This section cited in 34 Pa. Code § 39.82 (relating to scope); 34 Pa. Code § 39.83 (relating to modification or waiver of provisions); and 34 Pa. Code § 39.192 (relating to scope).

§ 39.82. Scope.

This section and §§ 39.81 and 39.83—39.90 are specifically directed to electrical equipment of indoor and outdoor stations and substations, and to similar equipment, including generators, motors, storage batteries, transformers, and lightning arresters, when installed in factories, mercantile establishments, vehicles, or elsewhere, if the equipment is in separate rooms or enclosures, under control of properly qualified persons, if the interiors of such rooms or enclosures are accessible only to such persons.

Cross References

This section cited in 34 Pa. Code § 39.81 (relating to applicability); 34 Pa. Code § 39.83 (relating to modification or waiver of provisions); and 34 Pa. Code § 39.192 (relating to scope).

§ 39.83. Modification or waiver of provisions.

This section and §§ 39.81, 39.82 and 39.84—39.90 may be modified or waived by the proper administrative authority or its authorized agents and shall be so modified or waived in the following instances:

- (1) Application of the provisions involve expense not justified by the protection secured, or for any other reason if application of provisions is shown to be impracticable.
- (2) If equivalent or safer construction can be more readily provided by other means.
- (3) In certain instances where temporary installations or installations are shortly to be dismantled or reconstructed.
- (4) In cases of emergency or pending decision of the administrator, the person responsible for the installation may decide as to modifications or waiver of any rule, subject to review by proper authority.

Cross References

This section cited in 34 Pa. Code § 39.81 (relating to applicability); 34 Pa. Code § 39.82 (relating to scope); and 34 Pa. Code § 39.192 (relating to scope).

§ 39.84. Time for compliance.

Time allowed for bringing existing installations into compliance with the rules will be determined by the proper administrative authority.

Cross References

This section cited in 34 Pa. Code § 39.81 (relating to applicability); 34 Pa. Code § 39.82 (relating to scope); 34 Pa. Code § 39.83 (relating to modification or waiver of provisions); and 34 Pa. Code § 39.192 (relating to scope).

§ 39.85. General requirements.

Rooms or spaces in which electrical supply equipment is installed shall comply with the following requirements:

- (1) No room or space in which electrical supply equipment is installed shall be used for the storage of material or for manufacturing processes causing hazard to electrical operators, except those materials or processes attendant upon the production or distribution of a supply of electrical energy.
- (2) They shall be free from flyings and inflammable gas, except for battery rooms. Reference should be made to §§ 39.121—39.127 (relating to storage batteries). Indoor stations should be dry and well ventilated.
- (3) In outdoor stations or stations in wet tunnels or subways live parts of equipment shall be enclosed in weatherproof cases, unless the equipment is suitably designed to withstand the prevailing atmospheric conditions and the live parts are suitably guarded against contacts, or isolated by elevation. Ungrounded conductors not in conduit shall be on suitable insulators, properly guarded or isolated by elevation.

Cross References

This section cited in 34 Pa. Code § 39.81 (relating to applicability); 34 Pa. Code § 39.82 (relating to scope); 34 Pa. Code § 39.83 (relating to modification or waiver of provisions); and 34 Pa. Code § 39.192 (relating to scope).

§ 39.86. Illumination.

(a) Rooms and spaces shall have good artificial illumination. Arrangement of permanent fixtures and plug receptacles shall be such that portable cords need not be brought into dangerous proximity to live electrical apparatus. Lamps shall be arranged to be controlled, replaced, or trimmed from readily accessible places.

(b) A separate emergency source of illumination from an independent generator, storage battery, gas main, lanterns or other suitable source shall be provided in every station where an attendant is located.

Cross References

This section cited in 34 Pa. Code § 39.81 (relating to applicability); 34 Pa. Code § 39.82 (relating to scope); 34 Pa. Code § 39.83 (relating to modification or waiver of provisions); and 34 Pa. Code § 39.192 (relating to scope).

§ 39.87. Enclosing walls and ceilings.

(a) Rooms and spaces shall be arranged with fences, screens, partitions, or walls, so as to prevent entrance of unauthorized persons or interference by them with equipment inside, and entrances not under observation of an authorized attendant shall be kept locked. Signs prohibiting entrance to unauthorized persons shall be displayed at entrances.

(b) Above all equipment, substantial roofs or ceilings shall be provided, except above equipment placed outdoors, if such portions of the equipment as would be injured by rains or by flying or falling objects are suitably enclosed or guarded to prevent such damage.

Cross References

This section cited in 34 Pa. Code § 39.81 (relating to applicability); 34 Pa. Code § 39.82 (relating to scope); 34 Pa. Code § 39.83 (relating to modification or waiver of provisions); and 34 Pa. Code § 39.192 (relating to scope).

§ 39.88. Floors, floor openings, passageways, stairs.

(a) Floors shall have even surfaces and afford secure footing. Projecting nails, loose boards, uneven or greasy wood floors, and smooth iron floors shall be avoided.

(b) Passageways, stairways, and working spaces shall be unobstructed, and shall, if possible, provide at least 6.5 feet of headroom unless they are used solely for infrequent inspection, construction and repair. Reference should also be made to § 39.104 (relating to working space about electrical equipment).

(c) Floor openings over 2 feet deep, and stairways or raised platforms over 4 feet high shall be provided with suitable handrails. Except for loading platforms, such rails are recommended if height exceeds 2 feet, especially where they are adjacent to live or moving parts, or the working space on the platform is restricted.

(d) Floor openings over 6 feet deep, and the edges of all raised platforms over 6 feet high, shall, if possible, be provided with suitable toeboards.

(e) Toeboards shall, if possible, be arranged at back of stairway treads if they are over exposed live or moving parts or over working spaces, passageways or other stairways.

Cross References

This section cited in 34 Pa. Code § 39.81 (relating to applicability); 34 Pa. Code § 39.82 (relating to scope); 34 Pa. Code § 39.83 (relating to modification or waiver of provisions); and 34 Pa. Code § 39.192 (relating to scope).

§ 39.89. Exits.

(a) Each room or space and each working space about equipment shall have suitable means of exit which shall be kept clear of obstructions.

(b) If the plan of the room or space and the character and arrangement of equipment are such that an accident would be liable to prevent an employe from getting out of the room through a single exit, as in the case of long narrow rooms, platforms or passageways, a second exit shall, if practicable, be provided.

Cross References

This section cited in 34 Pa. Code § 39.81 (relating to applicability); 34 Pa. Code § 39.82 (relating to scope); 34 Pa. Code § 39.83 (relating to modification or waiver of provisions); and 34 Pa. Code § 39.192 (relating to scope).

§ 39.90. Fire fighting appliances.

Each room or space where an operator is in attendance shall be provided with adequate approved fire-extinguishing appliances conveniently located and conspicuously marked. Any such appliances which have not been approved by Underwriters' Laboratories for use on live parts should be plainly and conspicuously marked with a warning to that effect whenever placed in rooms containing exposed live parts over 300 volts to ground.

Cross References

This section cited in 34 Pa. Code § 39.81 (relating to applicability); 34 Pa. Code § 39.82 (relating to scope); 34 Pa. Code § 39.83 (relating to modification or waiver of provisions); and 34 Pa. Code § 39.192 (relating to scope).

PROTECTIVE ARRANGEMENTS OF EQUIPMENT**§ 39.101. General requirement.**

Electrical supply equipment shall be of such construction and installed and maintained, so as to reduce the life hazard as far as practicable.

§ 39.102. Inspections.

(a) Electrical supply equipment shall comply with this Subchapter when placed in service, and shall thereafter be periodically cleaned and inspected. Defective equipment shall be put in good order or permanently disconnected. Defective wiring, when hazardous, shall be repaired or removed.

(b) Infrequently used equipment or wiring maintained for future service shall be periodically inspected to determine its fitness for service.

§ 39.103. Protective grounding.

(a) *Grounding method.* Lightning arresters, grounding, and all grounding of circuits, equipment or wire runways, intended to be a permanent and effective protective measure, shall be made in accordance with methods specified in §§ 39.61—39.70 (relating to methods of protective grounding).

(b) *Grounding noncurrent-carrying metal parts.* Electrical supply equipment, if operating at over 150 volts to ground, or if in hazardous locations, shall have their exposed noncurrent carrying metal parts, such as frames of generators, motors, and switchboards, and cases of transformers and oil switches, permanently grounded. References should also be made to §§ 39.115 and 39.159 (relating to grounding noncurrent-carrying parts; grounding noncurrent-carrying metal parts). When regulating voltage, generators or converters supplying circuits not exceeding 140 volts to ground are operated at not more than 180 volts, such generators or converters are considered not to exceed 150 volts to ground. Hazardous locations include those where dampness, acid fumes, explosives, inflammable gas, or flyings normally exist.

(c) *Exemptions.* Exposed noncurrent-carrying metal parts of electrical supply equipment operating on grounded direct current circuits or on series direct-current circuits may be left ungrounded if no inflammable gas is present, and if suitable insulating floors, platforms, or mats are used, so that no person may inadvertently come in contact with such ungrounded parts while he is standing upon any grounded surface, including floors not of insulating material; and further if suitable permanent insulating barrier guards are used so that a person may not, while touching the ungrounded parts at the same time inadvertently touch other machine frames or metallic fixtures not bonded to the parts in question. This provision shall not apply to the motor frame of a direct connected, motor driven, high tension, series generator sets in existing installations, when the generators have their frames insulated from ground, for operating reasons, and the motor frames are grounded, if it is impracticable to provide insulating barrier

guards in the space available. Reference should also be made to § 39.115 (relating to noncurrent-carrying parts).

(d) If exposed noncurrent-carrying metal parts are not grounded they shall be suitably insulated from the ground and from neighboring grounded surfaces.

Cross References

This section cited in 34 Pa. Code § 39.115 (relating to grounding noncurrent-carrying parts); 34 Pa. Code § 39.159 (relating to grounding noncurrent-carrying metal parts); and 34 Pa. Code § 39.176 (relating to grounding).

§ 39.104. Working space about electrical equipment.

(a) Adequate working space with secure footing shall be maintained about electrical supply equipment which requires adjustment or examination during operation.

(b) Working spaces about exposed live parts over 300 volts to ground shall be made inaccessible to other than authorized attendants by the use of suitable barriers when necessary.

(c) The spaces shall be arranged so as to give authorized attendants ready access to all parts requiring attention and if practicable, unless used only for infrequent construction, inspection, and repair, shall provide the following minimum working spaces:

(1) If there are exposed live parts from 300 volts up to 750 volts on one side, the minimum width shall be 2 1/2 feet; above 750 volts, not less than three feet.

(2) If there are exposed live parts from 300 volts up to 750 volts on the both sides, the minimum width shall be 3 feet; above 750 volts, not less than 5 feet.

Cross References

This section cited in 34 Pa. Code § 39.105 (relating to guarding live parts); 34 Pa. Code § 39.143 (relating to isolation by elevation); and 34 Pa. Code § 39.177 (relating to guarding live parts).

§ 39.105. Guarding live parts.

(a) Protection shall be provided for persons near otherwise exposed ungrounded current-carrying parts of electrical supply equipment such as bus bars and other conductors on the terminals of generators and motors, operating at over 300 volts to ground and not effectively isolated by elevation unless these parts are away from passageways, and working spaces, used for frequent construction, inspection and repair.

(b) If the working space about electrical equipment is less than that specified in § 39.104 (relating to working space about electrical equipment), suitable enclosures or barriers shall be provided to prevent inadvertent contact with live parts. If such enclosures must be opened or barriers removed while the parts they guard are alive, surrounding floors shall be provided with suitable insulating

platforms or mats, so placed that the operator may not readily touch the live parts without standing on the mat or platform.

(1) Enclosures may consist of suitable casings or suitable insulating coverings. The insulating covering of conductors shall be depended upon only when it is impracticable to install more suitable guards and then only when very substantial, thoroughly dry, and containing no noninsulating flameproofing compound or oil-soaked rubber.

(2) Barriers may consist of horizontal or vertical strips placed in front of current-carrying parts or of closely spaced partitions between such parts, extending beyond the exposed sides of the current-carrying parts.

(3) If covers, casings or barriers are at any time removed while the parts which they guard are alive, they shall be of insulating material, or so arranged that they are not readily brought in contact with the live parts.

(4) Mats may be of wood, held together by wood pins, or of cork matting, linoleum or rubber. The material and construction should be suitable for the voltage concerned and for the prevailing conditions. If subject to moisture or to accumulations of conducting dust, flyings or chips, mats should provide surfaces minimizing the hazards from these sources.

(c) If the specified working spaces are provided and the current-carrying parts are not guarded by enclosures or barriers, the insulating platforms or mats shall always be provided.

(d) If the current-carrying parts operate at over 7500 volts the enclosing or barrier guards shall always be provided even if insulating mats are also provided. Enclosing or barrier guards not of grounded metal shall be of substantial material and spaced from the current-carrying parts not less than three times the needle-point sparking distance, at the voltage concerned, of the intervening air, oil, or other dielectric. This requirement shall not apply to direct-connected, motor-driven, high-tension, series generators, which for operating reasons have their frames insulated from ground.

(e) Bare parts at different potentials shall be effectively separated. Such parts in circuits of large capacity or operating at above 7500 volts shall, unless provided with enclosures or other guards specified in subsection (b), be provided with suitable barriers, if practicable, so that they will not be short-circuited by tools or other conducting objects.

Cross References

This section cited in 34 Pa. Code § 39.160 (relating to guarding live parts of switches and automatic cut-outs not installed on switchboards); 34 Pa. Code § 39.144 (relating to guarding conductors); and 34 Pa. Code § 39.185 (relating to guarding live parts).

§ 39.106. Isolating live parts by elevation.

Current-carrying parts need not be guarded if they are maintained at the following distances above the floors which may be occupied by persons:

<i>Voltage of Conductors</i>	<i>Elevation (in feet)</i>
300—750	7
750—2,500	7
2,500—7,500	8
7,500—30,000	9
30,000—70,000	10
70,000—100,000	12
Over 100,000	14

Cross References

This section cited in 34 Pa. Code § 39.143 (relating to isolation by elevation); 34 Pa. Code § 39.160 (relating to guarding live parts of switches and automatic cut-outs not installed on switchboards); and 34 Pa. Code § 39.199 (relating to guarding or isolating live parts).

§ 39.107. Identification.

(a) Electrical supply equipment shall be suitably identified when necessary for safety. The identification may be by position, color, number, name, plate, label, design or other means.

(b) The voltage and intended use shall be shown when important.

ROTATING EQUIPMENT

§ 39.111. Speed control and stopping devices.

(a) Prime movers driving generating equipment shall be provided with automatic speed-limiting devices, in addition to their governors, if necessary, as with some types of steam turbines where harmful overspeed may otherwise occur.

(b) Separately excited direct current motors, series motors, and motor generators and converters, where possible for them to be driven at an excessive speed from the direct current end by a reversal of current or decrease of load, shall be provided with speed limiting devices, unless the load and the mechanical connections thereto are of such a character as to safely limit the speed.

(c) If the speed control of direct current motors is accomplished by varying the field resistance, and the nature of the load and the range of the field rheostat are such as to make a dangerous speed attainable and no speed limit devices are used, the field rheostats shall be arranged with no voltage releases or other devices so that the motor cannot be started or continued in operation under dangerously weakened field, except where a hazard to service or apparatus might result from operation if a hazard to service or apparatus might result from operation.

(d) Stopping devices, such as switches or valves which may be operated from locations convenient to machine operators, shall be provided from prime movers or motors driving generating equipment.

(e) If speed limiting or stopping devices are electrically operated the control circuits by which such devices are actuated shall be in conduit or otherwise suitably protected from mechanical injury.

§ 39.112. Protecting shaft ends, pulleys, belts, and other moving parts.

Pulleys, belts, and shaft ends, projecting through bearings, revolving armatures, revolving fields, and other moving parts shall either be entirely enclosed in suitable casings or otherwise adequately guarded by rails or barriers if persons would be liable to be injured by those parts.

§ 39.113. Guards for live parts.

(a) Suitable insulating mats or platforms of substantial construction providing good footing shall be placed on floors and, if necessary, on frames of machines having exposed live parts above 300 volts to ground, so that no operator may readily touch such parts unless he is standing on the mat or platform.

(b) For parts above 750 volts, suitable enclosing or barrier guards shall, if practicable, be provided in addition to mats or platforms, and arranged such that the operator may not inadvertently touch the live parts and any neighboring grounded parts at the same time.

(c) If necessary, steps and handrails shall be installed on or about large machines to afford ready access to live parts which shall be examined or adjusted during operation.

(d) If switches are installed on the frames of generating equipment for the purpose of reducing inductive voltage in generator and converter field coils, they shall be suitably constructed or guarded to prevent passers by from inadvertently coming in contact with the live parts, to protect persons handling them, and to prevent them being accidentally opened or closed.

(e) Suitable shields or barriers shall be provided where necessary to prevent areas from large commutators or circuit breakers from injuring persons in the vicinity such as narrow switchboard galleries or similar working spaces located immediately above or beside such equipment.

§ 39.114. Hazardous locations.

(a) If explosives, inflammable gas, or inflammable flyings normally exist in dangerous quantities, the parts at which sparking or arcing are liable to occur shall be enclosed so as to reduce the hazard as far as practicable. This enclosure shall be by any one of the following methods:

- (1) Placement in separate compartments or rooms.
- (2) Use of casings of enclosed type when inflammable dust or flyings are present.
- (3) Use of explosion-proof casings when inflammable gasses exist in dangerous quantities.

(b) Casings shall be nonabsorptive and noncombustible, and if made of metal shall be permanently grounded if within reach of grounded surfaces.

Cross References

This section cited in 34 Pa. Code § 39.152 (relating to hazardous locations).

§ 39.115. Grounding noncurrent-carrying parts.

(a) Exposed noncurrent-carrying metal parts of rotating electrical supply equipment shall be permanently grounded in accordance with the requirements for grounding provided in § 39.103 (relating to protective grounding).

(b) If machine frames, such as those of series are light generators or direct current railway generators, are necessarily ungrounded, suitable insulating floors, mats, or platforms providing good footing shall be so placed that no person may readily touch the machine frame unless standing on such floor, mat, or platform.

(c) If two or more machines, either of which operates at over 150 volts to ground, are mechanically coupled together and the operator is able to touch the frames of more than one at a time, the frames of all such shall be permanently grounded or bonded together electrically. This provision may be waived under the following circumstances:

(1) If high-voltage series generator sets in existing installations are used and for operating reasons the generators have their frames insulated from the ground and the motor frame is grounded.

(2) If it is impracticable to place insulating barriers between the grounded and ungrounded frames.

(d) Exciters and auxiliary circuits electrically connected to generators or other machines over 750 volts to ground (with frames ungrounded) shall be installed, protected, and identified as machines and circuits of the same voltage as that of the machine for which they are auxiliaries. Reference should also be made to § 39.132 (relating to grounding low voltage circuits of instrument transformers).

Cross References

This section cited in 34 Pa. Code § 39.103 (relating to protective grounding).

§ 39.116. Deteriorating agencies.

(a) Suitable guards or enclosures shall be provided to protect exposed current-carrying parts, insulation of leads, balancing coils or other electrical devices belonging to motors and generating equipment if installed directly under equipment or in other locations where dripping oil, excessive moisture, steam, vapors or similar injurious agents exist.

(b) The metal frames and other exposed noncurrent-carrying metal parts of equipment in these locations shall be permanently grounded.

STORAGE BATTERIES**§ 39.121. Applicability.**

The provisions of §§ 39.121—39.127 (relating to storage batteries), except for § 39.125 (relating to guarding live parts in battery room), shall apply only to storage batteries exceeding 50 kilowatt hours capacity at the 8 hour rate of discharge.

Cross References

This section cited in 34 Pa. Code § 39.85 (relating to general requirements); and 34 Pa. Code § 39.201 (relating to storage batteries, transformers, and lightning arresters).

§ 39.122. Isolation.

Storage batteries shall be made inaccessible to other than properly qualified persons by being placed in a separate room or enclosure.

Cross References

This section cited in 34 Pa. Code § 39.85 (relating to general requirements); 34 Pa. Code § 39.121 (relating to applicability); and 34 Pa. Code § 39.201 (relating to storage batteries, transformers, and lightning arresters).

§ 39.123. Ventilation.

Rooms or enclosures containing storage batteries shall be ventilated so as to remove acid spray and prevent dangerous accumulation of inflammable gas. Communication of drafts to other rooms shall be prevented.

Cross References

This section cited in 34 Pa. Code § 39.85 (relating to general requirements); 34 Pa. Code § 39.121 (relating to applicability); and 34 Pa. Code § 39.201 (relating to storage batteries, transformers, and lightning arresters).

§ 39.124. Suitable supports and floors.

The cells of storage batteries shall be supported by suitable insulators, except small cells of insulating material. Suitable drainage or other means shall be provided beneath cells to prevent the accumulation of electrolyte in case of leakage or spraying. Acid resistive floors, such as vitrified brick, set in pitch, are recommended where large batteries are installed.

Cross References

This section cited in 34 Pa. Code § 39.85 (relating to general requirements); 34 Pa. Code § 39.121 (relating to applicability); and 34 Pa. Code § 39.201 (relating to storage batteries, transformers, and lightning arresters).

§ 39.125. Guarding live parts in battery room.

(a) The arrangement of cells and connections shall be such that no two current-carrying parts between which a voltage exceeding 150 exists, shall be closer than three feet, if the parts are so exposed that persons are liable to make accidental contact with both at the same time.

(b) No conductor above 150 volts to ground shall be placed in any passage-way, unless guarded or isolated by elevation.

Cross References

This section cited in 34 Pa. Code § 39.85 (relating to general requirements); 34 Pa. Code § 39.121 (relating to applicability); and 34 Pa. Code § 39.201 (relating to storage batteries, transformers, and lightning arresters).

§ 39.126. Illumination.

Storage battery rooms shall be lighted, if practicable, from outside lamps. If lamps are inside, only incandescent electric lamps in keyless porcelain or composition sockets, controlled from points not exposed to battery vapor, shall be used.

Cross References

This section cited in 34 Pa. Code § 39.85 (relating to general requirements); 34 Pa. Code § 39.121 (relating to applicability); and 34 Pa. Code § 39.201 (relating to storage batteries, transformers and lightning arresters).

§ 39.127. Acid-resisting coverings.

Conductors in battery rooms, if of such material or so located as to be liable to corrosion, shall have suitable protective coverings or coatings, unless the ventilation is such as to render this unnecessary.

Cross References

This section cited in 34 Pa. Code § 39.85 (relating to general requirements); 34 Pa. Code § 39.121 (relating to applicability); and 34 Pa. Code § 39.201 (relating to storage batteries, transformers and lightning arresters).

**TRANSFORMERS, REACTANCES, INDUCTION REGULATORS,
BALANCE COILS AND SIMILAR EQUIPMENT****§ 39.131. Current transformers secondary circuits.**

(a) Secondary circuits of current transformers including constant current and instrument transformers, except those supplying relays only, or those having their primary circuits always disconnected before the secondary circuits are worked on, shall be provided with means of short circuiting them which may be readily con-

nected while the primary is energized and which are so arranged as to permit the removal of any instrument or other device from such circuits without opening the circuits.

(b) If primaries are above 7,500 volts, secondary circuits, unless otherwise adequately protected from injury or contact of persons, shall be permanently grounded conduit.

Cross References

This section cited in 34 Pa. Code § 39.201 (relating to storage batteries, transformers and lightning arresters).

§ 39.132. Grounding low voltage circuits of instrument transformers.

The low voltage circuit of instrument transformers shall be permanently grounded unless the circuits are installed, guarded, and plainly identified as required for the high voltage circuits of the transformers. This shall sometimes require marking to distinguish such a low voltage circuit from others with which it is associated, but which are protected by ground connections.

Cross References

This section cited in 34 Pa. Code § 39.115 (relating to grounding noncurrent-carrying parts); and 34 Pa. Code § 39.201 (relating to storage batteries, transformers, and lightning arresters).

§ 39.133. Grounding transformer cases.

(a) The metal case or exposed frame of each transformer, reactance, and similar equipment, which is located where dampness or inflammable gas normally exists, or which is connected to a circuit operating at over 150 volts to ground, shall be permanently grounded.

(b) Exception is permissible in locations free from inflammable gas, if the entire transformer is isolated or guarded as required for the highest voltage circuit connected with the transformer, and is plainly and conspicuously identified as of that voltage.

Cross References

This section cited in 34 Pa. Code § 39.201 (relating to storage batteries, transformers and lightning arresters).

§ 39.134. Transformers.

Transformers shall be installed according to any one of the following methods:

(1) On poles or, when permitted by local authority, on walls of buildings, in which case they shall comply with overhead line rules.

(2) In rooms in which other equipment is installed, in which case the construction, grounding, and guarding for live parts shall comply with the rules covering station construction or utilization equipment, as they may apply in each case.

(3) In transformer vaults or rooms which shall be made inaccessible to unauthorized persons.

(4) If the amount of oil in transformer casings is considerable and the transformers are located in buildings used for other than station purposes, they should be placed in suitable transformer vaults. Reference should also be made to § 39.201 (relating to storage batteries, transformers and lightning arresters).

Cross References

This section cited in 34 Pa. Code § 39.201 (relating to storage batteries, transformers and lightning arresters).

WIRING AND PROTECTION AND CONTROL EQUIPMENT

§ 39.141. Electrical protection from conductors.

(a) Conductors shall be suitable for the location, use, and voltage. Conductors shall be protected against excessive heating by the design of the system or by automatic cut-outs, unless grounded conductors, field excitation circuits, circuits supplying interconnected three wire systems of underground distribution, and other circuits the opening of which may cause special hazard to life through interruption of service. Such automatic cut-outs may be set so as to interrupt the circuits only on excessive short circuits, if constant attendance is provided and protection is thus also afforded by manual operation.

(b) Conductors normally grounded for the protection of persons shall be arranged without automatic cut-outs interrupting their continuity between the source of energy and the point at which the ground wire is attached, unless the operation of such a cut-out automatically results in the immediate disconnection of the grounded circuit from all sources of electrical energy.

(c) Conductors shall be provided with one or more suitable switches to effectively disconnect them from all sources of electrical energy.

Cross References

This section cited in 34 Pa. Code § 39.156 (relating to cut-outs).

§ 39.142. Mechanical and thermal protection.

(a) If exposed to mechanical injury, suitable casing, armor, or other means shall be employed to prevent injury or disturbances to conductors, their insulation, or supports.

(b) If conductors with insulating coverings are closely grouped, as sometimes on the rear of switchboards or in cableways, they shall have a substantial flame-proof outer covering.

(c) Large uninsulated conductors liable to be torn from their supports by the stresses to which they are subjected, as by the magnetic fields produced, shall be

so supported that they may not come in contact with the surfaces along which they are run or with other conductors.

§ 39.143. Isolation by elevation.

All conductors over 750 volts, and ungrounded bare conductors over 300 volts to ground shall be isolated by elevation as required by § 39.106 (relating to isolating live parts by elevation), unless guarded in accordance with § 39.144 (relating to guarding conductors), so that no person may inadvertently come in contact with them. Buses and bus structures and line connections thereto, installed in accordance with §§ 39.104 and 39.160 (relating to working space about electrical equipment; guarding live parts of switches and automatic cut-outs not installed on switchboards) in suitable locations specially arranged for such purposes, shall not be required to be so isolated.

Cross References

This section cited in 34 Pa. Code § 39.185 (relating to guarding live parts).

§ 39.144. Guarding conductors.

(a) *Use of enclosed casings.* If insulated conductors are enclosed, suitable permanently grounded metal conduit or grounded metal sheathing shall be used; or in lieu thereof other ducts, runways, or compartments of tile, bitumenized fiber, concrete, or other suitable fire-resistive materials may be used, if containing no exposed combustible material. In damp places, conduits, ducts, or runways shall be made waterproof and be provided with suitable means for draining off condensation, unless the conductors contained are lead-sheathed cables.

(b) *Conductors above 750 volts in conduits or sheathing.* Conductors operating at over 750 volts unless separately supported and effectively isolated by elevation or by enclosing in suitable compartments or screens, as in subsection (d), shall be suitable metal sheathed cable, run in metal conduits or suitable fire-resistive ducts or compartments, with the metal sheathing permanently grounded. Other covering may be used in suitable grounded metal conduit or insulating duct, when installed in dry locations. The conduit or duct shall provide a smooth runway with smooth outlets. Metal conduit, if used, shall be made electrically and mechanically continuous with the metal casings of conduit fittings.

(c) *Metal sheathed cable outlets above 750 volts.* Insulation of the several conductors of multiple conductor cable, where leaving the metal sheath at outlets, shall be thoroughly protected from mechanical injury, moisture and electrical strains by means of a pot head or equivalent method.

(d) *Open conductors above 750 volts.* When any open insulated conductor above 750 volts, or any open bare conductor above 300 volts to ground, is necessarily brought closer to the floor line than the clearances required for isolation by elevation, they shall be guarded by permanent screens, by enclosing partitions, or by suitable barrier guards.

(e) If barrier rails only are used, the surrounding floors shall be provided with suitable insulating platforms, mats, or covers. Reference should also be made to § 39.105(b) (relating to guarding live parts).

Cross References

This section cited in 34 Pa. Code § 39.143 (relating to isolation by elevation).

§ 39.145. Guarding in hazardous locations.

(a) Conductors in locations where inflammable gas normally exists shall be in metal conduit or metal sheathed cable. Fittings and outlets of such conduit and cable shall be electrically and mechanically continuous with the conduit or metal sheath, and the conduit shall be sealed to prevent entrance of gases.

(b) Conductors in damp locations, if neither in conduit nor in waterproof metal sheaths in other suitable ducts, shall be effectively isolated and supported on a suitable type of insulator.

§ 39.146. Pendants and portables.

(a) Pendant conductors shall not be installed if they may readily be moved so as to bring them in contact with live parts of electrical supply equipment.

(b) Portable conductors shall be attached to fixed wiring only through separable attachment plugs which will disconnect all poles by one operation.

§ 39.147. Temporary wiring.

Temporary wiring which is not in compliance with this subchapter may be used when it is constantly under competent supervision or protected by suitable barrier guards and warning signs while it or neighboring wiring is alive and accessible to any person.

§ 39.148. Taping ends and joints.

Ends and joints of insulated conductors, unless otherwise adequately guarded, shall have equal insulating covering with other portions of the conductor.

FUSES AND OTHER CUT-OUTS, SWITCHES, AND CONTROLLERS

§ 39.151. Accessible and indicating.

Switches, automatic cut-outs, starting rheostats and other control devices shall be readily accessible to authorized persons. They shall be arranged or marked so as to identify the equipment controlled by them, and, except fuses, shall indicate whether they are open or closed. They shall be installed so as to minimize the danger of accidental operation, and where practicable so that gravity cannot close them; such switches that close by gravity shall be provided with a proper latch or stop block to prevent accidental closing. If practicable, the blades of knife switches should be dead when the switches are open.

§ 39.152. Hazardous locations.

In locations where explosives, inflammable gas, or inflammable flyings normally exist in dangerous quantities, all parts at which sparking or arcing are liable to occur shall, if practicable, be so inclosed as to prevent hazard. Reference should also be made to § 39.114 (relating to hazardous locations).

§ 39.153. Required placement of switches.

(a) Suitable switches or cut-outs which may be manually operated shall be inserted in all leads, except a grounded conductor, to generators, motors, transformers, other than instrument transformers, and outgoing supply circuits.

(b) In most cases the switch called for should be capable of opening the circuit under overloads. In some cases as between generators and transformers banks used with them, only disconnectors shall be required.

(c) If two or more pieces of electrical supply equipment or supply lines are operated as a single unit no switch is necessarily required between them.

(d) Switches are not required in underground manholes or in transformer vaults except as may be deemed necessary by the utility to meet operating requirements.

§ 39.154. Switches or other grounding devices.

Switches or other suitable means should be provided, where practicable, to facilitate short circuiting and grounding equipment or lines for which the operating rules require grounding to protect workmen.

Cross References

This section cited in 34 Pa. Code § 39.176 (relating to grounding).

§ 39.155. Character of switches and disconnectors.

(a) *Capacity.* Switches used as other than disconnectors shall be of suitable voltage and ampere rating for the circuit on which they are installed, and be marked with the current which they are able to safely interrupt. Disconnectors shall be of suitable voltage and ampere rating for the circuit on which they are installed, and shall be marked with warning against opening when carrying load. Where a group of disconnectors is contained in one room or compartment a single conspicuous sign may be sufficient.

(b) *Locking.* Remotely controlled switches, oil switches and disconnectors shall be arranged so that they may be secured or blocked in the open position and plainly tagged to prevent careless closing while work is being done on equipment controlled by them, unless the switches are so constructed or installed as to prevent accidental closing or live or moving parts of the equipment they control are so guarded as to render blocking and tagging unnecessary. If the accidental opening of a switch or disconnector might cause hazard, similar arrangements should be used for retaining them in closed position. Locking should be used rather than

blocking wherever parts of equipment are remote from the point of control. Locking or securing doors of compartments is a means of securing switches in the open position to prevent careless closing while work is being done on the equipment controlled. Blocking the jaws of knife switches is also a method.

(c) *Air brake.* Unless a switch operating on a circuit above 750 volts makes an air break, there shall be installed between it and the source of energy supply a suitable air or oil break disconnecter or equivalent device having an air or oil gap suitable for the operating voltage of the circuit. Reference should also be made to § 39.358 (relating to protecting workmen by disconnectors).

(d) *Alignment.* Knife switches shall maintain such alignment under service conditions that it may be possible to close them with a single unhesitating motion.

§ 39.156. Cut-outs.

(a) Circuit leads to motors, transformers, or station auxiliaries shall be protected by suitable automatic cut-outs, except as noted in § 39.141 (relating to electrical protection from conductors).

(b) If two or more pieces of electrical supply equipment or supply lines are operated as a single unit no automatic cut-out is necessary between them.

§ 39.157. Disconnecting of fusible cut-outs before handling.

Fusible cut-outs in circuits operating at over 150 volts to ground shall be arranged in any one of the following ways:

(1) Ungrounded current-carrying parts are not touched by persons refusing the cut-outs until the fuses have been disconnected from sources of electrical energy.

(2) The cut-out may be disconnected by a suitable switch in series.

(3) The fuse may be conveniently handled by means of insulating handles or portable appliances provided for the purpose.

(4) Fusible cut-outs below 150 volts to ground and less than 60 amperes' capacity are exempted from the provisions of this section.

§ 39.158. Arcing or suddenly moving parts.

(a) Fuses and circuit breakers shall, as far as possible, be so located and shielded that persons may not be burned by their operation.

(b) Handles or levers of circuit breakers and similar parts which may move suddenly, in such a way that persons in the vicinity are liable to be injured by being struck by them, shall be guarded or isolated, if practicable.

§ 39.159. Grounding noncurrent-carrying metal parts.

(a) Exposed noncurrent-carrying metal parts of switch and fuse cases, levers, and other similar parts with live parts liable to leak, creating a hazard, shall be permanently grounded according to the provisions of § 39.103 (relating to protective grounding).

(b) Minor parts, such as ferrules of knife switches, which are not liable to become alive, are excluded from compliance with subsection (a).

Cross References

This section cited in 34 Pa. Code § 39.103 (relating to protective grounding).

§ 39.160. Guarding live parts of switches and automatic cut-outs not installed on switchboards.

(a) *Above 750 volts.* Switches interrupting circuits over 750 volts shall be operated by means of remote control mechanisms or be provided with suitable casings protecting the operator from danger of contact with current-carrying parts, except as provided in subsection (d), for switches requiring only infrequent attention and located in enclosures from which even the operator is normally excluded. The control devices for switches shall indicate whether switches are open or closed. Lever operated, circuit breaker type switches should be equipped with indicating devices to show, other than by the position of the handles, whether they are open or closed. Automatic cut-outs not suitably isolated by elevation shall be of an incased type or be provided with suitable enclosures for current-carrying parts. Large capacity, high voltage oil switches should, where practicable, be placed away from the operator and operated by remote (or lever) controls, since the blowing up of the oil containers may cause serious injuries to persons in the vicinity. For the purpose of this section voltage in excess of 750 will be included as below 750 where the excess is for the purposes of regulation only.

(b) *Below 750 volts.* Switches interrupting circuits under 750 volts shall be operated by means of remote control mechanisms or be incased during ordinary operation or be provided with insulating handles and insulating guard disks or shields arranged so as to make it unlikely that the hand may come in contact with live parts. Switches below 300 volts to ground may be exempted from the requirements of this subsection.

(c) *Platforms or mats.* Where live parts of switches or automatic cut-outs operating at over 300 volts to ground are not remotely controlled, or provided with enclosing guards effective during ordinary operation or adjustment, or isolated by elevation, suitable insulating floors, mats, or platforms shall be provided on which the operator shall stand while operating the switches or adjusting the automatic cut-outs. Reference should also be made to § 39.105(b) (relating to guarding live parts).

(d) *Working spaces about occasionally exposed live parts.* When switches, disconnectors, and fuses above 750 volts are ordinarily guarded by covers or enclosed in separate rooms, but are occasionally operated without such protection, either by removal of the covers or by entrance into the rooms, adequate working space shall be provided about the live parts, unless effectively isolated by elevation as required by § 39.106 (relating to isolating live parts by eleva-

tion), so that the operator is not required to bring any part of his body within the following horizontal distances:

<i>Voltage of parts</i>	<i>Distances (in feet)</i>
750—7,500	1
7,500—30,000	2
30,000—50,000	3
50,000—70,000	4
70,000—100,000	5
Above 100,000	6

(e) The distances given in subsection (d) are slightly greater than those required to be maintained by operators near parts of the corresponding voltage. Reference should also be made to §§ 39.364 and 39.365 (relating to voltages between 750 and 7,500; voltages above 7,500). This is for the purpose of providing against inadvertent movements of operators and to insure that operators of unusual height or size may be protected by this provision.

(f) Below 7,500 volts the distance specified in this section may be reduced if the operator uses suitable operating devices.

Cross References

This section cited in 34 Pa. Code § 39.143 (relating to isolation by elevation); 34 Pa. Code § 39.171 (relating to accessibility and convenient attendance); 34 Pa. Code § 39.177 (relating to guarding live parts); and 34 Pa. Code § 39.182 (relating to provisions for disconnecting).

SWITCHBOARDS

§ 39.171. Accessibility and convenient attendance.

Switchboards shall have switches so arranged that the points of control are readily accessible to the operator. Instruments, relays, and other devices requiring reading or adjustments shall be so placed that work may be readily performed from the working space. Reference should also be made to §§ 39.160 and 39.177 (relating to guarding live parts of switches and automatic cut-outs not installed on switchboards; guarding live parts).

§ 39.172. Location and illumination.

(a) Switchboards shall, if practicable, be so placed that the operator is not endangered by any live or moving parts of machinery or equipment located near the board.

(b) Sufficient illumination shall be provided both for the front and rear of the switchboard so that the switchboard may be readily operated and instruments conveniently read.

§ 39.173. Necessary equipment.

Switchboards which control outgoing supply circuits shall, except in substations without regular attendance, be equipped with such instruments as are necessary to show operating conditions.

§ 39.174. Arrangement and identification.

Connections, wiring and equipment of switchboards and panelboards shall be arranged in an orderly manner and switches and cut outs shall be plainly marked, labeled or arranged to afford ready means for identifying circuits or equipment supplied through them.

§ 39.175. Spacings and barriers against short circuit.

(a) Switchboards shall have the number of bare parts at different potentials on any panel reduced to a minimum, and these parts shall be effectively separated. If voltage exceeds 750, such parts should be protected or separated by suitable barriers. The parts, including bus bars, should be so located, or provided with such insulating coverings or barriers, that parts at different potentials are not readily short circuited by tools or other conducting objects.

(b) Fuses should be located so as to minimize the danger, in removing or replacing them, of short circuiting parts at different potentials by the fuses or by the hands of the operator.

§ 39.176. Grounding.

Switchboard frames shall be permanently grounded under the conditions and with the exceptions noted in § 39.103 (relating to protective grounding). If protective grounds are occasionally required on circuits for the protection of workmen, a permanent ground connection shall be provided, and also suitable means for effectively and readily connecting the parts being grounded to the ground connection. Reference should also be made to § 39.154 (relating to switches or other grounding devices).

§ 39.177. Guarding live parts.

(a) *Enclosure.* Switchboards operating at over 300 volts to ground and located near passageways shall be guarded from these by suitable inclosures or barriers and shall be made inaccessible to other than authorized persons, unless under constant attendance during operation.

(b) *Mats.* For the protection of the operator, if parts over 300 volts to ground are not otherwise guarded or isolated by elevation, suitable insulating floors, mats, or platforms providing good footing shall be so placed that the operator does not readily touch the live parts, unless standing on such floors, mats, or platforms.

(c) *Parts over 750 volts on face of board.* No switchboard shall have exposed on its face within six feet from floor line any current-carrying part over 750 volts, except as noted in subsection (e) and except direct current railway boards up to 1,500 volts, which, if above nominal 750 volts, shall be so constructed that the operator does not inadvertently come in contact with parts having a hazardous difference of potential. Dead face panels and remote control should be utilized to achieve this result if isolation by elevation is impracticable or undesirable.

(d) *Exposed live parts on face or back.* When working space adjacent to live parts are not provided in accordance with § 39.104 (relating to working space about electrical equipment), suitable guards shall be arranged to protect the operator from accidental contact with parts over 750 volts. Suitable insulating guardrails, sufficiently spaced from the face or back of the board, or suitable guards perpendicular to the face or the back of the board, and extending out beyond the live parts should be used, if practicable.

(e) *Plug-type switchboard.* Plug-type switchboards shall, except while connections are being changed, have no current-carrying part exposed on face of boards and, if practicable, they and their plug connectors shall be so arranged where the operating voltage exceeds 150 as to have current-carrying parts guarded so long as they are alive, even while connections are being changed.

(f) *Instruments.* Metal cases of instruments, unless isolated by elevation, operating at over 750 volts should be grounded or enclosed in suitable covers of insulating material or of grounded metal.

(g) *Exposed parts over 7,500 volts.* No switchboard shall have current-carrying parts above 7,500 volts exposed unguarded unless these parts are effectively isolated by elevation, except at times when occasionally left exposed by removal of covers or entrance into enclosures, such as switch and instrument transformer cells or compartments, which are ordinarily unoccupied by persons. For such parts, if exposed while alive for any purpose, including busses and disconnectors in compartments, working space shall be provided complying with the requirements under § 39.160(d) (relating to guarding live parts of switches and automatic cut-outs not installed on switchboards).

Cross References

This section cited in 34 Pa. Code § 39.171 (relating to accessibility and convenient attendance).

LIGHTNING ARRESTERS

§ 39.181. Location.

Lightning arresters when installed inside of buildings shall be located as far as practicable from all other equipment and from combustible parts of the building.

Cross References

This section cited in 34 Pa. Code § 39.201 (relating to storage batteries, transformers and lightning arresters).

§ 39.182. Provisions for disconnecting.

(a) Lightning arresters on circuits over 7,500 volts shall be so arranged, isolated, and equipped that they may be readily disconnected from conductors to which they are connected by air break manual disconnectors having air gaps of not less than four times the equivalent needle point sparking distance of the operating voltage of the circuit to which the arresters are connected, and never less than eight inches.

(b) The disconnectors, unless remotely controlled and operated, shall have the adjacent working spaces required by § 39.160(d) (relating to guarding live parts of switches and automatic cut-outs not installed on switchboards), for disconnectors generally.

Cross References

This section cited in 34 Pa. Code § 39.201 (relating to storage batteries, transformers and lightning arresters).

§ 39.183. Ground wires.

Ground wires shall be run as directly as possible and be of low resistance and ample current capacity. Reference should also be made to §§ 39.61—39.70 (relating to methods of protective grounding).

Cross References

This section cited in 34 Pa. Code § 39.201 (relating to storage batteries, transformers and lightning arresters).

§ 39.184. Grounding frames.

Noncurrent-carrying metal parts of arresters shall be grounded, unless effectively isolated by elevation, or guarded as required for live parts of the voltage of the circuit to which the arrester is connected, and suitably identified as of that voltage.

Cross References

This section cited in 34 Pa. Code § 39.201 (relating to storage batteries, transformers and lightning arresters).

§ 39.185. Guarding live parts.

(a) Current-carrying parts of arresters on circuits above 750 volts, unless effectively isolated by elevation, shall be adequately guarded to protect persons from inadvertent contact with them, or from injury by arcing.

(b) Lightning arresters, unless provided with disconnectors, which are always opened before work is done on the arresters shall be so arranged that necessary adjustments are possible, without approach to current-carrying parts, through the use of permanently grounded mechanisms or suitable insulating appliances. If it is necessary that charging or adjustments be made with arresters alive, permanently grounded mechanisms or suitable insulating appliances shall always be provided.

(c) Guarding shall comply with §§ 39.105 and 39.143 (relating to guarding live parts; isolation by elevation).

Cross References

This section cited in 34 Pa. Code § 39.201 (relating to storage batteries, transformers and lightning arresters).

§ 39.186. Utilization installations.

Lightning arresters when installed for the protection of utilization equipment may be installed on supply lines or service leads either within or without the buildings or inclosures containing the equipment to be protected, and the methods employed shall be in accordance with the rules governing the construction of overhead lines, supply stations, or utilization equipment, as they apply.

Cross References

This section cited in 34 Pa. Code § 39.201 (relating to storage batteries, transformers and lightning arresters).

PROTECTIVE ARRANGEMENTS

§ 39.191. Applicability.

This section and §§ 39.192—39.202 (relating to protective arrangements) apply to all installations within this Commonwealth, whether existing, new, reconstructions, extensions, or the like, except as waived or modified in § 39.193 (relating to modification or waiver of provisions).

Cross References

This section cited in 34 Pa. Code § 39.192 (relating to scope); and 34 Pa. Code § 39.193 (relating to modification or waiver of provisions).

§ 39.192. Scope.

This section and §§ 39.191 and 39.193—39.202 (relating to protective arrangements) are specifically directed to the following:

- (1) Electrical utilization equipment between 25 volts and 750 volts, if accessible to other than qualified electrical operators, as in mills, factories, mercantile establishments, hotels, theaters, and other public buildings, cars and other vehicles, and dwellings and similar places. Signal equipment connected

to signal lines is exempted, except from the provisions of §§ 39.301—39.304 (relating to telephone and other signal apparatus on circuits exposed by supply lines).

(2) Equipment and conductors exceeding 750 volts, in addition to complying with the provisions for stations and other applicable provisions of this Subchapter, shall, where accessible to other than qualified electrical operators, have ungrounded current-carrying parts either incased in permanently grounded metal cases or conduits, or otherwise suitably guarded to prevent access or too close approach to such current-carrying parts by any specially authorized persons.

(3) Electrical utilization equipment, however, as well as generating equipment, if enclosed in a separate room which is inaccessible to unauthorized persons, and when in service is under control of a qualified electrical operator whose attention is not distracted by other processes, shall be installed in conformity with the provisions of §§ 39.81—39.90 (relating to installation and maintenance of electrical supply station and equipment).

Cross References

This section cited in 34 Pa. Code § 39.191 (relating to applicability); and 34 Pa. Code § 39.193 (relating to modification or waiver of provisions).

§ 39.193. Modification or waiver of provisions.

This section and §§ 39.191, 39.192 and 39.194—39.202 (relating to protective arrangements) may be modified or waived by the proper administrative authority or its authorized agents and shall be so modified or waived in any of the following instances:

(1) If application of the provisions involve expense not justified by the protection secured, or for any other reason if application of provisions is shown to be impracticable.

(2) If equivalent or safer construction may be more readily provided by other means.

(3) In certain instances if temporary installations or installations are shortly to be discarded or reconstructed.

(4) In cases of emergency, or pending decision of the administrator, the person responsible for the installation may decide as to modifications or waiver of any rule, subject to review by proper authority.

Cross References

This section cited in 34 Pa. Code § 39.191 (relating to applicability); and 34 Pa. Code § 39.192 (relating to scope).

§ 39.194. Time for compliance.

Time allowed for bringing existing installations into compliance with the rules shall be determined by the proper administrative authority.

Cross References

This section cited in 34 Pa. Code § 39.191 (relating to applicability); 34 Pa. Code § 39.192 (relating to scope); and 34 Pa. Code § 39.193 (relating to modification or waiver of provisions).

§ 39.195. General requirements.

(a) Electrical utilization equipment shall be of such construction and so installed and maintained as to reduce the life hazard as far as practicable.

(b) The requirements of the National Electrical (Fire) Code for the installation of wiring and fittings should be followed.

(c) If materials or devices are available which have been subjected to examination by some properly qualified body and found to comply with the general requirements of the National Electrical Safety Code, the National Electrical Code, and other nonconflicting accepted standards which apply for any given purpose, such materials or devices should be used in preference to others which have not been so examined regarding their suitability for the given purpose. In order to avoid the necessity for repetition of such examinations by different examiners, frequently with inadequate facilities for such work, and to avoid the confusion which may result from conflicting reports as to the suitability of devices examined for a given purpose, it is necessary that such examinations be made under standard conditions, and the record made generally available through promulgation by organizations properly equipped and qualified for experimental testing, inspections of the run of goods at factories and service value determinations through field inspections, and whose findings are subject to appeal to the Bureau of Standards.

Cross References

This section cited in 34 Pa. Code § 39.191 (relating to applicability); 34 Pa. Code § 39.192 (relating to scope); and 34 Pa. Code § 39.193 (relating to modification or waiver of provisions).

§ 39.196. Inspections and repairs.

(a) Electrical utilization equipment shall comply with this chapter when placed in service, and shall thereafter be periodically inspected, and when necessary, cleaned. Defective equipment shall be put in good order or permanently disconnected. Defective wiring, if hazardous, shall be repaired or removed.

(b) Repairs, extensions, and changes shall be made to existing utilization equipment and conductors only by properly qualified persons.

Cross References

This section cited in 34 Pa. Code § 39.191 (relating to applicability); 34 Pa. Code § 39.192 (relating to scope); and 34 Pa. Code § 39.193 (relating to modification or waiver of provisions).

§ 39.197. Grounding.

(a) *Grounding method.* Lighting arrester grounding and all grounding of circuits, equipment, or wire runways, which are intended to be a permanent and

effective protective measure shall be made in accordance with the methods specified in §§ 39.61—39.70 (relating to methods of protective grounding).

(b) *Circuits required to be grounded.* Circuits installed in rooms to which other than properly qualified electrical workmen have access, or in rooms where nonelectrical processes are liable to distract the attention of the electrical operator from the purely electrical operations, shall be permanently grounded in accordance with §§ 39.61—39.70 except that the following circuits are not required to be grounded:

(1) Circuits on two-wire, direct-current systems.

(2) Circuits entirely unexposed to leakage or induction from higher voltage circuits, either through overhead construction or through transformers or other devices. It is recommended, however, that all three-wire, not delta three-phase, circuits, even if unexposed, have their neutrals grounded; and that multiphase circuits, even if unexposed where partly used for lighting, be so arranged and grounded that the lighting circuits have the lowest practical voltage ground.

(3) Circuits over 150 volts to ground. Reference should be made to § 39.199 (relating to guarding or isolating live parts).

(4) Electric furnace and welding circuits. Reference should be made to § 39.263 (relating to guarding live parts).

(c) *Grounding noncurrent-carrying metal parts.* Under the hazardous conditions given in this subsection, fixed electrical utilization equipment shall, if practicable, have the exposed noncurrent-carrying metal parts, such as frames of motors, cranes, cars, and switchboards, cases of transformers and oil switches, and casings of wiring and conductors permanently grounded. Reference should be made to §§ 39.61—39.70 and 39.281—39.285. The following conditions shall be considered hazardous:

(1) Operations at voltages over 150 to ground, wherever equipment is located.

(2) Locations where explosives, inflammable gas or inflammable flyings normally exist in dangerous quantities.

(3) Cases where exposed grounded surfaces, such as metal frames of other machines, plumbing fixtures, and conducting floors or walls, exist within the reach of persons when touching the metal parts under consideration. Grounded surfaces within 5 feet horizontally of the parts considered and within 8 feet vertically of the floor shall be considered within reach.

(d) *Exceptions.* Except as set out in subsection (c)(2) and (3) no ground connection need be made to expose metal frames of switchboards, motors, or lighting fixtures connected to direct current trolley or third rail circuit, if such frames are effectively insulated from ground, and if the metal frames in question are so located with reference to insulating floors or platforms that persons may not readily touch the metal frames in question without standing on such floors or platforms.

(e) Parts of machines, such as name plates, screws in wood, and similar small parts which are not liable to become alive, except under very unusual circumstances, are not considered as coming under the rule and may be left ungrounded.

Cross References

This section cited in 34 Pa. Code § 39.191 (relating to applicability); 34 Pa. Code § 39.192 (relating to scope); 34 Pa. Code § 39.193 (relating to modification or waiver of provisions); 34 Pa. Code § 39.201 (relating to storage batteries, transformers, and lightning arresters); 34 Pa. Code § 39.219 (relating to grounding or isolating service conduits); 34 Pa. Code § 39.237 (relating to grounding noncurrent-carrying metal parts); 34 Pa. Code § 39.245 (relating to grounding frames); 34 Pa. Code § 39.253 (relating to deteriorating agencies); 34 Pa. Code § 39.254 (relating to guards for live parts); and 34 Pa. Code § 39.271 (relating to grounding).

§ 39.198. Working space about electrical equipment.

(a) Suitable working space shall be provided and maintained about electrical utilization equipment.

(b) The working spaces should, if practicable, have minimum horizontal dimensions, when adjacent to exposed live parts within 8 feet of floor, as follows:

(1) Parts above 150 volts to ground, if on one side, 2 feet 6 inches; if on two sides, 4 feet.

(2) Parts below 150 volts to ground, if on one side, 1 foot, 6 inches; if on two sides, 2 feet, 6 inches.

(c) If adjacent to such exposed live parts, working spaces should be so arranged that they shall not be used as passageways.

(d) The elevation of the equipment at least 8 feet above ordinarily accessible working platforms affords protection at least equivalent to that provided by the horizontal clearances of subsection (b), and may be used in lieu of such clearances, if desired.

Cross References

This section cited in 34 Pa. Code § 39.191 (relating to applicability); 34 Pa. Code § 39.192 (relating to scope); 34 Pa. Code § 39.193 (relating to modification or waiver of provisions); and 34 Pa. Code § 39.199 (relating to guarding or isolating live parts).

§ 39.199. Guarding or isolating live parts.

(a) Ungrounded current-carrying parts of electrical utilization equipment, such as bus bars, conductors, and terminals, operating at over 150 volts to ground and not isolated by elevation at least 8 feet above floor line shall, if practicable, be provided with suitable permanent enclosures or other guards arranged so as to prevent persons or conducting objects from inadvertently coming in, or being brought into, contact with the parts in question and at the same time so as to permit ready access to authorized persons for making adjustments or repairs, unless

excepted under the provisions of subsection (b). Enclosures may consist of suitable casings or suitable insulating coverings. The continuous insulating covering of conductors should be depended upon only when the circuit is grounded or entirely unexposed to leakage or induction from higher voltage circuits, and when it is impracticable to install more suitable guards. It should be depended upon then only when the covering is not exposed to liability of mechanical injury, and is very substantial, thoroughly dry, and contains no noninsulating flameproofing compound or oil-soaked rubber. It is recommended that in addition to the protection afforded by such coverings the insulating mats or platforms called for in subsection (b) be used. If it is necessary that covers, casings, or barriers at any time be removed from the otherwise exposed current-carrying parts which they guard, while these parts are alive, the covers, casings or barriers should be of insulating material, or so arranged that they are not readily brought in contact with the live parts. Mats may be of wood, held together by wood pins, or of cork matting, linoleum or rubber. The material and construction should be suitable for the voltage concerned and for the prevailing conditions. If subject to moisture or to accumulations of conducting dust, flyings, or chips, mats should present surfaces minimizing the hazards from these sources. Reference should be made to § 39.214 (relating to guarding conductors).

(b) If current-carrying parts at over 150 volts to ground are necessarily exposed, ungrounded, and within 8 feet from the floor line, surrounding conducting floors and other noncurrent-carrying surfaces within reach shall be covered with suitable insulating platforms, mats or other insulating devices. Reference should also be made to § 39.198 (relating to working space about electrical equipment). The guarding of current-carrying parts obviates the necessity for such insulating devices, and when the use of the latter is impracticable, from the nature of the location or processes carried on, guards should always be used.

(c) Except on fenced rights of way or other locations to which only qualified persons are admitted, trolley or crane collector wires and third rails, whether indoors or out, shall be so isolated by elevation, or be provided with suitable guards so arranged that persons do not inadvertently touch the current-carrying parts while in contact with the ground, or with conducting material connected to the ground, and shall be provided with warning signs effective whenever the conductors are alive. Damp wood, concrete floors, and metal parts of crane cabs are considered as grounded. Trolley-contact conductors indoors shall be so supported that in case of a single break, contact with the floor is not made. Reference should be made to § 39.106 (relating to isolating live parts by elevation).

(d) Bare parts at different potentials shall be effectively separated. Such parts in circuits of large capacity or operating at over 300 volts shall, if practicable, unless provided with the enclosure or other guard specified in subsection (a), be provided with suitable barriers, if otherwise they would be liable to be short circuited by tools or other conducting objects.

Cross References

This section cited in 34 Pa. Code § 39.191 (relating to applicability); 34 Pa. Code § 39.192 (relating to scope); 34 Pa. Code § 39.193 (relating to modification or waiver of provisions); 34 Pa. Code § 39.197 (relating to grounding); 34 Pa. Code § 39.201 (relating to storage batteries, transformers, and lightning arresters); 34 Pa. Code § 39.212 (relating to mechanical and thermal protection); 34 Pa. Code § 39.214 (relating to guarding conductors); 34 Pa. Code § 39.219 (relating to grounding or isolating service conduits); 34 Pa. Code § 39.246 (relating to guarding current-carrying parts); and 34 Pa. Code § 39.291 (relating to guarding live and moving parts).

§ 39.200. Hazardous locations.

(a) In locations where explosives, inflammable gas, or inflammable flyings normally exist in dangerous quantities all parts at which sparking or arcing is liable to occur shall be enclosed so as to reduce the hazard as far as practicable.

(b) This protection should be obtained by any one of the following methods:

(1) By placement in separate compartments or rooms, free from explosives, inflammable gas, and inflammable vapors.

(2) By using casings of the inclosed type, ventilated, if necessary, when dust or flyings are present.

(3) By using explosion-proof casings when inflammable gases exist in dangerous quantities.

(c) Casings shall be nonabsorptive and noncombustible, and when of metal shall be permanently grounded, if within reach of grounded surfaces, or if inflammable gas is present.

Cross References

This section cited in 34 Pa. Code § 39.191 (relating to applicability); 34 Pa. Code § 39.192 (relating to scope); 34 Pa. Code § 39.193 (relating to modification or waiver of provisions); 34 Pa. Code § 39.232 (relating to hazardous locations); and 34 Pa. Code § 39.252 (relating to hazardous locations).

§ 39.201. Storage batteries, transformers, and lightning arresters.

(a) The installation of nonportable storage batteries above 50 kilowatt-hour capacity, at the 8 hour rate of discharge, shall be in accordance with the requirements given in §§ 39.121—39.127. If small storage batteries, not included under §§ 39.121—39.127, are placed in rooms used also for other purposes, adequate guards or enclosures shall be provided, when necessary, to prevent the approach of unauthorized persons, and special means of ventilation when necessary to prevent the accumulation of inflammable gas. For batteries whose operating voltage exceeds 150, construction shall comply with §§ 39.125 and 39.199(b) (relating to guarding live parts in battery room; and guarding or isolating live parts).

(b) The installation of transformers having either winding over 300 volts to ground shall comply with the provisions of §§ 39.131—39.134 and if the operating voltage of any winding exceeds 750, the transformers shall be made inaccessible to unauthorized persons. Reference should also be made to § 39.197(c) (relating to grounding).

(c) The installation of lightning arresters shall comply with §§ 39.181—39.186 and if the operating voltage of the circuit exceeds 750 volts, the arresters shall be made inaccessible to unauthorized persons.

Cross References

This section cited in 34 Pa. Code § 39.134 (relating to transformers); 34 Pa. Code § 39.191 (relating to applicability); 34 Pa. Code § 39.192 (relating to scope); and 34 Pa. Code § 39.193 (relating to modification or waiver of provisions).

§ 39.202. Identification.

(a) Electrical utilization equipment shall be suitably identified, when necessary for safety.

(b) The identification may be by position, color, number, nameplate, label, design or other means.

(c) The voltage and intended use shall be shown where important.

Cross References

This section cited in 34 Pa. Code § 39.191 (relating to applicability); 34 Pa. Code § 39.192 (relating to scope); and 34 Pa. Code § 39.193 (relating to modification or waiver of provisions).

CONDUCTORS

§ 39.211. Electrical protection.

(a) Conductors shall be suitable for the location, use, and voltage, and each conductor, except neutral conductors, ground wires, and conductors of circuits the opening of which may cause special hazard by the interruption of service or removal of protection, shall be protected against excessive current by a suitable automatic cut-out or by the design of the system.

(b) Neutral conductors in three wire systems shall be arranged without automatic cut-outs interrupting their continuity, unless the cut-out opens conductors of the circuit with one operation. Switches in three wire circuits shall open conductors of the circuit with one operation, except that the switch may be omitted from the neutral. The neutrals shall everywhere be of sufficient size to safely carry the maximum current in either outer conductor at that point. In two wire branches from three wire circuits the conductor connected to the neutral is not for the purpose of this subsection considered a neutral conductor.

(c) Conductors normally grounded for the protection of persons shall be arranged without automatic cut-outs interrupting their continuity between the source of electrical supply and the point at which the ground wire is attached, unless the cut-out opens all conductors of the circuit with one operation. Switches shall open all conductors of the circuit with one operation, except that the switch need not be placed only on ungrounded conductors of the circuit, except that this does not necessarily apply to single pole key sockets which may be used in which the switch may be placed on the grounded side. When the utilization equipment

is connected to electrical supply lines, the point of connection to the service leads is considered as the source of electrical supply. The identification of neutral and grounded conductors by some suitable marking will facilitate compliance with this subsection.

Cross References

This section cited in 34 Pa. Code § 39.233 (relating to where switches are required).

§ 39.212. Mechanical and thermal protection.

(a) If exposed to mechanical injury, suitable casing, armor, or other means shall be employed to prevent injury or disturbances to conductors, their insulation, or supports. Conductors used as meter loops shall be substantially supported clear of objects other than their insulating supports, and separated from each other, or shall be in approved conduit or substantial noncombustible, nonabsorptive casings.

(b) If conductors with combustible insulating coverings are closely grouped, as sometimes on the rear of switchboards or in cableways, they shall have a substantial noncombustible outer covering. Conductors in very hot locations shall have a noncombustible insulating covering.

(c) Bare conductors shall be used only for switchboard, panelboard, or storage battery connections; or for electrolytic, low voltage furnace, or low voltage welding circuit, and similar connections; or for trolley wires, third rails, and other contact conductor, and parts at different potentials. Such bare conductors shall be fixed at adequate separations by the use of suitable supports. Except at the point where a permanent ground connection is made such conductors within buildings shall be kept insulated from the ground. Bare conductors shall not be used where inflammable gases or explosives are liable to exist in large quantities. Reference should also be made to §§ 39.199 and 39.213 (relating to guarding or isolating live parts; isolating or guarding).

§ 39.213. Isolating or guarding.

Fixed conductors having insulating coverings and operating at over 300 volts to ground, and bare conductors at all voltages shall, unless guarded as required in § 39.214 (relating to guarding conductors) be so isolated by elevation, as required by § 39.199(a) (relating to guarding or isolating live parts), that no person may inadvertently come or bring conducting objects in contact with them.

Cross References

This section cited in 34 Pa. Code § 39.212 (relating to mechanical and thermal protection).

§ 39.214. Guarding conductors.

(a) *Use of enclosing casings.* For enclosing insulated conductors, approved permanently grounded metal conduit, waterproof insulating conduit, or grounded

metal conduit, waterproof insulating conduit, or grounded metal sheathing shall be used, except that in dry places, ducts, runways, or compartments of suitable fire-resistive material, may be used for conductors, below 750 volts, if containing no exposed combustible material. Reference should also be made to § 39.219 (relating to grounding or isolating service conduits). In damp places conduit shall be made waterproof and provided with suitable means for draining off condensation, unless the conductors contained are lead sheathed cable.

(b) *Open conductors below 750 volts.* If open insulated conductors between 300 volts to ground and 750 volts, or open bare ungrounded conductors at any voltage below 750 volts (except bare wires used at high temperatures in heating devices, at voltages not exceeding 300 volts to ground) are necessarily brought closer to the floor line than 8 feet, they shall be guarded by permanent screens or enclosures.

(c) *Other requirements.* If persons at any time remove or pass by screens or other guards for bare conductors while such conductors are alive, such screens or guards shall be of insulating material, and all conducting floors, walls, machine frames and similar surfaces within 8 feet below the conductors or 3 feet horizontally from them, shall be covered with suitable insulating platforms, mats or covers. Reference should also be made to § 39.199(b) (relating to guarding or isolating live parts). Dependence should not be placed on the unprotected insulating covering as a suitable guard or enclosure for such conductors near the floor line, nor in certain other cases. Reference should also be made to § 39.199(a). Other guards should be provided to protect the insulation against mechanical injury and to secure the safety of persons who necessarily come near the conductors.

Cross References

This section cited in 34 Pa. Code § 39.199 (relating to guarding or isolating live parts); and 34 Pa. Code § 39.274 (relating to accessibility and guarding of signs).

§ 39.215. Guarding in damp or hazardous locations.

(a) Conductors in damp locations or where exposed to corrosion, if not in waterproofed conduit, or in waterproof metal sheaths in other suitable ducts, shall be effectively isolated and supported on insulators of a suitable type.

(b) Conductors in locations where inflammable gas or flyings normally exist shall be in grounded metal conduit or metal sheathed cable. Fittings and outlets of such conduit and cable shall be electrically and mechanically continuous with the conduit or metal sheath, and the conduit shall be sealed by the use of suitable potheads or equivalent devices to prevent entrance of gases.

§ 39.216. Precautions to avoid excessive inductance and eddy currents.

Supply conductors of alternating-current or direct-current circuits should not be run in separate iron conduits or on opposite sides of I beams or other iron structures or be otherwise run so as to increase abnormally the self-inductance of the

circuit. Such construction, by introducing large self inductance in direct-current circuits, causes fuses to blow explosively; in alternating-current circuits it causes heating due to eddy currents in the metal.

§ 39.217. Pendants and portables.

Pendants or portable conductors shall not be installed or used on circuits operating at over 300 volts to ground, unless they are accessible only to persons authorized to approach them. In such cases they shall be of a type suitable for the voltage and conditions, and conform to the provisions of §§ 39.281—39.285.

§ 39.218. Taping ends and joints.

Ends and joints of insulated conductors, unless otherwise adequately guarded, shall have equal insulating covering with other portions of the conductor, and this covering shall be securely held in place.

§ 39.219. Grounding or isolating service conduits.

(a) Metal conduit or sheathing encasing service conductors from either overhead or underground lines shall either be permanently grounded as required by § 39.197 (relating to grounding) or effectively isolated by elevation. Reference should also be made to §§ 39.197 and 39.199 (relating to grounding; and guarding or isolating live parts).

(b) If not grounded, the service conduit or sheathing shall be effectively insulated from metal work of the building, and from its piping. If service conduit or sheathing is electrically continuous with interior conduit or sheathing, the grounding required for conduit in § 39.197(c) shall be made direct to the service conduit or sheathing and shall have conductance not less than that of No. 6 copper wire.

(c) If grounded service conduit or sheathing is insulated from interior conduit or sheathing, its ground wire conductance need not exceed that required under §§ 39.61—39.70. It is frequently advisable to insulate interior conduit or sheathing from underground service conduit or sheathing, to prevent burnouts of small interior conduit, armored cable sheaths or metal molding, by large currents which might flow from grounded circuits through the interior metal to water pipes or other good ground connections within the building.

Cross References

This section cited in 34 Pa. Code § 39.214 (relating to guarding conductors).

§ 39.220. Temporary wiring.

Temporary wiring and equipment, which is not in compliance with this chapter, may be used, but only when under competent supervision, or protected by suitable barriers or warning signs while it or neighboring wiring is alive and accessible to any person.

FUSES AND OTHER CUT-OUTS, SWITCHES AND CONTROLLERS**§ 39.231. Accessible and indicating.**

Switches, automatic cut-outs, controllers, starting rheostats, auto starters and other control devices shall be readily and safely accessible to authorized persons; they shall be so located or marked when controlling circuits of over 1,320 watts, as sufficiently to indicate their function and the location and character of the equipment controlled by them and whether they are open or closed. They shall be so installed as to minimize the danger of accidental operation. If practicable, they shall be so installed that gravity can not close them; and such switches as close by gravity shall be provided with a proper stop block or latch to prevent accidental closing. Switches controlling emergency lighting circuits, elevator circuits, circuits in theaters, hospital operating rooms, and other circuits, the interruption of which may cause special hazard, shall be arranged so as to be accessible only to authorized persons.

§ 39.232. Hazardous locations.

When necessary to install fuses or other automatic cut-outs, or switches or other control devices in locations where explosives, inflammable gas or inflammable flyings exist, they shall be suitably protected. Reference should also be made to § 39.200 (relating to hazardous locations).

§ 39.233. Where switches are required.

(a) Suitable switches shall be inserted in all feeder conductors connecting utilization installations to service connections from either overhead or underground lines. These switches shall be readily accessible, and as close as practicable to the point of connection with overhead or underground lines.

(b) Suitable switches shall be inserted in all circuit leads, except a grounded conductor to motors, transformers, storage batteries, electric furnaces, and similar utilization equipment, except between parts or pieces of apparatus intended to operate as a unit. Switches installed for use on lighting and similar circuits under 1,320 watts are not required to interrupt all conductors of the circuit. Reference should also be made to § 39.211 (relating to electrical protection).

(c) Switches or plug connectors shall be placed in circuit leads at the point where temporary wiring or portable conductors are connected to the permanent wiring.

§ 39.234. Character of switches and disconnectors.

(a) *Capacity.* Switches used otherwise than as disconnectors shall have a rated capacity sufficient to insure safe interruption, at the working voltage, of the greatest current which they may be required to carry continuously, and shall be marked with the current which they can safely interrupt. Rating means that they

should operate successfully at 50% overload in amperes and at the working voltage under the most severe conditions which they are liable to meet in practice.

(b) *Disconnectors.* Disconnectors shall be of suitable voltage and ampere rating for the circuit in which they are installed and shall be accessible only to properly qualified persons. They shall also be protected by signs warning against opening the switches while carrying current in excess of the safe opening limit. Interlocking arrangements should be used to prevent opening of such disconnectors under loads beyond their safe opening capacity.

(c) *Locking or blocking.* Means shall be provided so that switches controlling motors, storage batteries, transformers, electric furnaces, and similar utilization equipment may be locked or blocked in the open position and plainly tagged to prevent careless closing while work is being done on the equipment controlled by them, unless live and moving parts of controlled equipment which would cause a hazard are so guarded as to render locking or blocking unnecessary. Small capacity snap switches, if near machines and in plain sight from parts of the machines controlled, are exempted. Switches of any size are exempted if the installation comprises only one motor, and the switch is in plain sight from parts of the machines operated by the motor. Locking should be utilized instead of blocking, wherever parts of the machinery driven are remote from the point of control.

(d) *Good contact.* Switches, controllers, and rheostats shall be so constructed as to make and maintain good contact. Knife switches shall maintain such alignment under service conditions that they may be closed with a single unhesitating motion.

§ 39.235. Disconnection of fusible cut-outs before handling.

(a) Fusible cut-outs in circuits operating at over 150 volts to ground, shall, if practicable, where accessible to others than qualified electrical attendants, be so arranged that the ungrounded current-carrying parts cannot be touched by persons refusing the cut-out until the fuses have been disconnected from all sources of electrical energy. If the circuit voltage exceeds 300 to ground, this arrangement shall always be made. If practicable this protection should also be provided for fusible cut-outs in circuits operating below 150 volts to ground. This may be accomplished by a construction in which the fuse and its exposed current-carrying connections are accessible only after they have been disconnected from the circuit, either by opening the fuse enclosure or by other means.

(b) On circuits not exceeding 150 volts to ground, if the fusible cut-outs are not arranged so that they are necessarily disconnected from all sources of electrical energy before the ungrounded current-carrying parts can be touched, it is recommended that switches be so placed or arranged that opening them will disconnect the fuses from all sources of electrical energy. On circuits between 150 and 300 volts to ground, if fusible cut-outs are not arranged so that they are necessarily disconnected from sources of electrical energy before the ungrounded current-carrying parts can be touched, switches shall always be so placed or arranged that

opening them will disconnect the fuses from sources of electrical energy unless portable insulating appliances are provided for handling the cut-outs.

(c) If fusible cut-outs are in locked cabinets or otherwise made inaccessible to all but qualified persons, sufficient protection is usually secured, even for voltages above 300, by the use of switches accessible only to such persons, these switches to be placed or arranged so that their operation will disconnect the fuses from all sources of electrical energy.

§ 39.236. Arcing or suddenly moving parts.

(a) Fuses and circuit breakers shall, as far as possible, be so located and shielded that persons will not be burned by their operation.

(b) Handles or levers of circuit breakers and similar parts which may move suddenly in such way that persons in the vicinity are liable to be injured by being struck by them shall be guarded or isolated, if practicable.

§ 39.237. Grounding noncurrent-carrying metal parts.

Exposed noncurrent-carrying metal parts of switch and fuse cases, levers, and other similar parts to which leakage may occur from live parts shall be permanently grounded according to the provisions of § 39.197 (relating to grounding). Parts of machines, such as name plates, screws in wood, and similar small parts which are not liable to become alive except under very unusual circumstances are not considered as coming under this requirement and may be left ungrounded.

§ 39.238. Guarding live parts of switches and automatic cut-outs.

(a) Manual switches, except those under 150 volts to ground and limited to 60 amperes by cut-outs in series, shall have suitable casings or guards protecting the operator from danger of contact with current-carrying parts, or shall be provided with insulating handles and suitable insulating guard disks or shields so arranged between the handles and the live parts as to prevent the hand from slipping into contact with live parts or being burned by arcing at the switches.

(b) Current-carrying parts of switches or automatic cut-outs operating at over 150 volts to ground shall be provided with enclosing guards, effective during ordinary operation, if accessible to other than properly qualified persons. Those having current-carrying parts exposed may be made inaccessible to other than properly qualified persons by enclosure in locked cabinets or rooms.

(c) If switches or cut-outs above 150 volts to ground are not guarded during operation, suitable insulating floors, mats or platforms shall be provided on which the operator shall stand while operating the switches or adjusting automatic cut-outs, and, unless operators invariably wear suitable insulating gloves while handling the switches, any conducting walls or machine frames within three feet shall be provided with suitable insulating guards. The suitable guarding of live parts will obviate the necessity for such insulating floors and other devices, and

if use of such devices is impracticable from the nature of the location or mechanical process carried on, guards should always be used.

(d) Switches shall, if practicable, be so connected as to have no live blades exposed to contact when a switch is open.

Cross References

This section cited in 34 Pa. Code § 39.246 (relating to guarding current-carrying parts).

SWITCHBOARDS AND PANEL BOARDS

§ 39.241. Accessibility and convenient attendance.

(a) Switchboards and panelboards shall have switches so arranged that the means of control are readily accessible to the operator.

(b) Instruments, relays or other devices requiring reading or adjustment shall be so placed that work may be readily performed from the working space provided. Reference should also be made to § 39.246 (relating to guarding current-carrying parts).

§ 39.242. Location.

Switchboards shall, if practicable, be so placed that the persons necessarily near the board are not endangered by machinery or equipment located near the board. Means for adequate illumination shall be provided.

§ 39.243. Arrangement and identification.

(a) Connections, wiring and equipment of switchboards and panelboards shall be arranged in an orderly manner and switches and cut-outs shall be plainly marked, labeled or arranged so as to afford ready means for identifying circuits or equipment supplied through them.

(b) A diagram of switchboard or panelboard connections and devices should be kept posted in some convenient place near such equipment.

(c) Switchboards shall have current-carrying parts which are ordinarily isolated or guarded, but which may occasionally require adjustment or repair while alive, so arranged that suitable portable covers or shields may be effectively placed to protect workmen from contact with any neighboring live parts.

§ 39.244. Spacing and barriers against short circuit.

(a) Exposed bare parts of different potential on any switchboard or panel shall be as few as practicable and these parts shall be effectively separated.

(b) Such parts, including bus bars, should, when practicable, be so located or provided with such barriers or substantial insulating coverings that parts of different potential are not accidentally short circuited by tools or other conducting objects.

Cross References

This section cited in 34 Pa. Code § 39.246 (relating to guarding current-carrying parts).

§ 39.245. Grounding frames.

Switchboard frames and metal cabinets should be permanently grounded, under the conditions and with the exceptions noted in § 39.197 (relating to grounding).

§ 39.246. Guarding current-carrying parts.

(a) Switchboards and panelboards having exposed current-carrying parts operating at over 150 volts to ground and not isolated by elevation at least eight feet above the floor shall when practicable be suitably enclosed in locked cabinets, screens, or rooms, or other enclosures to make them inaccessible to others than the authorized operator. Conducting floors about such boards shall be provided with a suitable insulating platform or mat so placed that no person may inadvertently touch live parts unless standing on the insulating platform or mat. Reference should also be made to §§ 39.199 and 39.238(a) (relating to guarding or isolating live parts; guarding live parts of switches and automatic cut-outs). If the circuit voltage exceeds 300 to ground this arrangement shall always be made.

(b) If switchboards or panelboards at voltage below 150 to ground are accessible to other than properly qualified operators, they should, if practicable, be enclosed in cabinets or screens as an effective precaution against accidental short circuits at times when no operation of the board necessitates the opening of the cabinet or screen. Reference should also be made to § 39.244 (relating to spacing and barriers against short circuit).

(c) Plug-type switchboards on constant-current systems, or if above 150 volts to ground, shall have no current-carrying parts exposed on face of boards, and plug connectors shall have current-carrying parts guarded as long as they are alive.

(d) Switchboards having no current-carrying parts exposed to at the face, that is, the working space, should be used in theaters and similar places where rapid handling is necessary, and the attention shall be given to signals or to other processes.

(e) Theater switchboards at any voltage, if having current-carrying parts exposed at the face, should, if practicable, be elevated, or guarded by suitable railings, to prevent contact with live parts by passersby.

Cross References

This section cited in 34 Pa. Code § 39.241 (relating to accessibility and convenient attendance).

MOTORS AND MOTOR DRIVEN MACHINERY**§ 39.251. Control devices.**

(a) Separately excited direct-current motors, also series motors, and motor generators and converters larger than ten kilowatts where it is possible for them to be driven at excessive speed from the direct-current end, as by a reversal of current or decrease in load, shall be provided with speed-limiting devices, unless the load and the mechanical connection to such load are of such a character as to safely limit the speed.

(b) If the speed control of direct-current motors is accomplished by varying the field resistance, and the nature of the load and the range of the field rheostat are such as to make a dangerous speed attainable, and no speed limit devices are used, the field rheostats shall be arranged with novoltage releases or other devices so that the motor may not be started or continued in operation under dangerously weakened field, unless the operation of such a novoltage release might result in serious injury to service or apparatus. Motors which are designed to permit starting safely under weakened field shall not be included in the provisions of this subsection.

(c) Manually controlled starters for motors shall be so designed and circuits so arranged that they return automatically to the off or starting position upon failure of the energy supply, unless the motors and their starting devices are, during operation, under supervision of qualified persons and equivalent protection is otherwise provided.

(d) If speed limiting devices or remote control switches are electrically operated, the control circuits by which such devices are actuated shall be adequately guarded by conduit or otherwise, against mechanical injury.

§ 39.252. Hazardous locations.

Motors in which sparking or arcing may occur during operation, shall, if practicable be kept out of locations where explosives or inflammable gas or inflammable flyings exist. If necessarily in such locations, they shall be suitably protected. Reference should also be made to § 39.200 (relating to hazardous locations).

§ 39.253. Deteriorating agencies.

(a) Suitable guards or enclosures shall be provided to protect exposed current-carrying parts of motors and the insulation of motor leads when installed directly under equipment or in other locations where dripping oil, excessive moisture, steam, vapors, chemicals, or similar injurious agents exist.

(b) The metal frames and other exposed noncurrent-carrying metal parts of equipment in these locations shall be permanently grounded. Reference should also be made to § 39.197(c) (relating to grounding).

§ 39.254. Guards for live parts.

(a) Motors operating at over 150 volts to ground, unless isolated by elevation at least 8 feet above the floor line, should, if practicable, be provided with permanent inclosures or other suitable guards so arranged as to prevent persons or conducting objects from inadvertently coming or being brought into contact with live parts or interfering with the operation of the motors.

(b) Suitable insulating mats or platforms of substantial construction and providing good footing shall be so placed on floors and, if necessary, on frames of machines having exposed live parts above 150 volts to ground that the operators or other persons in the vicinity cannot readily touch such parts unless standing on the mats, platforms, or insulating floors. The suitable guarding of live parts by inclosures of barriers effective during attendance or necessary adjustments of live parts will obviate the necessity for insulating mats, and, if such mats are impracticable from the nature of the location or process carried on, guards shall be used. If connectors are used in motor leads, these should be provided with insulating covering equal to that on the conductors.

(c) If necessary, steps and handrails shall be installed on or about large machines to afford safe access to live parts which shall be examined or adjusted during operation.

(d) If two or more machines, either of which operates at over 150 volts to ground, are mechanically coupled together, and the operator can touch the frames of more than one at a time, the frames of all such machines shall be permanently grounded, unless they are bonded together electrically and surrounded by insulating mats or platforms on which it is necessary persons stand in order to touch the machine frames. If operating at above 300 volts to ground, their frames shall always be grounded, and frames shall also be grounded wherever, from the nature of the location or of processes carried on, the use or maintenance of insulating mats or platforms is impracticable. Reference should also be made to § 39.197(c) (relating to grounding).

§ 39.255. Protecting moving parts.

Suitable guards or enclosures shall be arranged at each motor or motor driven machine when necessary to prevent persons or objects from inadvertently coming in harmful contact with moving parts, including chains, belts, gears and pulleys.

ELECTRIC FURNACES AND WELDING**§ 39.261. Protection from burns.**

(a) Electric furnaces and apparatus used for arc welding where intensely glowing, incandescent, or arcing parts are exposed, shall be enclosed, so that those parts are not accessible or visible to unauthorized persons.

(b) Suitable protecting screens, hoods, goggles, gloves and other devices shall be provided for the authorized operators who necessarily work or come near such exposed parts.

§ 39.262. Grounding.

The outside noncurrent-carrying metallic frames of furnaces shall be permanently grounded if they contain current-carrying parts connected to circuits above 150 volts to ground, or if the circuit within is not grounded and is exposed through transformer windings to a circuit over 150 volts to ground.

§ 39.263. Guarding live parts.

Except at points where necessarily left exposed, as at spot welder contacts, current-carrying parts of furnaces, welders, and control equipment shall be suitably guarded with enclosures or barrier guards.

Cross References

This section cited in 34 Pa. Code § 39.197 (relating to grounding); 34 Pa. Code § 39.272 (relating to insulation); and 34 Pa. Code § 39.281 (relating to insulation).

LIGHTING FIXTURES AND SIGNS

§ 39.271. Grounding.

(a) Unless otherwise provided by § 39.197(d) (relating to grounding), exposed noncurrent-carrying metal parts of lighting fixtures and other similar fixed electrical devices shall be permanently grounded when used under the following circumstances:

- (1) When in locations where explosives, inflammable gas, or inflammable flyings normally exist in dangerous quantities.
- (2) When within touching distance or about 8 feet from metal, concrete, or permanently damp floors or stairways, including fire escapes, galleries, or bridges, as in machine shops, stables, laundries, and the like.
- (3) When readily accessible from the ground or floor and also within five feet of conducting surfaces, such as metal piping, metal radiators, stoves, furnaces, plumbing fixtures, damp walls or similar conducting surfaces, as in kitchens, machine shops, print shops, and the like.

(b) On grounded systems the center contacts of sockets and receptacles should be connected to the ungrounded side of the system, and the inner screw shell of the devices to the grounded side or neutral, in order to reduce the liability of breakdown of the dielectric between the inner screw shell and the grounded outer brass shell, and also reduce the liability of injury to persons in replacing lamps. This is especially important in wiring electric signs. In lieu of grounding the external metal parts of lamp sockets, if suitable means for grounding are not readily available, as sometimes is the case with knob and tube wiring not near

plumbing fixtures, sockets and lamp guards or similar devices of suitable insulating material may be used, or the socket itself placed out of reach and arranged for its operation by a chain pull having adequate insulation in the chain.

§ 39.272. Insulation.

(a) Electric fixtures shall be provided with an adequate and mechanically protected dielectric, complying with the standardization rules of the American Institute of Electrical Engineers (A.I.E.E.), interposed between ungrounded current-carrying parts and those external surfaces which persons can touch.

(b) Those current-carrying parts of grills, heaters, and other heating devices, which operate at high temperatures and are necessarily exposed, are exempted. Reference should be made to § 39.263 (relating to guarding live parts).

Cross References

This section cited in 34 Pa. Code § 39.273 (relating to exposed live parts); and 34 Pa. Code § 39.281 (relating to insulation).

§ 39.273. Exposed live parts.

Unless otherwise provided by § 39.272 (relating to insulation), electric fixtures including lamp sockets and lamp bases, plugs, receptacles, and the like, shall be so designed and installed that no current-carrying parts will normally be exposed externally.

§ 39.274. Accessibility and guarding of signs.

(a) Electric signs at an elevation greater than 30 feet above roadways or footways, or at an elevation above a roof greater than the distance from the edge of the roof shall, if they require attendance while in position, be provided with substantial, safely accessible runways, ladders or platforms from which all replacements and other necessary adjustments may be made. Provision for supporting workmen by safety belts should be made in the construction and installation of signs so located.

(b) Electric signs outside buildings shall have no ungrounded current-carrying parts normally exposed to contact of workmen on or in the building. Reference should also be made to § 39.214(b) (relating to guarding conductors).

(c) The exposed noncurrent-carrying metal parts of a sign should be grounded if within reach of any grounded surfaces, including metal work of the building structure.

Cross References

This section cited in 34 Pa. Code § 39.275 (relating to control of outdoor signs).

§ 39.275. Control of outdoor signs.

Electric signs, located as noted in § 39.274 (relating to accessibility and guarding of signs), shall be provided with switches arranged to entirely disconnect all feed wires of the sign, and either located within sight of the sign or arranged so that they may be locked in the open position.

§ 39.276. Connectors for signs.

Electric signs shall be so arranged that changeable connections can be made manually only by approved connectors in which all poles of the circuit are simultaneously interrupted. All current-carrying parts of pin and socket connectors shall be provided with approved guards so as not to be exposed to contact.

§ 39.277. Isolated or guarding lamps in series circuits.

(a) Arc and incandescent lamps and other devices in series circuits, except in grounded circuits of which no part exceeds 150 volts to ground, shall be effectively isolated or suitably guarded.

(b) All metal cable or chain supports for lamps shall be effectively insulated from the lamp or shall be permanently grounded. Isolation will ordinarily be deemed sufficient when a vertical clearance of eight feet is provided from floors or other ordinary accessible places within buildings, of 10 feet from footways outside buildings and of 15 feet from roadways. Horizontal clearance from windows, porches, and other spaces accessible to the general public should be not less than three feet.

(c) Lamps shall be secured from falling on persons or traffic passing below, and the hanger, rope, chain, or other means adopted for holding the lamps shall be regularly and systematically inspected. Metal chains or wire cables used for lowering lamps in series circuits shall be interrupted by a suitable strain insulator the minimum height of which from the floor or ground shall be 8 feet, whether the lamp is in position or lowered.

§ 39.278. Safe access to arc lamps.

A suitable device shall be provided by which each arc lamp or other device of series circuits may be safely and entirely disconnected from the circuit before it is handled, unless the lamps are accessible only to properly qualified persons, worked on only from suitable insulating stools, platforms or tower wagons, and treated always as under the full voltage of the circuit concerned.

**PORTABLE DEVICES, CABLES AND CONNECTORS OTHER THAN
FOR SIGNAL SYSTEMS**

§ 39.281. Insulation.

(a) Portable devices shall be provided with an adequate dielectric, complying with the standardization rules of the American Institute of Electrical Engineers (A.I.E.E.), interposed between ungrounded current carrying parts and those external surfaces which persons touch. Toasters, grills, or other heating devices in which the current-carrying parts at high temperature are necessarily exposed, are exempted. Reference should also be made to §§ 39.263 and 39.272 (relating to guarding live parts; insulation).

(b) In locations where the dielectric is exposed to mechanical injury it shall be suitably protected.

Cross References

This section cited in 34 Pa. Code § 39.197 (relating to grounding); and 34 Pa. Code § 39.217 (relating to pendants and portables).

§ 39.282. Grounding.

(a) The permanent grounding of frames of portable devices, especially in connection with voltage above 150 to ground and for any voltage when the devices are used within eight feet of the floor in locations such as bathrooms, laundries, and the like, where persons may easily touch ground surfaces at the same time as the device, should be used as a safety measure, if this is practicable and suitable means are available, but cannot, of course, be reasonably required unless such means are available. Such grounding may be obtained by the use of a three wire portable cord with the portable device, one wire being used for the ground conductor and the connectors being properly designed so that wrong connections are not made by the user of the device.

(b) In lieu of grounding the external metal parts of portable lamp sockets if suitable means, as described in subsection (a), are not readily available, sockets and lamp guards or other similar devices of suitable insulating material may be used, and should be used in the hazardous locations listed previously.

Cross References

This section cited in 34 Pa. Code § 39.197 (relating to grounding); 34 Pa. Code § 39.217 (relating to pendants and portables); and 34 Pa. Code § 39.284 (relating to identified conductors, cords and connectors).

§ 39.283. Cable connectors.

(a) Where used with portable conductors connectors should be used which necessarily disconnect both or all poles from the live source of energy where the circuit is opened.

(b) Connectors shall be so constructed, with guards when necessary, that the person using them does not inadvertently come in contact with live parts, or be burned by arcing when interrupting the largest current for which they are related or marked.

(c) The end of a separable connector which is left alive, or the two ends of a separable connector where both are connected to live circuits, as in battery charging, shall have live parts suitably guarded.

(d) Where connectors are attached to portable cables, suitable means shall be provided for relieving the terminal connections of cable from strains.

(e) Separable connectors should, where practicable, be so designed that the plugs do not fit receptacles rated for larger currents than the plugs.

Cross References

This section cited in 34 Pa. Code § 39.197 (relating to grounding); and 34 Pa. Code § 39.217 (relating to pendants and portables).

§ 39.284. Identified conductors, cords, and connectors.

(a) Where used with portable devices, the cases of which are designed to be grounded in accordance with the provisions of § 39.282 (relating to grounding), the portable cable and the separable connectors, both to the device and to the circuit, shall, where practicable, be provided with identified parts so that the ground conductor wire in both the fixed wiring and portable cable will always be attached to the proper terminals of the connectors. It is desirable that the fixed wiring also have suitable marking to distinguish the ground conductors from circuit conductors.

(b) Separable connectors shall be so constructed that wrong connection between the two parts is impossible.

Cross References

This section cited in 34 Pa. Code § 39.197 (relating to grounding); and 34 Pa. Code § 39.217 (relating to pendants and portables).

§ 39.285. Use of portables and pendants.

(a) Portable and pendant conductors shall not be installed or used on circuits operating at over 300 volts to ground, unless they are accessible only to persons authorized to approach them. In such cases they shall be of a type suited to the voltage and conditions. In car houses and similar locations where service at low voltage is not available and where necessary to use low voltage pendant or portable lamps or other devices in series with lamps on trolley circuits, the devices should be used only with great caution and be placed preferably on the grounded side of the circuit concerned.

(b) If portable conductors are required, fixed sockets or connectors shall be provided at safely accessible points, attached, if practicable, to the grounded side

of the circuit, and so located that liability of such conductors being brought into dangerous proximity with other live parts is reduced as far as practicable.

(c) If exposed to dampness or corrosive influences, portable conductors shall be of a type specially suited, and if exposed to inflammable gas or flyings they shall be so protected or isolated by elevation that they may not be readily damaged. In the latter case connectors shall be arranged so as not to be exposed to accidental opening by persons handling the portable conductors or devices. Portable lamps in locations where explosives or inflammable gases are normally present shall be incased in vaporproof globes with suitable mechanical guards.

(d) Portable and pendant conductors shall be so installed that no strain is placed on the terminal connections and shall have no joints except at suitable fittings.

(e) The use of worn or defective portable and pendant conductors should be avoided because of the danger to users by wire strands piercing the insulating covering, or becoming exposed through abrasion of the covering.

Cross References

This section cited in 34 Pa. Code § 39.197 (relating to grounding); and 34 Pa. Code § 39.217 (relating to pendants and portables).

ELECTRICALLY OPERATED CARS, CRANES, AND ELEVATORS

§ 39.291. Guarding live and moving parts.

(a) *Current-carrying parts.* Current-carrying parts connected to circuits above 150 volts to ground shall be so isolated or guarded that no person may inadvertently come in contact with them. Reference should also be made to § 39.199 (relating to guarding or isolating live parts).

(b) *Conductors.* Conductors over 150 volts to ground in locations accessible to the public shall be run in conduit, armored cable, or molding, the exposed metallic parts of which shall be permanently grounded.

(c) *Equipment.* Guards for the current-carrying parts of unisolated electrical equipment, such as controllers, motors, transformers, automatic cut-outs, circuit breakers, switches and other devices, shall consist of cabinets, casings, or shields of permanently grounded metal or of substantial insulating material.

(d) *Arcing or suddenly moving parts.* These parts of electrical equipment, including fuses and the handles and arc chutes of circuit breakers, shall be so isolated or guarded that the liability of persons struck or burned by sparking, flashing, or movement during operation is reduced as far as practicable.

§ 39.292. Grounding noncurrent-carrying parts.

(a) Exposed noncurrent-carrying metal parts of electrical equipment at over 150 volts to ground shall be permanently grounded. In electric cars steam or hot water heating devices accessible to the public shall also be grounded. The ground

connection through well bonded track rails shall be considered satisfactory for equipment on cars and cranes.

(b) The metallic parts of portable cranes, derricks, hoists and similar equipment on which wires, cables, chains, or other conducting objects are maintained should be provided with an effective protective ground. Reference should be made to §§ 39.61—39.70 (relating to methods of protective grounding), when operated in the vicinity of supply lines operating at over 150 volts to ground, and whether the cranes or similar equipment are themselves electrically operated.

§ 39.293. Control of energy supply to cars and cranes.

(a) Readily accessible means shall be provided whereby conductors and equipment located in or on cars or cranes may be disconnected entirely from the source of energy at a point as near as possible to the trolley or other current collectors.

(b) A circuit breaker or switch, capable of interrupting the circuit under heavy loads, shall be used unless the current collector may be safely removed, under heavy loads, from the trolley or third rail.

(c) If a car is operated in locations other than private rights of way and equipped with both trolley and third-rail current collectors, means shall be provided by which any exposed third-rail collector may be readily disconnected from the trolley circuit when not in use.

§ 39.294. Control of movement of cars, cranes, and elevators.

(a) Means shall be provided whereby the operator, whether motorman or elevator attendant, may prevent the starting of the equipment by unauthorized persons while he is absent from his post. Removable reverse levers or controller handles and locked doors to the cab of the operator are among the most effective means.

(b) The car control lever of passenger elevators should be located so that the operator may readily face the principal car opening. For cars and traveling cranes the car control should be so located that the operator may readily face the direction of travel.

§ 39.295. Subway and car lighting.

Subways and similar locations used for passenger transportation where artificial illumination is indispensable shall be lighted throughout their entire length by a system independent of the current for electric traction where such is used. Passenger cars operated in such locations and lighted normally by the current for electric traction shall be equipped with an auxiliary system of emergency lighting.

**TELEPHONE AND OTHER SIGNAL APPARATUS ON CIRCUITS
EXPOSED BY SUPPLY LINES**

§ 39.301. Guarding noncurrent-carrying parts.

(a) If telephone or other signal apparatus, not included under subsection (b) of this section, which is necessarily handled by persons is permanently connected, except for portable telephones, to overhead signal circuits exposed by supply lines over 400 volts to ground, provision shall be made by one of the following methods against shock to persons handling apparatus:

(1) The use of suitable protective devices, including fuses and arresters.

(2) The grounding of exposed noncurrent-carrying metal parts and the suitable guarding of ungrounded current-carrying parts. Reference should also be made to § 39.302 (relating to guarding current-carrying parts).

(3) The arrangement of apparatus in such a way that persons using it will be obliged to stand on a suitably insulated platform, in a suitably insulated booth or on other insulating surfaces. This paragraph shall apply where apparatus is accessible to authorized persons only.

(4) The arrangement of apparatus on signal circuits exposed to supply lines of more than 750 volts to ground as to have no exposed current-carrying parts exceeding two square inches in area with which a person is liable to come in contact and the use of suitable protective devices, including fuses and arresters or other means.

(b) The signaling devices as fire and police alarm boxes and telegraph test boxes, if connected to overhead signal circuits exposed by supply lines over 400 volts to ground, should have the accessible noncurrent-carrying metal parts permanently grounded whenever the character of service gives valid objection to the use of arresters or transformers on the signal circuit. Police alarm boxes if connected to overhead police alarm circuits should usually be protected by arresters operating at 400 volts to ground, placed in the connecting leads outside the box. Fire alarm boxes connected to overhead circuits, if not protected by arresters, should be provided with suitable insulating material between the circuit within and the exposed frame and operating hook, this insulation to be capable of withstanding the highest voltage of the supply circuits to which the fire-alarm circuit is exposed up to 7,500 volts.

Cross References

This section cited in 34 Pa. Code § 39.192 (relating to scope).

§ 39.302. Guarding current-carrying parts.

(a) Telephone or other signaling devices which are permanently located outdoors or if exposed to corrosive fumes or dampness, such as may occur in subways, cellars, basements, laundries, stables, and the like, shall be so arranged that ungrounded current-carrying parts are guarded so as to be suitably protected

against the prevailing atmospheric conditions. The enclosing cases of signal apparatus provide suitable guards if substantially built of metal or insulating material.

(b) Receiver cords shall be guarded by shields of permanently grounded metal, such as metal armor, or of nonabsorptive insulating material, such as flexible insulating tubing, or shall have suitable insulating coverings for the individual conductors.

(c) If no protective device is installed the shields of portable cords shall always be of grounded metal or of special insulating material suitable to withstand the voltage of the highest supply circuit to which the signal circuit is exposed up to 7,500 volts. Only for fire-alarms or similar apparatus or for apparatus not for public use, where the character of service precludes the use of arresters and fuses, is a lack of a protective device be permissible.

Cross References

This section cited in 34 Pa. Code § 39.192 (relating to scope); 34 Pa. Code § 39.301 (relating to guarding noncurrent-carrying parts); and 34 Pa. Code § 39.303 (relating to protection against induced voltages).

§ 39.303. Protection against induced voltages.

Telephone or other signaling equipment which is necessarily handled by persons and which is connected to a line that parallels a supply circuit in such manner that by reason of exposure to the supply circuit under normal operating conditions more than 150 volts are induced between the terminals of the signaling equipment and ground shall be protected by one or more of the following means:

- (1) Exposed metal parts of the equipment shall be insulated from the circuit, and the circuit shall be protected by arresters having a breakdown potential not exceeding 1/2 the insulation between the above named noncurrent-carrying metal parts and the current-carrying parts.
- (2) Cords shall have an additional insulating tubing protection.
- (3) Exposed noncurrent-carrying metal parts shall be permanently grounded and current-carrying metal parts shall either be permanently grounded or adequately shielded. Reference should be made to § 39.302 (relating to guarding current-carrying parts).
- (4) Equipment shall be so located that persons coming into contact with the equipment shall be obliged to stand either on an insulated platform or in a booth of suitable insulating material.

Cross References

This section cited in 34 Pa. Code § 39.192 (relating to scope).

§ 39.304. Grounding of arresters for signaling systems.

(a) *Exemptions.* The ground connections for outside installations of cable protectors employed solely to prevent electrical injury to the cable need not conform to the requirements of this section. For the provisions governing the ground-

ing of the metal cases of outdoor apparatus as covered by this section, reference should be made to §§ 39.61—39.70 (relating to methods of protective grounding).

(b) *Arresters.* Arresters shall be permanently and effectively grounded in the following manner:

(1) *Ground conductor.* The ground conductor shall preferably be of copper or other material which does not corrode under the conditions of use, and shall be not less than No. 18 in size and in urban districts or within buildings shall be covered with a suitable insulation. If necessary to guard the ground conductor from mechanical injury on poles or if a ground conductor on the outside of building walls is near a roadway, sidewalk or pathway thus necessarily exposing it to tampering by unauthorized persons, it shall be protected for a distance of eight feet from the ground by a wooden molding or by conduit of nonmagnetic material.

(2) *Ground connection.* The ground connection shall be made to a cold water pipe, if available, connected to the street mains and in service. An outlet pipe from a water tank fed by a street main may be used if such outlet pipe is adequately bonded around the tank to the inlet pipe connected to the street main. If a cold water pipe is not available, the ground connection may be made to a gas pipe, if the ground conductor is attached to the pipe between the meter and the street mains. If cold water or gas pipes are not available, the ground connection may be made to an iron rod or pipe driven into permanently damp earth, or to a plate or other body of metal buried in permanently damp earth. Reference should also be made to § 39.65 (relating to ground conductor). Steam or hot water pipes should not be used for ground connections. Driven rods or pipes, used as ground connections for protectors, shall not also be used as ground connections for electrical supply circuits or electrical apparatus, and where water or gas pipes are used for a ground connection, attachment to such pipes shall be made at a different point than for attachments to electrical supply circuits or equipment.

(c) *Connecting ground conductor to pipes.* Ground conductors shall be attached to pipes by means of suitable ground clamps. The entire surface of the pipe to be covered by the clamp shall be thoroughly cleaned.

(d) *Connecting ground conductor to driven rod or pipe.* The ground conductor shall be attached to the rod or pipe so as to give reliable connection both mechanically and electrically and in such a manner as to prevent corrosion when the joint is buried in the earth.

(e) *Connecting ground conductor to buried electrode.* If a buried plate or other metal electrode is employed, the ground conductor shall be securely fastened to it in such manner as to make a reliable electrical and mechanical contact.

Cross References

This section cited in 34 Pa. Code § 39.192 (relating to scope).

RULES FOR THE EMPLOYER—ORGANIZATION**§ 39.311. Interpretation and enforcement of rules.**

(a) The employer shall furnish to each regular employe operating or working on electrical supply equipment, supply or signal lines, or hazardous electrical tests a copy of these safety rules for operation, or such of these provisions as apply to his work, either separately or incorporated in more comprehensive rule books, and shall take means to secure compliance of the employes with such provisions.

(b) If a difference of opinion arises with regard to the meaning of application of these provisions or as to the means necessary to carry them out, the decision of the employer or his authorized agent shall be final, subject to an appeal, if taken, to the regulative body having jurisdiction.

(c) Cases may arise where the strict enforcement of some particular rule will seriously impede the progress of the work in hand; in such cases the employe in charge of the work to be done and the employe in charge of that portion of the system on which the work is to be done may, with the consent of the chief operator concerned, make such temporary modification of the rule as will expedite the work without materially increasing the hazard.

(d) Many companies number their books of rules and require a receipt from each employe for his copy.

§ 39.312. Organization diagram.

To better secure the safe and accurate performance of work, an organization diagram or written statement clearly showing the division of responsibility between officials and employes, down to and including the grade of foreman, should be supplied with the book of rules, or the rules should be posted conspicuously in offices and stations of the employer and in other places if the number of employes and the nature of the work warrants.

§ 39.313. Address list and emergency.

(a) The rule book should contain or be accompanied by the following:

(1) A list of names and addresses of those physicians and members of the organization who are to be called upon in emergencies.

(2) A copy of rules for first aid, resuscitation and fire extinguishment.

(b) These should also be kept in conspicuous locations in every station and testing room, in line wagons, and in other places if the number of employes and the nature of the work warrant.

§ 39.314. Instructing employes.

Employes regularly working on or about equipment or lines shall be thoroughly instructed in methods of first aid, resuscitation, and, if advisable, in fire extinguishment.

§ 39.315. Qualifications of employes.

The employer shall use every reasonable means and precaution to assure himself that each employe is mentally and physically qualified to perform his work in accordance with these rules.

§ 39.316. Chief operator.

(a) A properly qualified chief operator, system operator, load dispatcher, general superintendent, or otherwise designated employe, whose duties are those prescribed in § 39.351 (relating to duties of chief operator), shall be in charge of the operation of electrical equipment and lines and directly responsible for their safe operation.

(b) In large organizations the duties of the chief operator may be delegated for any particular section of the system to a deputy chief operator, or otherwise designated employe, who shall report as required to the chief.

(c) When it is impracticable to have the entire system placed in charge of one chief operator, the duties of the chief operator may be performed for a portion of the system by a local superintendent, local manager or other employe who may also perform other duties.

(d) In small organizations the duties of the chief operator may be performed by the superintendent, electrician, engineer or some other employe who may also perform other duties. In these provisions the various employes listed by such titles, including the deputy chief operator, will be designated, for simplicity, by the title of chief operator, where referred to in this capacity.

Cross References

This section cited in 34 Pa. Code § 39.351 (relating to duties of chief operator).

§ 39.317. Responsibility.

If more than one person is engaged in work on or about the same electrical equipment or lines at any one location, one of the persons shall be designated as the foreman locally in charge of the work; or workmen shall be instructed as to the work they are to perform, and the employe instructing the workmen shall be considered in charge of the work.

Cross References

This section cited in 34 Pa. Code § 39.525 (relating to duties of foreman).

PROTECTIVE METHODS AND DEVICES**§ 39.321. Attendance.**

Unless a qualified employe is kept on duty where generators or rotary converters are operating, the equipment shall be made inaccessible to unauthorized persons.

§ 39.322. Requirement for two workmen.

Except in trouble or emergency work, at least two employes should be provided where work is done on live lines above 750 volts in wet weather or at night.

§ 39.323. Uninstructed workmen and visitors.

Unqualified employes or visitors shall be prohibited from approaching live parts, unless accompanied by a qualified employe.

§ 39.324. Diagrams for chief operator.

Diagrams or equivalent devices, showing plainly the arrangement and location of the electrical equipment and lines, should be maintained on file or in sight of the chief operator. These diagrams may be of the entire system, of each specific portion of the system, or they may show typical arrangements.

§ 39.325. Instructions to employes.

(a) Employes shall be instructed as to the character of equipment or lines on or dangerously near to, work which is done by them.

(b) Instructions shall describe the equipment and lines to be worked on, identifying them by position, letter, color, number or name.

§ 39.326. Protective devices.

There shall be provided in conspicuous and suitable places in electrical stations, testing departments, and line construction and repair wagons, a sufficient supply of suitable protective, first aid and fire-extinguishing devices and equipment, to enable employes to meet the requirements of these rules. These devices and equipment shall be inspected or tested to insure that they are kept in good order. The following is a list of suitable devices and equipment, the kinds and number of which will depend on the requirements of each case:

- (1) First aid outfits.
- (2) Insulating wearing apparel, such as insulating gloves, sleeves, and boots. Insulating shields, covers, mats, stools and platforms. Insulating appliances, such as rods and tongs, for any necessary handling or testing of live equipment or lines.
- (3) Protective goggles of suitable materials and construction.

(4) Tools of such special design and insulation as to eliminate so far as practicable the danger of forming short circuits across conducting parts at different potentials or bringing the user into circuit with such parts.

(5) “Men at work” tags, log books, operating diagrams or equivalent devices, and portable danger signs.

(6) Fire extinguishing devices, either designed for safe use on live parts or plainly marked that they shall not be so used.

(7) Grounding devices for making protective grounds. Safety belts, whether furnished by employer or employe, should be inspected from time to time to assure that they are in safe working condition.

§ 39.327. Warning and danger signs.

(a) There shall be displayed in conspicuous places at unattended and unlocked entrances to electrical supply stations, substations, and testing rooms, containing exposed current-carrying parts or moving parts, permanent warning signs forbidding entrance to unauthorized persons.

(b) Suitable danger signs, shall be placed in supply stations, substations, switching towers, and testing rooms about equipment having exposed current-carrying parts above 750 volts.

RULES FOR EMPLOYEES—GENERAL PRECAUTIONS

§ 39.331. Rules and emergency method.

(a) Safety rules shall be carefully read and studied. Employes may be called upon at any time to show their knowledge of the rules.

(b) Employes should familiarize themselves with approved methods of first aid, resuscitation, and fire extinguishment.

Cross References

This section cited in 34 Pa. Code § 39.411 (relating to general provisions); 34 Pa. Code § 39.421 (relating to general provisions); 34 Pa. Code § 39.431 (relating to general provisions); 34 Pa. Code § 39.441 (relating to general provisions); 34 Pa. Code § 39.451 (relating to general provisions); 34 Pa. Code § 39.461 (relating to general requirements); 34 Pa. Code § 39.471 (relating to general requirements); and 34 Pa. Code § 39.491 (relating to general requirements).

§ 39.332. Heeding warnings, warning others.

(a) Employes whose duties do not require them to approach or handle electrical equipment and lines should keep away from such equipment or lines.

(b) Employes shall be cautious, heed warning signs and signals, and warn others when seen in danger near live equipment or lines.

Cross References

This section cited in 34 Pa. Code § 39.411 (relating to general provisions); 34 Pa. Code § 39.421 (relating to general provisions); 34 Pa. Code § 39.431 (relating to general provisions); 34 Pa. Code § 39.441 (relating to general provisions); 34 Pa. Code § 39.451 (relating to general provisions); 34 Pa. Code § 39.461 (relating to general requirements); 34 Pa. Code § 39.471 (relating to general requirements); and 34 Pa. Code § 39.491 (relating to general requirements).

§ 39.333. Inexperienced or unfit employes.

No employe shall do work for which he is not properly qualified on or about live equipment or lines, except under the direct supervision of an experienced and properly qualified person.

Cross References

This section cited in 34 Pa. Code § 39.411 (relating to general provisions); 34 Pa. Code § 39.421 (relating to general provisions); 34 Pa. Code § 39.431 (relating to general provisions); 34 Pa. Code § 39.441 (relating to general provisions); 34 Pa. Code § 39.451 (relating to general provisions); 34 Pa. Code § 39.461 (relating to general requirements); 34 Pa. Code § 39.471 (relating to general requirements); and 34 Pa. Code § 39.491 (relating to general requirements).

§ 39.334. Supervision of workmen.

Workmen whose employment incidentally brings them in the neighborhood of electrical supply equipment or lines with the dangers of which they are not familiar shall proceed with their work only when authorized. They shall then be accompanied by a properly qualified and authorized person, whose instructions shall be strictly obeyed.

Cross References

This section cited in 34 Pa. Code § 39.411 (relating to general provisions); 34 Pa. Code § 39.421 (relating to general provisions); 34 Pa. Code § 39.431 (relating to general provisions); 34 Pa. Code § 39.441 (relating to general provisions); 34 Pa. Code § 39.451 (relating to general provisions); 34 Pa. Code § 39.461 (relating to general requirements); 34 Pa. Code § 39.471 (relating to general requirements); and 34 Pa. Code § 39.491 (relating to general requirements).

§ 39.335. Exercising care.

Employes about live equipment and lines should consider the effect of each act and do nothing which may endanger themselves or others. Employes should be careful always to place themselves in a safe and secure position and to avoid slipping, stumbling, or moving backward against live parts. The care exercised by others should not be relied upon for protection.

Cross References

This section cited in 34 Pa. Code § 39.411 (relating to general provisions); 34 Pa. Code § 39.421 (relating to general provisions); 34 Pa. Code § 39.431 (relating to general provisions); 34 Pa. Code § 39.441 (relating to general provisions); 34 Pa. Code § 39.451 (relating to general provisions); 34 Pa. Code § 39.461 (relating to general requirements); 34 Pa. Code § 39.471 (relating to general requirements); and 34 Pa. Code § 39.491 (relating to general requirements).

§ 39.336. Live and arcing parts.

(a) *Everything shall be treated as alive.* Electrical equipment and lines shall always be considered as alive, unless they are positively known to be dead. Before work is begun, a preliminary inspection or test should always be made to determine what conditions exist. Reference should also be made to §§ 39.363 and 39.403 (relating to general requirements; and test of circuit).

(b) *Protection against arcs.* If exposed to injurious arcing, the hands should be protected by insulating gloves and the eyes by suitable goggles or other means. Employes should keep all parts of their bodies as distant as possible from brushes, commutators, switches, circuit breakers, or other parts at which arcing is liable to occur during operation or handling.

Cross References

This section cited in 34 Pa. Code § 39.411 (relating to general provisions); 34 Pa. Code § 39.421 (relating to general provisions); 34 Pa. Code § 39.431 (relating to general provisions); 34 Pa. Code § 39.441 (relating to general provisions); 34 Pa. Code § 39.451 (relating to general provisions); 34 Pa. Code § 39.461 (relating to general requirements); 34 Pa. Code § 39.471 (relating to general requirements); and 34 Pa. Code § 39.491 (relating to general requirements).

§ 39.337. Safety appliances and suitable clothing.

(a) *Safety appliances.* Employes at work on or near live parts should use the protective devices and special tools provided, first examining them to make sure that these devices and tools are suitable and in good condition. Protective devices may get out of order or be unsuited to the work in hand.

(b) *Suitable clothing.* Employes should wear suitable clothing while working on or about live equipment and lines. In particular they should keep sleeves down and avoid wearing unnecessary metal or inflammable articles, such as rings, watch or key chains, or metal cap visors, celluloid collars or celluloid cap visors. Loose clothing and shoes that slip easily should not be worn near moving parts.

Cross References

This section cited in 34 Pa. Code § 39.411 (relating to general provisions); 34 Pa. Code § 39.421 (relating to general provisions); 34 Pa. Code § 39.431 (relating to general provisions); 34 Pa. Code § 39.441 (relating to general provisions); 34 Pa. Code § 39.451 (relating to general provisions); 34 Pa. Code § 39.461 (relating to general requirements); 34 Pa. Code § 39.471 (relating to general requirements); and 34 Pa. Code § 39.491 (relating to general requirements).

§ 39.338. Safe supports and safety belts.

(a) *Safe supports.* Employes should not support themselves on any portion of a tree, pole structure, scaffold, ladder, or other elevated structure without first making sure that the supports are strong enough, reinforcing them if necessary. Portable ladders should be in a safe position before being climbed. The slipping of a ladder at either end should be carefully guarded against, especially if the surfaces are smooth or vibrating.

(b) *Safety belts.* Employees should not work in elevated positions unless secured from falling by a suitable safety belt or by other adequate means. Before an employe trusts his weight to the belt, he should determine that the snaps or fastenings are properly engaged and that he is secure in his belt. Employees who furnish their own belts shall from time to time submit them to the employer for inspection.

Cross References

This section cited in 34 Pa. Code § 39.411 (relating to general provisions); 34 Pa. Code § 39.421 (relating to general provisions); 34 Pa. Code § 39.431 (relating to general provisions); 34 Pa. Code § 39.441 (relating to general provisions); 34 Pa. Code § 39.451 (relating to general provisions); 34 Pa. Code § 39.461 (relating to general requirements); 34 Pa. Code § 39.471 (relating to general requirements); and 34 Pa. Code § 39.491 (relating to general requirements).

§ 39.339. Fire extinguishers.

Employees should avoid using fire extinguishing liquids which are not insulating in fighting fires near exposed live parts. If necessary to use them, neighboring equipment should first be killed. Reference should also be made to §§ 39.381—39.391 (relating to killing supply equipment and lines).

Cross References

This section cited in 34 Pa. Code § 39.411 (relating to general provisions); 34 Pa. Code § 39.421 (relating to general provisions); 34 Pa. Code § 39.431 (relating to general provisions); 34 Pa. Code § 39.441 (relating to general provisions); 34 Pa. Code § 39.451 (relating to general provisions); 34 Pa. Code § 39.461 (relating to general requirements); 34 Pa. Code § 39.471 (relating to general requirements); and 34 Pa. Code § 39.491 (relating to general requirements).

§ 39.340. Repeating messages.

To avoid misunderstandings and to prevent accidents, each person receiving an unwritten message concerning the handling of lines and equipment shall immediately repeat it back to the sender and secure his full name and acknowledgment. Each person sending an unwritten message shall require it to be repeated back to him by the receiver and secure the full name of the latter.

Cross References

This section cited in 34 Pa. Code § 39.411 (relating to general provisions); 34 Pa. Code § 39.421 (relating to general provisions); 34 Pa. Code § 39.431 (relating to general provisions); 34 Pa. Code § 39.441 (relating to general provisions); 34 Pa. Code § 39.451 (relating to general provisions); 34 Pa. Code § 39.461 (relating to general requirements); 34 Pa. Code § 39.471 (relating to general requirements); and 34 Pa. Code § 39.491 (relating to general requirements).

GENERAL OPERATIONS

§ 39.351. Duties of chief operator.

(a) The chief operator, described in § 39.316 (relating to chief operator) shall keep informed of conditions affecting the safe and reliable operation of the sys-

tem, and shall keep a suitable record or log book showing changes in such conditions. He shall read and sign such record when assuming duty and sign again on being relieved. He shall keep within sight operating diagrams or equivalent devices indicating whether electrical supply circuits are open or closed at stations under his immediate jurisdiction and where work is being done under his special authorization, if these devices are not required for any chief operators classed under § 39.316(c) and (d) and the record or log sheets show these conditions.

(b) The duties of the chief operator will vary according to the size and character of the system under his jurisdiction, and might, for example, be about as follows:

(1) In the case of distribution from a single station, he shall direct the starting and stopping of generating equipment and the opening and closing of outgoing circuits. He shall, in general, give permission for work to be done on live lines above 7,500 volts and in cases where circuits are killed at the station for the protection of workmen.

(2) In the case of a system consisting of one or more generating stations and a number of substations, he shall have supervisory charge within his jurisdiction of the operation of generating and substation equipment and direct charge of interconnected transmission and feeder lines, and where protection of workmen is concerned, shall direct the starting and stopping of generating and substation equipment. He shall, in general, give permission for work on live lines above 7,500 volts and on live interconnected lines, and in all cases where circuits are killed at the generating stations for the protection of workmen.

(c) In the provisions of this section, the person performing these duties is designated as chief operator, regardless of his ordinary title.

Cross References

This section cited in 34 Pa. Code § 39.316 (relating to chief operator); 34 Pa. Code § 39.411 (relating to general provisions); 34 Pa. Code § 39.421 (relating to general provisions); 34 Pa. Code § 39.431 (relating to general provisions); 34 Pa. Code § 39.441 (relating to general provisions); 34 Pa. Code § 39.451 (relating to general provisions); 34 Pa. Code § 39.461 (relating to general requirements); 34 Pa. Code § 39.462 (relating to authorization for work); 34 Pa. Code § 39.471 (relating to general requirements); and 34 Pa. Code § 39.491 (relating to general requirements).

§ 39.352. Duties of foreman.

(a) Each foreman in charge of work shall adopt such precautions as are within his power to prevent accidents and to see that the safety rules are observed by the employes under his direction. He shall make all the necessary records, reporting to his chief operator when required. He shall, as far as possible, prevent unauthorized persons from approaching places where work is being done. He shall also prohibit the use of any tools or devices unsuited to the work in hand or which are so defective or in such poor condition as to make them unsafe.

(b) The qualified persons accompanying uninstructed workmen or visitors near electrical equipment or lines shall take precautions to provide suitable safeguards and see that the safety rules are observed.

Cross References

This section cited in 34 Pa. Code § 39.411 (relating to general provisions); 34 Pa. Code § 9.421 (relating to general provisions); 34 Pa. Code § 39.431 (relating to general provisions); 34 Pa. Code § 39.441 (relating to general provisions); 34 Pa. Code § 39.451 (relating to general provisions); 34 Pa. Code § 39.461 (relating to general requirements); 34 Pa. Code § 39.462 (relating to authorization for work) and 34 Pa. Code § 39.471 (relating to general requirements); and 34 Pa. Code § 39.491 (relating to general requirements).

§ 39.353. Special authorization.

(a) *Special work.* Special authorization from the chief operator shall be secured before work is begun on or about station equipment, transmission, or interconnected feeder lines or live lines above 7,500 volts, and in all cases where lines are to be killed by regular procedure as prescribed in §§ 39.381—39.391 (relating to killing supply equipment and lines) at stations, and a report shall be made to him when such work ceases.

(b) *Exceptions to special work.* In emergency, to protect life or property, or when communication with the chief operator is difficult, due to storms or other causes, any qualified employe may make repairs on or about the equipment or lines covered by this rule without special authorization if the trouble is such as he can promptly clear with help available in compliance with the remaining rules. The chief operator shall thereafter be notified as soon as possible of the action taken. Reference should also be made to § 39.357(b) (relating to protecting traffic).

(c) *Operations at stations.* In the absence of specific operating schedules for opening and closing supply circuits at stations, or starting and stopping equipment, employes shall secure special authorization from the chief operator before performing these operations. In all cases such special authorization shall be secured where circuit or equipment control devices are tagged at stations to protect workmen. Reference should be made to § 39.356 (relating to tagging electrical supply circuits).

(d) *Exceptions to operations at stations.* In emergency, to protect life or property, any qualified employe may open circuits and stop moving equipment without special authorization if, in his judgment, his action will promote safety, but the chief operator shall be notified as soon as possible of such action, with reasons therefor. To maintain service, any qualified employe may also reclose circuits which have been opened by automatic cut-outs, unless this is prohibited by § 39.355 (relating to maintaining service).

(e) *Cutting out sections of circuits.* Special authorization shall be secured from the chief operator before sections of overhead or underground circuits are cut off by employes at points other than at stations by means of sectionalizing switches.

(f) *Exception to cutting out sections of circuits.* Portions of distribution circuits below 7,500 volts may be cut off by authorized employes, without special authorization from the chief operator, by means of sectionalizing switches, if the chief operator is thereafter notified as soon as possible of the action taken. This may also be done even for circuits above 7,500 volts when communication with the chief operator is difficult.

Cross References

This section cited in 34 Pa. Code § 39.357 (relating to protecting traffic); 34 Pa. Code § 39.411 (relating to general provisions); 34 Pa. Code § 39.421 (relating to general provisions); 34 Pa. Code § 39.431 (relating to general provisions); 34 Pa. Code § 39.441 (relating to general provisions); 34 Pa. Code § 39.451 (relating to general provisions); 34 Pa. Code § 39.461 (relating to general requirements); 34 Pa. Code § 39.462 (relating to authorization for work); 34 Pa. Code § 39.471 (relating to general requirements); and 34 Pa. Code § 39.491 (relating to general requirements).

§ 39.354. Restoring service after work.

No instructions for making alive equipment or lines which have been killed by permission of the chief operator to protect workmen shall be issued by him until workmen concerned have been reported clear. When there is more than one workman at a location, a person authorized for the purpose shall report clear for such workmen, but only after all have reported clear to him. If there is more than one gang, each shall be so reported clear to the chief operator.

Cross References

This section cited in 34 Pa. Code § 39.411 (relating to general provisions); 34 Pa. Code § 39.421 (relating to general provisions); 34 Pa. Code § 39.431 (relating to general provisions); 34 Pa. Code § 39.441 (relating to general provisions); 34 Pa. Code § 39.451 (relating to general provisions); 34 Pa. Code § 39.461 (relating to general requirements); 34 Pa. Code § 39.462 (relating to authorization for work); 34 Pa. Code § 39.471 (relating to general requirements); and 34 Pa. Code § 39.491 (relating to general requirements).

§ 39.355. Maintaining service.

(a) When live circuits on which “men at work” tags have been placed are opened automatically, they should be kept disconnected until the chief operator has given proper authorization for reconnection.

(b) When overhead circuits other than trolley and third-rail circuits open automatically, the local operating rules of the employer shall determine in what manner and how many times they may be closed with safety for persons on or near those circuits. The chief operator shall be advised of the conditions.

(c) When circuits feeding supply lines become accidentally grounded, they shall be tested to determine where the ground exists. If the ground cannot be

definitely located and removed by the station operator, an immediate report of the finding shall be given to the chief operator, who shall order a patrol of the lines affected to definitely locate and remove the ground as soon as practicable. Above 7,500 volts it will usually be found advisable to disconnect the circuit or effectively ground the accidentally grounded conductor until the lines have been cleared of the accidental ground.

Cross References

This section cited in Pa. Code § 39.353 (relating to special authorization); 34 Pa. Code § 39.411 (relating to general provisions); 34 Pa. Code § 39.421 (relating to general provisions); 34 Pa. Code § 39.431 (relating to general provisions); 34 Pa. Code § 39.441 (relating to general provisions); 34 Pa. Code § 39.451 (relating to general provisions); 34 Pa. Code § 39.461 (relating to general requirements); 34 Pa. Code § 39.462 (relating to authorization for work); 34 Pa. Code § 39.471 (relating to general requirements); and 34 Pa. Code § 39.491 (relating to general requirements).

§ 39.356. Tagging electrical supply circuits.

Before work is done under special authorization of the chief operator on or about any equipment or lines used as transmission or interconnected feeder lines, or lines operating above 7,500 volts, or lines killed at stations or substations to protect workmen, the chief operator shall have “men at work” tags attached at points where such equipment or lines may be manually controlled by regular operators to plainly identify the circuits worked on. Before work is done on or about any equipment or lines which are killed by authorized employes at points other than at stations, the employes shall have “men at work” tags placed at points where the circuit has been disconnected to identify the portion worked on.

Cross References

This section cited in 34 Pa. Code § 39.353 (relating to special authorization); 34 Pa. Code § 39.411 (relating to general provisions); 34 Pa. Code § 39.421 (relating to general provisions); 34 Pa. Code § 39.431 (relating to general provisions); 34 Pa. Code § 39.441 (relating to general provisions); 34 Pa. Code § 39.451 (relating to general provisions); 34 Pa. Code § 39.461 (relating to general requirements); 34 Pa. Code § 39.462 (relating to authorization for work); 34 Pa. Code § 39.471 (relating to general requirements); and 34 Pa. Code § 39.491 (relating to general requirements).

§ 39.357. Protecting traffic.

(a) *Barrier guards.* Before engaging in such work as may endanger traffic, employes shall first erect suitable barrier guards. They shall also display danger signs or red lamps from two sides of the barriers at right angles to the direction of the traffic. If the nature of work and traffic requires it, a man shall be stationed to warn passersby while work is going on.

(b) *Crossed or fallen wires.* When any crossed or fallen wires which may create a hazard are found, the employe shall remain on guard or adopt other adequate means to prevent accidents and have the chief operator notified. If the employe observes the rules for handling live parts by use of insulating appliances, he may correct the condition at once. Otherwise he shall first secure the authori-

zation from the chief operator for so doing. Reference should also be made to § 39.353(a) (relating to special authorization).

Cross References

This section cited in 34 Pa. Code § 39.353 (relating to special authorization); 34 Pa. Code § 39.411 (relating to general provisions); 34 Pa. Code § 39.421 (relating to general provisions); 34 Pa. Code § 39.431 (relating to general provisions); 34 Pa. Code § 39.441 (relating to general provisions); 34 Pa. Code § 39.451 (relating to general provisions); 34 Pa. Code § 39.461 (relating to general requirements); 34 Pa. Code § 39.462 (relating to authorization for work); 34 Pa. Code § 39.471 (relating to general requirements); and 34 Pa. Code § 39.491 (relating to general requirements).

§ 39.358. Protecting workmen by disconnectors.

When equipment or lines are to be disconnected from any source of electrical energy, for the protection of workmen, the operator shall first open the switches or circuit breakers designed for operation under load, and then the air brake disconnectors, when provided.

Cross References

This section cited in 34 Pa. Code § 39.155 (relating to character of switches and disconnectors); 34 Pa. Code § 39.411 (relating to general provisions); 34 Pa. Code § 39.421 (relating to general provisions); 34 Pa. Code § 39.431 (relating to general provisions); 34 Pa. Code § 39.441 (relating to general provisions); 34 Pa. Code § 39.451 (relating to general provisions); 34 Pa. Code § 39.461 (relating to general requirements); 34 Pa. Code § 39.462 (relating to authorization for work); 34 Pa. Code § 39.471 (relating to general requirements); and 34 Pa. Code § 39.491 (relating to general requirements).

HANDLING LIVE EQUIPMENT AND LINES

§ 39.361. Definitions.

The following words and terms, when used in this section and §§ 39.362—39.371 have the following meanings, unless the context clearly indicates otherwise:

Voltage—In general the highest effective voltage between the conductors of the circuit concerned, except that in grounded multiwire circuits, not exceeding 750 volts between outer conductors, it means the highest effective voltage between any wire of the circuit and the ground.

Voltage to ground—In ungrounded low-voltage circuits, the voltage of the circuit.

Cross References

This section cited in 34 Pa. Code § 39.411 (relating to general provisions); 34 Pa. Code § 39.421 (relating to general provisions); 34 Pa. Code § 39.431 (relating to general provisions); 34 Pa. Code § 39.441 (relating to general provisions); 34 Pa. Code § 39.451 (relating to general provisions); 34 Pa. Code § 39.461 (relating to general requirements); 34 Pa. Code § 39.471 (relating to general requirements); 34 Pa. Code § 39.491 (relating to general requirements); and 34 Pa. Code § 39.496 (relating to stringing wires).

§ 39.362. General provisions.

(a) When one circuit is directly connected to another circuit of higher voltage, as in the case of an autotransformer, both are considered as of the higher voltage, unless the circuit of the lower voltage is permanently grounded. Direct connection implies electrical connection as opposed to connection merely through electromagnetic or electrostatic induction.

(b) Signal equipment and lines not over 400 volts are not considered alive, unless made alive by leakage from supply equipment or lines. They are, however, a source of danger when near live supply lines, due to their liability of being grounded.

Cross References

This section cited in 34 Pa. Code § 39.361 (relating to definitions); 34 Pa. Code § 39.411 (relating to general provisions); 34 Pa. Code § 39.421 (relating to general provisions); 34 Pa. Code § 39.431 (relating to general provisions); 34 Pa. Code § 39.441 (relating to general provisions); 34 Pa. Code § 39.451 (relating to general provisions); 34 Pa. Code § 39.461 (relating to general requirements); 34 Pa. Code § 39.471 (relating to general requirements); 34 Pa. Code § 39.491 (relating to general requirements); and 34 Pa. Code § 39.496 (relating to stringing wires).

§ 39.363. General requirements.

(a) *Touching live parts.* No employe should touch with bare hands at the same time two parts at different potential; nor should he touch with bare hands even a single exposed ungrounded live part at a dangerous potential to ground unless he is insulated from other conducting surfaces, including the ground itself, and stands on insulating surfaces.

(b) *Wire insulation.* Employes should not place dependence for their safety on the insulating covering of wires. Precautions in this section for handling live parts shall be observed in handling insulated wires. Insulation on a wire may look perfect, but it frequently cannot be relied on to prevent shock.

(c) *Exposure to higher voltages.* Every employe working on or about equipment or lines exposed in overhead construction to voltages higher than those guarded against by the safety appliances provided should, as far as practicable, assure himself that the equipment or lines worked on are free from dangerous leakage or induction or have been effectively grounded.

(d) *Cutting into insulating coverings of live conductors.* The following precautions should be observed:

(1) When the insulating covering on live wires or cables is cut into, the employe should use a suitable tool. While doing such work suitable goggles should be worn to protect the eyes. Insulating gloves should be worn to protect the hands.

(2) When metal sheathing is necessarily removed from cables it should be done with special tools which will not injure the insulation. The sheathing should be so cut as to leave enough exposed insulation after the conductor has been bared to avoid arcing over between the conductor and the sheath. If the

cable consists of more than one conductor, similar exposed insulating surfaces should be left for each conductor, using insulating separators between conductors, if necessary.

(3) Insulating devices, such as wood separators, and the like, should be examined to eliminate conducting dust or chips, sharp edges, or nails, which may defeat the purpose for which the devices are intended.

Cross References

This section cited in 34 Pa. Code § 39.336 (relating to live and arcing parts); 34 Pa. Code § 39.361 (relating to definitions); 34 Pa. Code § 39.367 (relating to when to kill parts); 34 Pa. Code § 39.411 (relating to general provisions); 34 Pa. Code § 39.421 (relating to general provisions); 34 Pa. Code § 39.431 (relating to general provisions); 34 Pa. Code § 39.441 (relating to general provisions); 34 Pa. Code § 39.451 (relating to general provisions); 34 Pa. Code § 39.461 (relating to general requirements); 34 Pa. Code § 39.471 (relating to general requirements); 34 Pa. Code § 39.491 (relating to general requirements); and 34 Pa. Code § 39.496 (relating to stringing wires).

§ 39.364. Voltages between 750 and 7500.

No employe should go, or take any conducting object within, six inches of any exposed live part whose voltage exceeds 750, in stations, in testing rooms, in underground construction, or in overhead construction, if it is practicable to avoid this except as follows:

(1) In dry locations this distance may be less than six inches, if insulating devices, such as shields, covers, or gloves are placed between the person and the part or object. The distance may also be reduced if insulating barriers, such as mats, stools, or platforms, are placed between the person and the ground, and suitable insulating shields between the person and all other conducting surfaces, except the live part, which he could accidentally touch at the same time.

(2) In damp or dark locations, and wherever grounded surfaces are exposed, the distance may be less than six inches only if insulating devices are used between the person and the live parts and also between him and other conducting surfaces with which he might otherwise come in contact at the same time. If it is impossible to secure a safe distance from live parts by use of the special insulating tools and appliances furnished, properly tested insulating gloves and sleeves may serve as the sole portable insulating devices between the person and live parts. Care should be exercised in using insulating gloves to avoid puncturing them on sharp edges, especially in making wire splices. It is sometimes advisable to wear protecting gloves over insulating gloves.

Cross References

This section cited in 34 Pa. Code § 39.160 (relating to guarding live parts of switches and automatic cut-outs not installed on switchboards); 34 Pa. Code § 39.361 (relating to definitions); 34 Pa. Code § 39.367 (relating to when to kill parts); 34 Pa. Code § 39.404 (relating to completing grounds); 34 Pa. Code § 39.411 (relating to general provisions); 34 Pa. Code § 39.421 (relating to general provisions); 34 Pa. Code § 39.431 (relating to general provisions); 34 Pa. Code § 39.441 (relating to general provisions); 34 Pa. Code § 39.451 (relating to general provisions); 34 Pa. Code § 39.461 (relating to general provisions); 34 Pa. Code § 39.471 (relating to general provisions); 34 Pa. Code § 39.491 (relating to general provisions); 34 Pa. Code § 39.496 (relating to stringing wires).

§ 39.461 (relating to general requirements); 34 Pa. Code § 39.471 (relating to general requirements); 34 Pa. Code § 39.491 (relating to general requirements); 34 Pa. Code § 39.494 (relating to approaching supply line); 34 Pa. Code § 39.496 (relating to stringing wires); 34 Pa. Code § 39.534 (relating to approaching supply line); and 34 Pa. Code § 39.537 (relating to stringing wires).

§ 39.365. Voltages above 7500.

(a) No employe should go, or take any conducting object, within the distances named below from any exposed live part at or above the voltage specified, except as permitted by this section; (distance for intermediate voltage to be determined by interpolation):

<i>Operating Voltage</i>	<i>Distance (in feet)</i>
7,500	1
15,000	2
50,000	3
70,000	5

(b) In dry locations these distances may be reduced, if suitable insulating guards or barriers are placed between the person and such part or object.

(c) If the part is being directly worked on, the tools or other mechanical appliances used shall provide the full distance of insulating material, unless protective guards are also used between the person and the live part. These protective guards may be permanent insulating covers or shields, or may be disks of insulating material, suitable for the voltages, to be handled and for the attendant conditions, attached to the handles of rods or tools.

Cross References

This section cited in 34 Pa. Code § 39.160 (relating to guarding live parts of switches and automatic cut-outs not installed on switchboards); 34 Pa. Code § 39.361 (relating to definitions); 34 Pa. Code § 39.367 (relating to when to kill parts); 34 Pa. Code § 39.404 (relating to completing grounds); 34 Pa. Code § 39.411 (relating to general provisions); 34 Pa. Code § 39.421 (relating to general provisions); 34 Pa. Code § 39.431 (relating to general provisions); 34 Pa. Code § 39.441 (relating to general provisions); 34 Pa. Code § 39.451 (relating to general provisions); 34 Pa. Code § 39.461 (relating to general requirements); 34 Pa. Code § 39.471 (relating to general requirements); 34 Pa. Code § 39.491 (relating to general requirements); 34 Pa. Code § 39.494 (relating to approaching supply line); 34 Pa. Code § 39.496 (relating to stringing wires); 34 Pa. Code § 39.534 (relating to approaching supply line); and 34 Pa. Code § 39.537 (relating to stringing wires).

§ 39.366. Requirement for two workmen.

Except in trouble and emergency work, no employe shall work alone dangerously near live lines above 750 volts in wet weather or at night.

Cross References

This section cited in 34 Pa. Code § 39.361 (relating to definitions); 34 Pa. Code § 39.411 (relating to general provisions); 34 Pa. Code § 39.421 (relating to general provisions); 34 Pa. Code § 39.431 (relating to general provisions); 34 Pa. Code § 39.441 (relating to general provisions); 34 Pa. Code § 39.451 (relating to general provisions); 34 Pa. Code § 39.461 (relating to general require-

ments); 34 Pa. Code § 39.471 (relating to general requirements); 34 Pa. Code § 39.491 (relating to general requirements); and 34 Pa. Code § 39.496 (relating to stringing wires).

§ 39.367. When to kill parts.

No employe shall approach or willingly permit others to approach any exposed underground part normally alive, except as provided in §§ 39.363—39.365 (relating to general requirements; voltages between 750 and 7,500; and voltages above 7,500), unless he has first assured himself of his own safety and the safety of those working under his direction by having the supply equipment and lines killed. Reference should also be made to §§ 39.381—39.391.

Cross References

This section cited in 34 Pa. Code § 39.361 (relating to definitions); 34 Pa. Code § 39.411 (relating to general provisions); 34 Pa. Code § 39.421 (relating to general provisions); 34 Pa. Code § 39.431 (relating to general provisions); 34 Pa. Code § 39.441 (relating to general provisions); 34 Pa. Code § 39.451 (relating to general provisions); 34 Pa. Code § 39.461 (relating to general requirements); 34 Pa. Code § 39.471 (relating to general requirements); 34 Pa. Code § 39.491 (relating to general requirements); and 34 Pa. Code § 39.496 (relating to stringing wires).

§ 39.368. Operating switches and working from below.

(a) *Opening and closing switches.* Manual switches and disconnectors should be closed by a single unhesitating motion, and, if possible, with one hand. Care should be exercised in opening switches to avoid causing serious arcing.

(b) *Work from below.* Employes should avoid working on equipment or lines from any position by reason of which a shock or slip will tend to bring the body toward exposed live parts. Work should therefore generally be done from below rather than from above.

Cross References

This section cited in 34 Pa. Code § 39.361 (relating to definitions); 34 Pa. Code § 39.411 (relating to general provisions); 34 Pa. Code § 39.421 (relating to general provisions); 34 Pa. Code § 39.431 (relating to general provisions); 34 Pa. Code § 39.441 (relating to general provisions); 34 Pa. Code § 39.451 (relating to general provisions); 34 Pa. Code § 39.461 (relating to general requirements); 34 Pa. Code § 39.471 (relating to general requirements); 34 Pa. Code § 39.491 (relating to general requirements); and 34 Pa. Code § 39.496 (relating to stringing wires).

§ 39.369. Attaching connecting wires and grounds.

(a) *Handling connecting lines.* In connecting dead equipment or lines to a live circuit by means of a connecting wire or device, employes should first attach the wire to the dead part before attaching it to the circuit. When disconnecting, the live end should be removed first. Loose conductors shall be kept away from exposed live parts. Metal measuring tapes, and tapes, ropes, or hand lines having metal threads woven into the fabric, should not be used near exposed live parts. Ladders reinforced by metal in a longitudinal direction should not be used near exposed live parts.

(b) *Applying grounds.* In applying a grounding device to normally live parts the device shall be grounded before being brought near the parts, and shall be removed from the live parts before being removed from the ground connection.

Cross References

This section cited in 34 Pa. Code § 39.361 (relating to definitions); 34 Pa. Code § 39.411 (relating to general provisions); 34 Pa. Code § 39.421 (relating to general provisions); 34 Pa. Code § 39.431 (relating to general provisions); 34 Pa. Code § 39.441 (relating to general provisions); 34 Pa. Code § 39.451 (relating to general provisions); 34 Pa. Code § 39.461 (relating to general requirements); 34 Pa. Code § 39.471 (relating to general requirements); 34 Pa. Code § 39.491 (relating to general requirements); and 34 Pa. Code § 39.496 (relating to stringing wires).

§ 39.370. Handling series circuits.

Secondaries of current transformers to meters or other devices, should not be opened when alive, until a jumper has been connected across the point of opening or such secondary has been short circuited elsewhere. Before working on arc lights or similar devices, connected to series circuits they shall be short circuited, or, when necessary to avoid hazard, disconnected entirely from such circuits by absolute cut-outs.

Cross References

This section cited in 34 Pa. Code § 39.361 (relating to definitions); 34 Pa. Code § 39.411 (relating to general provisions); 34 Pa. Code § 39.421 (relating to general provisions); 34 Pa. Code § 39.431 (relating to general provisions); 34 Pa. Code § 39.441 (relating to general provisions); 34 Pa. Code § 39.451 (relating to general provisions); 34 Pa. Code § 39.461 (relating to general requirements); 34 Pa. Code § 39.471 (relating to general requirements); 34 Pa. Code § 39.491 (relating to general requirements); and 34 Pa. Code § 39.496 (relating to stringing wires).

§ 39.371. Stringing wires.

Wires being strung near live conductors, should be treated as alive unless effectively grounded.

Cross References

This section cited in 34 Pa. Code § 39.361 (relating to definitions); 34 Pa. Code § 39.411 (relating to general provisions); 34 Pa. Code § 39.421 (relating to general provisions); 34 Pa. Code § 39.431 (relating to general provisions); 34 Pa. Code § 39.441 (relating to general provisions); 34 Pa. Code § 39.451 (relating to general provisions); 34 Pa. Code § 39.461 (relating to general requirements); 34 Pa. Code § 39.471 (relating to general requirements); 34 Pa. Code § 39.491 (relating to general requirements); and 34 Pa. Code § 39.496 (relating to stringing wires).

KILLING SUPPLY EQUIPMENT AND LINES

§ 39.381. General provisions.

(a) When workmen depend on others for operating switches to kill circuits on which they are to work, or when they first secure special authorization from the chief operator before themselves operating such switches, the precautionary mea-

asures established in §§ 39.381—39.391 shall be taken in the order given, before work is begun on or about equipment or lines concerned, as a means for preventing misunderstanding and accident.

(b) In small organizations the chief operator may himself operate the switches and disconnectors instead of instructing others to do so, thus much simplifying and abbreviating the procedure. In certain cases the chief operator may direct the workman who wishes the section killed for his own protection, to operate some or all switches necessary himself, thus also abbreviating the procedure.

(c) In cases where there is no station with regular attendants at either end of a section of line to be killed for the protection of workers, the requirements of §§ 39.381—39.391 need not apply for disconnection of that end of the section concerned, if the employe under whose direction that end of the section is disconnected is in sole charge of the section and of the means of disconnection employed or if the point of disconnection at that end of the section is suitably tagged before work proceeds.

Cross References

This section cited in 34 Pa. Code § 39.339 (relating to fire extinguishers); 34 Pa. Code § 39.353 (relating to special authorization); 34 Pa. Code § 39.367 (relating to when to kill parts); 34 Pa. Code § 39.411 (relating to general provisions); 34 Pa. Code § 39.421 (relating to general provisions); 34 Pa. Code § 39.431 (relating to general provisions); 34 Pa. Code § 39.441 (relating to general provisions); 34 Pa. Code § 39.451 (relating to general provisions); and 34 Pa. Code § 39.461 (relating to general requirements).

§ 39.382. Workman's request.

The workman in charge of the work shall apply to the chief operator to have the particular section of equipment or lines killed, identifying it by position, letter, color, number or other means.

Cross References

This section cited in 34 Pa. Code § 39.339 (relating to fire extinguishers); 34 Pa. Code § 39.353 (relating to special authorization); 34 Pa. Code § 39.367 (relating to when to kill parts); 34 Pa. Code § 39.381 (relating to general provisions); 34 Pa. Code § 39.411 (relating to general provisions); 34 Pa. Code § 39.421 (relating to general provisions); 34 Pa. Code § 39.431 (relating to general provisions); 34 Pa. Code § 39.441 (relating to general provisions); 34 Pa. Code § 39.451 (relating to general provisions); and 34 Pa. Code § 39.461 (relating to general requirements).

§ 39.383. Opening disconnectors and tagging.

(a) The chief operator at his discretion shall direct the proper persons to open switches and air break disconnectors through which electrical energy may be supplied to the particular section of equipment and lines to be killed and shall require such person to tag such switches and disconnectors, and each tag shall be of a distinctive character indicating that men are at work. Oil switches and remotely controlled switches should also be blocked if necessary to avoid mistakes.

(b) The person shall, when placing the tag, record the time of disconnection, his own name, the name of the workman who requested the disconnection, and the name of the chief operator.

(c) If the section of equipment or lines may be made alive from two or more sources, all such sources shall be disconnected. This applies to work on lines with more than one station, also sometimes to work on transformers in banks, rotary converters, motor generators, switches and on other similar equipment.

Cross References

This section cited in 34 Pa. Code § 39.339 (relating to fire extinguishers); 34 Pa. Code § 39.353 (relating to special authorization); 34 Pa. Code § 39.367 (relating to when to kill parts); 34 Pa. Code § 39.381 (relating to general provisions); 34 Pa. Code § 39.384 (relating to station protective grounds); 34 Pa. Code § 39.411 (relating to general provisions); 34 Pa. Code § 39.421 (relating to general provisions); 34 Pa. Code § 39.431 (relating to general provisions); 34 Pa. Code § 39.441 (relating to general provisions); 34 Pa. Code § 39.451 (relating to general provisions); and 34 Pa. Code § 39.461 (relating to general requirements).

§ 39.384. Station protective grounds.

When the switches and disconnectors designated have been opened, blocked, and tagged in accordance with § 39.383 (relating to opening disconnectors and tagging), the chief operator shall require each person operating them to make protective grounds in accordance with §§ 9.401—39.405 upon the lines being killed and to report to him when such grounds are in place.

Cross References

This section cited in 34 Pa. Code § 39.339 (relating to fire extinguishers); 34 Pa. Code § 39.353 (relating to special authorization); 34 Pa. Code § 39.367 (relating to when to kill parts); 34 Pa. Code § 39.381 (relating to general provisions); 34 Pa. Code § 39.411 (relating to general provisions); 34 Pa. Code § 39.421 (relating to general provisions); 34 Pa. Code § 39.431 (relating to general provisions); 34 Pa. Code § 39.441 (relating to general provisions); 34 Pa. Code § 39.451 (relating to general provisions); and 34 Pa. Code § 39.461 (relating to general requirements).

§ 39.385. Permission to work.

Upon receipt of information from persons operating switches and disconnectors that protective grounds are in place the chief operator shall advise the workman who requested the killing of the section that the specified section of equipment or lines has been killed and that he may proceed to work.

Cross References

This section cited in 34 Pa. Code § 39.339 (relating to fire extinguishers); 34 Pa. Code § 39.353 (relating to special authorization); 34 Pa. Code § 39.367 (relating to when to kill parts); 34 Pa. Code § 39.381 (relating to general provisions); 34 Pa. Code § 39.411 (relating to general provisions); 34 Pa. Code § 39.421 (relating to general provisions); 34 Pa. Code § 39.431 (relating to general provisions); 34 Pa. Code § 39.441 (relating to general provisions); 34 Pa. Code § 39.451 (relating to general provisions); and 34 Pa. Code § 39.461 (relating to general requirements).

§ 39.386. Protective grounds of workmen for overhead lines.

The workman in charge should immediately proceed to make his own protective grounds on the disconnected lines, except under conditions where the making of such ground is itself more hazardous than working on the lines without grounding. Such grounds shall be made between the particular point at which work is to be done and every source of energy.

Cross References

This section cited in 34 Pa. Code § 39.339 (relating to fire extinguishers); 34 Pa. Code § 39.353 (relating to special authorization); 34 Pa. Code § 39.367 (relating to when to kill parts); 34 Pa. Code § 39.381 (relating to general provisions); 34 Pa. Code § 39.387 (relating to proceeding with work); 34 Pa. Code § 39.411 (relating to general provisions); 34 Pa. Code § 39.421 (relating to general provisions); 34 Pa. Code § 39.431 (relating to general provisions); 34 Pa. Code § 39.441 (relating to general provisions); 34 Pa. Code § 39.451 (relating to general provisions); and 34 Pa. Code § 39.461 (relating to general requirements).

§ 39.387. Proceeding with work.

After the equipment or lines have been killed and grounded, if required by § 39.386 (relating to protective grounds of workmen for overhead lines), the workman in charge and those under his direction may proceed with work without taking the precautions required on or about live parts by this Subchapter.

Cross References

This section cited in 34 Pa. Code § 39.339 (relating to fire extinguishers); 34 Pa. Code § 39.353 (relating to special authorization); 34 Pa. Code § 39.367 (relating to when to kill parts); 34 Pa. Code § 39.381 (relating to general provisions); 34 Pa. Code § 39.411 (relating to general provisions); 34 Pa. Code § 39.421 (relating to general provisions); 34 Pa. Code § 39.431 (relating to general provisions); 34 Pa. Code § 39.441 (relating to general provisions); 34 Pa. Code § 39.451 (relating to general provisions); and 34 Pa. Code § 39.461 (relating to general requirements).

§ 39.388. Procedure for other gangs.

Each additional workman in charge desiring the same equipment or lines to be killed for the protection of himself or the men under his direction shall follow the same procedure as the first workman and secure similar protection.

Cross References

This section cited in 34 Pa. Code § 39.339 (relating to fire extinguishers); 34 Pa. Code § 39.353 (relating to special authorization); 34 Pa. Code § 39.367 (relating to when to kill parts); 34 Pa. Code § 39.381 (relating to general provisions); 34 Pa. Code § 39.411 (relating to general provisions); 34 Pa. Code § 39.421 (relating to general provisions); 34 Pa. Code § 39.431 (relating to general provisions); 34 Pa. Code § 39.441 (relating to general provisions); 34 Pa. Code § 39.451 (relating to general provisions); and 34 Pa. Code § 49.461 (relating to general requirements).

§ 39.389. Reporting clear-transferring responsibility.

(a) The workman in charge, upon completion of his work, and after assuring himself that men under his direction are in safe positions, shall remove his pro-

tective grounds and shall report to the chief operator that tags protecting him may be removed, and shall give his location, and shall report:

“Mr. _____ and men clear and all grounds removed.”

(b) The workman in charge who received the permission to work may transfer this permission and the responsibility for men under him by personally informing the chief operator of the proposed transfer. If this is permitted, the name of the successor shall be entered at that time on the tags concerned or in the records of the persons placing the tags and of the chief operator. Thereafter the successor shall report clear and shall be responsible for the safety of the original workmen, so far as this is affected by the removal of tags.

Cross References

This section cited in 34 Pa. Code § 39.339 (relating to fire extinguishers); 34 Pa. Code § 39.353 (relating to special authorization); 34 Pa. Code § 39.367 (relating to when to kill parts); 34 Pa. Code § 39.381 (relating to general provisions); 34 Pa. Code § 39.411 (relating to general provisions); 34 Pa. Code § 39.421 (relating to general provisions); 34 Pa. Code § 39.431 (relating to general provisions); 34 Pa. Code § 39.441 (relating to general provisions); 34 Pa. Code § 39.451 (relating to general provisions); and 34 Pa. Code § 39.461 (relating to general requirements).

§ 39.390. Removal of tags.

(a) The chief operator shall then direct the removal of tags for that workman and the removal shall be reported back to him immediately by the persons removing them.

(b) Upon the removal of any tag, there shall be added to the record the name of the chief operator and workman who requested the tag, the time of removal, and the signature of the person removing the tag.

Cross References

This section cited in 34 Pa. Code § 39.339 (relating to fire extinguishers); 34 Pa. Code § 39.353 (relating to special authorization); 34 Pa. Code § 39.367 (relating to when to kill parts); 34 Pa. Code § 39.381 (relating to general provisions); 34 Pa. Code § 39.391 (relating to restoring service); 34 Pa. Code § 39.411 (relating to general provisions); 34 Pa. Code § 39.421 (relating to general provisions); 34 Pa. Code § 39.431 (relating to general provisions); 34 Pa. Code § 39.441 (relating to general provisions); 34 Pa. Code § 39.451 (relating to general provisions); and 34 Pa. Code § 39.461 (relating to general requirements).

§ 39.391. Restoring service.

Only after protective tags have been removed as outlined in § 39.390 (relating to removal of tags) from points of disconnection shall the chief operator at his discretion, direct the removal of protective grounds and blocks and the closing of any or all switches and disconnectors.

Cross References

This section cited in 34 Pa. Code § 39.339 (relating to fire extinguishers); 34 Pa. Code § 39.353 (relating to special authorization); 34 Pa. Code § 39.367 (relating to when to kill parts); 34 Pa. Code § 39.381 (relating to general provisions); 34 Pa. Code § 39.411 (relating to general provisions); 34

Pa. Code § 39.421 (relating to general provisions); 34 Pa. Code § 39.431 (relating to general provisions); 34 Pa. Code § 39.441 (relating to general provisions); 34 Pa. Code § 39.451 (relating to general provisions); and 34 Pa. Code § 39.461 (relating to general requirements).

MAKING PROTECTIVE GROUNDS

§ 39.401. General provisions.

When making temporary protective grounds on a normally live circuit the precautionary measures of this section and §§ 39.401—39.405 shall be observed in the order given, and the ground shall be made to all wires of the circuit, which are to be considered as grounded.

Cross References

This section cited in 34 Pa. Code § 39.384 (relating to station protective grounds); 34 Pa. Code § 39.411 (relating to general provisions); 34 Pa. Code § 39.421 (relating to general provisions); 34 Pa. Code § 39.431 (relating to general provisions); 34 Pa. Code § 39.441 (relating to general provisions); 34 Pa. Code § 39.442 (relating to precaution on series circuits); 34 Pa. Code § 39.451 (relating to general provisions); and 34 Pa. Code § 39.461 (relating to general requirements).

§ 39.402. Ground connections.

The employe making a protective ground on equipment or lines shall first connect one end of the grounding device to an effective ground connection supplied for that purpose.

Cross References

This section cited in 34 Pa. Code § 39.384 (relating to station protective grounds); 34 Pa. Code § 39.401 (relating to general provisions); 34 Pa. Code § 39.411 (relating to general provisions); 34 Pa. Code § 39.421 (relating to general provisions); 34 Pa. Code § 39.431 (relating to general provisions); 34 Pa. Code § 39.441 (relating to general provisions); 34 Pa. Code § 39.442 (relating to precaution on series circuits); 34 Pa. Code § 39.451 (relating to general provisions); and 34 Pa. Code § 39.461 (relating to general requirements).

§ 39.403. Test of circuit.

Normally live parts which are to be grounded should next be tested for any indication of voltage, the employe carefully keeping portions of his body at the distance required from such parts when alive by the use of suitable insulating rods or handles of proper length, or other suitable devices.

Cross References

This section cited in 34 Pa. Code § 39.336 (relating to live and arcing parts); 34 Pa. Code § 39.384 (relating to station protective grounds); 34 Pa. Code § 39.401 (relating to general provisions); 34 Pa. Code § 39.411 (relating to general provisions); 34 Pa. Code § 39.421 (relating to general provisions); 34 Pa. Code § 39.431 (relating to general provisions); 34 Pa. Code § 39.441 (relating to general provisions); 34 Pa. Code § 39.442 (relating to precaution on series circuits); 34 Pa. Code § 39.451 (relating to general provisions); and 34 Pa. Code § 39.461 (relating to general requirements).

§ 39.404. Completing grounds.

(a) If the test shows no voltage, or the local operating rules so direct, the free end of the grounding device shall next be brought into contact with the normally live part and securely clamped or otherwise secured to such part, before the employe comes within the resistances from the normally live parts specified in §§ 39.364 and 39.365 (relating to voltages between 750 and 7,500; and voltages above 7,500), or proceeds to work upon the parts as upon a grounded part.

(b) In stations, remote control switches may be employed to connect the equipment or lines being grounded to the actual ground connection. On lines it is generally necessary to resort to portable grounding devices or chains handled directly by means of insulating handles, rods or ropes.

Cross References

This section cited in 34 Pa. Code § 39.384 (relating to station protective grounds); 34 Pa. Code § 39.401 (relating to general provisions); 34 Pa. Code § 39.411 (relating to general provisions); 34 Pa. Code § 39.421 (relating to general provisions); 34 Pa. Code § 39.431 (relating to general provisions); 34 Pa. Code § 39.441 (relating to general provisions); 34 Pa. Code § 39.442 (relating to precaution on series circuits); 34 Pa. Code § 39.451 (relating to general provisions); and 34 Pa. Code § 39.461 (relating to general requirements).

§ 39.405. Removing grounds.

In removing a protective ground the employe shall not remove the grounding device from the ground connection until the device has been disconnected from normally live current-carrying parts.

Cross References

This section cited in 34 Pa. Code § 39.384 (relating to station protective grounds); 34 Pa. Code § 39.401 (relating to general provisions); 34 Pa. Code § 39.411 (relating to general provisions); 34 Pa. Code § 39.421 (relating to general provisions); 34 Pa. Code § 39.431 (relating to general provisions); 34 Pa. Code § 39.441 (relating to general provisions); 34 Pa. Code § 39.442 (relating to protection on series circuits); 34 Pa. Code § 39.451 (relating to general provisions); and 34 Pa. Code § 39.461 (relating to general requirements).

SPECIAL RULES FOR EMPLOYES—SUPPLY STATION AND SWITCHBOARD OPERATORS**§ 39.411. General provisions.**

Engineers, machine attendants, switchboard operators, and helpers shall study and strictly observe the following, in addition to all the general rules in §§ 39.331—39.405 (relating to rules for employes—general precautions; general operations; handling live equipment and lines; killing supply equipment and lines; and making protective grounds), which apply to their work.

Cross References

This section cited in 34 Pa. Code § 39.461 (relating to general requirements); 34 Pa. Code § 39.471 (relating to general requirements); and 34 Pa. Code § 39.491 (relating to general requirements).

§ 39.412. Care about machines.

(a) Care shall be exercised to prevent oil cans, tools, dusters, or wiping cloths from catching in moving parts of machinery. In passing any switchboard or machine in operation, employes shall not touch it unnecessarily nor allow metal tools or other metal objects to touch the apparatus or connections. Employes shall not use iron or tin oil cans near field magnets, but they shall use only dusters and wipers with insulating handles on or about exposed live parts.

(b) Any employe about to work on normally moving parts of electrical equipment during periods of rest shall protect himself against their accidental starting by placing "men at work" signs on the starting devices, and locking or blocking these where practicable.

Cross References

This section cited in 34 Pa. Code § 39.461 (relating to general requirements); 34 Pa. Code § 39.471 (relating to general requirements); and 34 Pa. Code § 39.491 (relating to general requirements).

§ 39.413. Care about live or moving parts.

(a) No employe shall work on or near exposed live or moving parts unless authorized to do such work, and he shall strictly observe the rules applicable to such work.

(b) When working near fuses and circuit breakers or other apparatus which may arc suddenly, care shall be taken to avoid injury from their operation.

(c) When working on one section of a switchboard or in one compartment it shall be conspicuously marked and barriers placed to prevent accidental contact with live parts in that section or adjacent sections.

(d) When working on or about live parts and standing on insulated stools or ladders, or when otherwise insulated from the ground, employes shall avoid handing metal tools or other objects to other persons who are not insulated.

Cross References

This section cited in 34 Pa. Code § 39.461 (relating to general requirements); 34 Pa. Code § 39.471 (relating to general requirements); and 34 Pa. Code § 39.491 (relating to general requirements).

§ 39.414. Handling fuses or brushes.

(a) In handling fuses above 750 volts, use shall be made of the special rods or tongs. Such person shall stand on insulating platforms, or mats, if provided. The body shall be kept as distant and as far below as possible.

(b) Link fuses shall be replaced or removed from live terminals and brushes on live equipment shall be handled only when absolutely necessary, and then with due precautions.

Cross References

This section cited in 34 Pa. Code § 39.461 (relating to general requirements); 34 Pa. Code § 39.471 (relating to general requirements); and 34 Pa. Code § 39.491 (relating to general requirements).

§ 39.415. Battery rooms.

(a) No employe shall smoke or cause arcing in storage battery rooms. The use of open flames should be avoided, especially while the cells are gassing, and should be permitted only in special cases under the direct supervision of an experienced person, and after the room has been thoroughly ventilated.

(b) No employe shall handle live parts of batteries or their connections, unless standing on insulating platforms or wearing suitable insulating boots.

Cross References

This section cited in 34 Pa. Code § 39.461 (relating to general requirements); 34 Pa. Code § 39.471 (relating to general requirements); and 34 Pa. Code § 39.491 (relating to general requirements).

§ 39.416. Working in elevated positions.

When working in an elevated position, especially above live or moving parts, employers shall assure the security of position and support, and precautions should be taken to avoid dropping tools or materials.

Cross References

This section cited in 34 Pa. Code § 39.461 (relating to general requirements); 34 Pa. Code § 39.471 (relating to general requirements); and 34 Pa. Code § 39.491 (relating to general requirements).

§ 39.417. Handling switchboard equipment.

(a) Ungrounded metal parts of devices on switchboards shall be handled as if operating at the highest voltage to which any portion of the equipment on the same switchboard panel is subject, unless the parts are known, by test or otherwise, to be free from such voltage.

(b) When cable plug connectors are used, one end shall not remain hanging loose while the other end is connected to a live terminal. In handling instrument circuits, the secondary of a current transformer should never be opened when it is alive.

Cross References

This section cited in 34 Pa. Code § 39.461 (relating to general requirements); 34 Pa. Code § 39.471 (relating to general requirements); and 34 Pa. Code § 39.491 (relating to general requirements).

§ 39.418. Reporting circuit trouble to chief operator.

Employes shall report to their immediate superior or the chief operator any unusual conditions of load, and the indication of any accidental ground on an outgoing circuit.

Cross References

This section cited in 34 Pa. Code § 39.461 (relating to general requirements); 34 Pa. Code § 39.471 (relating to general requirements); and 34 Pa. Code § 39.491 (relating to general requirements).

§ 39.419. Reporting defects.

Employes shall promptly report to superiors any dangerous conditions of equipment or surroundings, including defective tools, switches, or protective devices, or live cases or frames of apparatus or instruments.

Cross References

This section cited in 34 Pa. Code § 39.461 (relating to general requirements); 34 Pa. Code § 39.471 (relating to general requirements); and 34 Pa. Code § 39.491 (relating to general requirements).

OVERHEAD LINE OPERATION**§ 39.421. General provisions.**

Linemen and assistants and groundmen, in construction, extension, removal, or repair work, shall study and strictly observe the provisions of §§ 39.421—39.429 as well as the general rules in sections §§ 39.331—39.405 which apply to their work.

Cross References

This section cited in 34 Pa. Code § 39.441 (relating to general provisions); and 34 Pa. Code § 39.461 (relating to general requirements).

§ 39.422. Testing structures before climbing.

Before climbing poles, ladders, scaffolds or other elevated structures, care shall be taken to assure that the pole, ladder, scaffold, tree, crossarm, messenger wire, cable car, or boatswain's chair, or other elevated support, is strong enough to safely sustain weight. Poles may be tested for decay near the ground line with a bar, screwdriver or other tool, and sounded for decay at the center by rapping with a heavy tool or block of wood. When poles or crossarms are apparently

unsafe from decay or unequal strains of wire on them they should be properly braced or guyed, if necessary, before they are climbed.

Cross References

This section cited in 34 Pa. Code § 39.421 (relating to general provisions); 34 Pa. Code § 39.441 (relating to general provisions); and 34 Pa. Code § 39.461 (relating to general requirements).

§ 39.423. Use of pole steps.

When poles are stepped, use should be made of such steps in climbing. Employes shall not support themselves by pins, brackets, or conductors.

Cross References

This section cited in 34 Pa. Code § 39.421 (relating to general provisions); 34 Pa. Code § 39.441 (relating to general provisions); and 34 Pa. Code § 39.461 (relating to general requirements).

§ 39.424. Spurs.

Spurs with gaffs worn short shall not be used. The gaffs on spurs shall be kept sharp, and spurs shall fit properly. Spurs shall not be worn on work for which they are not required, nor while men are traveling to or from work.

Cross References

This section cited in 34 Pa. Code § 39.421 (relating to general provisions); 34 Pa. Code § 39.441 (relating to general provisions); and 34 Pa. Code § 39.461 (relating to general requirements).

§ 39.425. Care about live parts.

(a) Employes shall not go among any wires until their voltage is known. Leaning over and crowding through unprotected wires should be avoided if possible. Employes shall place themselves so that they do not fall on wires if an accident occurs.

(b) Employes shall not depend on the insulating covering of wires, and shall treat lines as live unless they have been properly killed, except signal lines known to be clear.

(c) Employes shall avoid use of hand lines or measuring tapes containing metal strands.

(d) Dangerous switches or fuses shall be handled only by means of suitable insulating handles, rods or tongs.

Cross References

This section cited in 34 Pa. Code § 39.421 (relating to general provisions); 34 Pa. Code § 39.441 (relating to general provisions); and 34 Pa. Code § 39.461 (relating to general requirements).

§ 39.426. Touching live parts.

(a) Employes shall not allow any portion of the body to come in contact with any live or grounded part other than that worked on.

(b) When touching supply lines or equipment, employes shall avoid, as far as possible, touching ground wires, guy wires, span wires, metal pipes, metal poles, metal sheaths, signal lines or equipment, transformer cases, hangers, and other metal fixtures. Signal lines are included principally because of their liability of being grounded. The other equipment and lines listed may become either alive or grounded.

(c) When touching signal lines or equipment, metal sheaths, metal pipes, ground wires, or metal fixtures on poles, employes shall avoid, as far as possible, touching supply lines or equipment, guy or span wires.

Cross References

This section cited in 34 Pa. Code § 39.421 (relating to general provisions); 34 Pa. Code § 39.441 (relating to general provisions); and 34 Pa. Code § 39.461 (relating to general requirements).

§ 39.427. Protecting traffic.

(a) When working overhead, employes shall keep tools and materials not in use in proper receptacles; tools or materials should not be thrown to or from the man on the pole, but should be raised or lowered by means of a hand line, using proper receptacles if practicable.

(b) Employes shall not unnecessarily stand where they may be struck by materials dropped by men working overhead.

(c) Pole holes and obstructions along public highways and other frequented places shall be protected by watchmen or by suitable guards or danger signals located so as to be conspicuous to traffic.

(d) When working overhead, or hoisting or lowering materials above places where frequent traffic occurs, a man should be stationed to warn passersby. If traffic is light, warning signs or barriers may be used in lieu of a watchman. If traffic is congested, it may be necessary to rope off the space.

Cross References

This section cited in 34 Pa. Code § 39.421 (relating to general provisions); 34 Pa. Code § 39.441 (relating to general provisions); and 34 Pa. Code § 39.461 (relating to general requirements).

§ 39.428. Stringing wires.

(a) Employes shall not string wire near live lines except by means of suitable insulating hand lines or other appliances. Care shall be taken to avoid bringing string wire in contact with the live lines. Employes shall regard them as live wires of the same voltage because of their liability to come in contact with the live lines.

(b) Employes shall not change the strains on a pole by adding or removing wires until assured that the pole is able to stand the altered strains.

(c) In stringing wires employes shall not allow them to sag so as to endanger vehicles or pedestrians below, unless traffic is intercepted by a watchman or otherwise.

Cross References

This section cited in 34 Pa. Code § 39.421 (relating to general provisions); 34 Pa. Code § 39.441 (relating to general provisions); and 34 Pa. Code § 39.461 (relating to general requirements).

§ 39.429. Reporting defects.

Employees shall promptly report to their immediate superior any dangerous conditions of their own or other utilities observed arising from defective insulators, pins, crossarms, abnormally sagging wires, and the like.

Cross References

This section cited in 34 Pa. Code § 39.421 (relating to general provisions); 34 Pa. Code § 39.441 (relating to general provisions); and 34 Pa. Code § 39.461 (relating to general requirements).

UNDERGROUND LINE OPERATION**§ 39.431. General provisions.**

Cable splicers and other workmen in underground construction or operation shall study and strictly observe this section and §§ 39.432—39.438 in addition to the general rules in §§ 39.331—39.405 which apply to their work.

Cross References

This section cited in 34 Pa. Code § 39.441 (relating to general provisions); 34 Pa. Code § 39.461 (relating to general requirements); 34 Pa. Code § 39.471 (relating to general requirements); and 34 Pa. Code § 39.491 (relating to general requirements).

§ 39.432. Guarding manholes, handholes, and street openings.

When removing manhole or handhole covers or making excavations, employees shall promptly protect the opening with a barrier, temporary cover or other suitable guard, and see that danger signals or red lights are displayed in a location conspicuous to the traffic until permanent covers are in place or the excavations are filled.

Cross References

This section cited in 34 Pa. Code § 39.431 (relating to general provisions); 34 Pa. Code § 39.441 (relating to general provisions); 34 Pa. Code § 39.461 (relating to general requirements); 34 Pa. Code § 39.471 (relating to general requirements); and 34 Pa. Code § 39.491 (relating to general requirements).

§ 39.433. Testing for gas.

Employees shall not enter manholes until they have assured themselves that the manholes are free from dangerous gases, by testing with approved safety lamps, by ventilation, or by other adequate methods. Reference should be made to § 39.542 (relating to testing for gas).

Cross References

This section cited in 34 Pa. Code § 39.431 (relating to general provisions); 34 Pa. Code § 39.441 (relating to general provisions); 34 Pa. Code § 39.461 (relating to general requirements); 34 Pa. Code § 39.471 (relating to general requirements); and 34 Pa. Code § 39.491 (relating to general requirements).

§ 39.434. Watchman on surface at manholes.

Employes shall not enter a manhole unless a temporary cover is placed over the opening or a watchman is stationed at the surface. If any gas may be present employes shall see that the watchman is stationed at the surface. If any hazard is involved no employe shall leave a manhole unwatched until all workmen are out.

Cross References

This section cited in 34 Pa. Code § 39.431 (relating to general provisions); 34 Pa. Code § 39.441 (relating to general provisions); 34 Pa. Code § 39.461 (relating to general requirements); 34 Pa. Code § 39.471 (relating to general requirements); and 34 Pa. Code § 39.491 (relating to general requirements).

§ 39.435. Avoiding flames.

(a) Employes shall not smoke in manholes; they shall avoid, as far as practicable, open flames or torches in or near manholes.

(b) Employes shall avoid sparks in handling live parts or cable sheaths and avoid igniting the flux in soldering and wiping joints. In using hot paraffin care should be taken that it does not reach a temperature at which it will ignite. Reference should also be made to § 39.544 (relating to avoiding flames).

Cross References

This section cited in 34 Pa. Code § 39.431 (relating to general provisions); 34 Pa. Code § 39.441 (relating to general provisions); 34 Pa. Code § 39.461 (relating to general requirements); 34 Pa. Code § 39.471 (relating to general requirements); and 34 Pa. Code § 39.491 (relating to general requirements).

§ 39.436. Pulling cables.

When pulling in cables employes shall insure that the gear can not slip so as to injure workmen. They shall avoid the danger of having the hands drawn into the tackle by the pulling line.

Cross References

This section cited in 34 Pa. Code § 39.431 (relating to general provisions); 34 Pa. Code § 39.441 (relating to general provisions); 34 Pa. Code § 39.461 (relating to general requirements); 34 Pa. Code § 39.471 (relating to general requirements); and 34 Pa. Code § 39.491 (relating to general requirements).

§ 39.437. Testing and splicing live cable.

(a) If lines and cables are not properly identified by markings or positions, employes shall not work upon them.

(b) Employes shall always ascertain, if practicable, whether cables are alive by testing with the test devices provided, before cutting into the cable sheaths. Live cables should be spliced only by men experienced in the work, and they should use extreme caution and suitable devices in so doing.

Cross References

This section cited in 34 Pa. Code § 39.431 (relating to general provisions); 34 Pa. Code § 39.441 (relating to general provisions); 34 Pa. Code § 39.461 (relating to general requirements); 34 Pa. Code § 39.471 (relating to general requirements); and 34 Pa. Code § 39.491 (relating to general requirements).

§ 39.438. Reporting defects.

Employes shall promptly report to immediate superiors any dangerous condition of their own or other utilities, whether observed in underground or overhead construction. Report shall particularly be made of unsanitary conditions, gas or missing cable tags in manholes, and abnormally sagging wires or broken supports in overhead construction.

Cross References

This section cited in 34 Pa. Code § 39.431 (relating to general provisions); 34 Pa. Code § 39.441 (relating to general provisions); 34 Pa. Code § 39.461 (relating to general requirements); 34 Pa. Code § 39.471 (relating to general requirements); and 34 Pa. Code § 39.491 (relating to general requirements).

SERIES LAMP OPERATION

§ 39.441. General provisions.

Series lamp trimmers, hangers and inspectors shall study and strictly observe this section and §§ 39.442—39.447 in addition to the general rules in §§ 39.331—39.405 and the special rules in §§ 39.421—39.438 which apply to their work.

Cross References

This section cited in 34 Pa. Code § 39.461 (relating to general requirements).

§ 39.442. Precaution on series circuits.

Series lamps and devices in series circuits should always be treated as alive unless disconnected by absolute cut-outs or protected by the grounding of the circuit. Reference should also be made to §§ 39.401—39.405.

Cross References

This section cited in 34 Pa. Code § 39.441 (relating to general provisions); and 34 Pa. Code § 39.461 (relating to general requirements).

§ 39.443. Handling series lamps.

(a) Trimmers, inspectors, or patrolmen shall wear suitable insulating gloves and stand on insulating platforms or dry, well seasoned wood poles while touching series lamps or their cut-outs, when these are alive.

(b) If stools or tower wagons are used, which provide sufficient insulation from ground for the voltages to be handled, the insulating gloves may be dispensed with.

Cross References

This section cited in 34 Pa. Code § 39.441 (relating to general provisions); and 34 Pa. Code § 39.461 (relating to general requirements).

§ 39.444. Bridging series lamps.

Before working on lamps or other devices in live series circuits, employes shall bridge the device with jumpers such as series lamp cut-outs usually provided so that the circuit cannot be opened at the device and be completed through the body or arc at the point of opening and burn an employe.

Cross References

This section cited in 34 Pa. Code § 39.441 (relating to general provisions); and 34 Pa. Code § 39.461 (relating to general requirements).

§ 39.445. Testing series lamp circuits.

Series lamp circuits should not be tested at their full operating voltage unless it is impracticable to test otherwise. Tests should be made only in accordance with a time schedule, concerning which persons whose safety may be affected are informed.

Cross References

This section cited in 34 Pa. Code § 39.441 (relating to general provisions); and 34 Pa. Code § 39.461 (relating to general requirements).

§ 39.446. Periodically disconnected circuits.

If circuits, such as series lamp circuits, are not effectively grounded during the idle period, rules for handling live parts shall be strictly observed.

Cross References

This section cited in 34 Pa. Code § 39.441 (relating to general provisions); and 34 Pa. Code § 39.461 (relating to general requirements).

§ 39.447. Reporting defects.

Employes shall report promptly to immediate superiors any abnormally sagging wires, broken insulators, leaning poles, defective poles steps, broken globes or

lamp supports, and other defects giving rise to a dangerous condition of employes or other utilities, or any indication of voltage on lines supposed to be dead.

Cross References

This section cited in 34 Pa. Code § 39.441 (relating to general provisions); and 34 Pa. Code § 39.461 (relating to general requirements).

METER OPERATION

§ 39.451. General provisions.

Meter setters and testers shall study and strictly observe this section and §§ 39.452—39.457 in addition to all the general rules in §§ 39.331—39.405 which apply to their work.

Cross References

This section cited in 34 Pa. Code § 39.461 (relating to general requirements).

§ 39.452. Taped joints.

Employes shall not leave joints or loose ends of wires untaped unless they are otherwise protected.

Cross References

This section cited in 34 Pa. Code § 39.451 (relating to general provisions); and 34 Pa. Code § 39.461 (relating to general requirements).

§ 39.453. Care about live parts.

Employes shall not use bare fingers or hands to determine whether a circuit is alive nor shall they replace fuses in live circuits above 750 volts except by means of the suitable appliances provided.

Cross References

This section cited in 34 Pa. Code § 39.451 (relating to general provisions); and 34 Pa. Code § 39.461 (relating to general requirements).

§ 39.454. Opening circuits at switches.

Special care should be exercised in opening circuits at meter connections unless the circuits have been first properly opened at switches.

Cross References

This section cited in 34 Pa. Code § 39.451 (relating to general provisions); and 34 Pa. Code § 39.461 (relating to general requirements).

§ 39.455. Current transformer secondaries.

Before working on an instrument or other device in a current transformer secondary circuit employes shall bridge the device with jumpers so that the circuit

cannot be opened at the device. Employes shall not open such a circuit at meter connections until it has been elsewhere bridged.

Cross References

This section cited in 34 Pa. Code § 39.451 (relating to general provisions); and 34 Pa. Code § 39.461 (relating to general requirements).

§ 39.456. Special tools.

Employes shall use only handtools suited to the work in hand, to reduce the danger of short circuits.

Cross References

This section cited in 34 Pa. Code § 39.451 (relating to general provisions); and 34 Pa. Code § 39.461 (relating to general requirements).

§ 39.457. Reporting defects.

Employes shall promptly report to immediate superiors any live meter case or any condition of a meter or its connections of the interior wiring or of overhead lines, of their own or other utilities, which may endanger life and property.

Cross References

This section cited in 34 Pa. Code § 39.451 (relating to general provisions); and 34 Pa. Code § 39.461 (relating to general requirements).

TESTING OPERATIONS

§ 39.461. General requirements.

Electrical testers, helpers and others working about electrical tests shall study and strictly observe this section and §§ 39.462—39.467 in addition to the general rules in §§ 39.331—39.405. Owing to the diversified character of testing work this study should usually extend also to the special rule in §§ 39.411—39.497.

§ 39.462. Authorization for work.

(a) Employes shall not work on or about equipment or lines without first receiving authorization from the person in charge.

(b) If such equipment or lines are under control of a chief operator, this authorization shall come from him. This shall include the attaching of tags at the proper points and the observation of all rules for general operation in §§ 39.351—39.358.

Cross References

This section cited in 34 Pa. Code § 39.461 (relating to general requirements).

§ 39.463. Checking of conditions.

(a) Employes shall thoroughly familiarize themselves with conditions surrounding equipment or lines to be tested before making any change in these conditions.

(b) Employes shall not make any change in equipment or lines unless they fully understand the effect of the change.

Cross References

This section cited in 34 Pa. Code § 39.461 (relating to general requirements).

§ 39.464. Foreman.

One properly qualified person shall be in immediate charge of testing work, or workmen shall be instructed as to the work they are to perform and the employe instructing them shall be considered in charge of the work.

Cross References

This section cited in 34 Pa. Code § 39.461 (relating to general requirements).

§ 39.465. Warnings and barriers.

(a) The employer shall display danger signs and erect suitable guards about equipment or lines under test when in places where traffic is frequent, if live or moving parts would otherwise be exposed.

(b) When temporary wiring, belts, pulleys or other temporary live or moving parts are necessarily guarded, suitable portable guards and warning signs shall be used.

Cross References

This section cited in 34 Pa. Code § 39.461 (relating to general requirements).

§ 39.466. Requirement for two workmen.

No person shall work alone in testing or experimental work on or about parts on which the voltage may exceed 750 volts, except in routine testing where the live parts are properly guarded.

Cross References

This section cited in 34 Pa. Code § 39.461 (relating to general requirements).

§ 39.467. Reporting defects.

Employes shall promptly report to immediate superiors any conditions of equipment or lines under test which may endanger life or property.

Cross References

This section cited in 34 Pa. Code § 39.461 (relating to general requirements).

TUNNEL AND SUBWAY OPERATION**§ 39.471. General requirements.**

(a) Tunnel and subway electricians, operators, and others working on or about underground electrical equipment, not in stations, substations, or in underground conduit systems, shall study and strictly observe this section and §§ 39.472—39.481 in addition to §§ 39.331—39.371, §§ 39.411—39.419 and §§ 39.431—39.438 so far as they apply to their work.

(b) The value of insulation, insulating covering, as protection from shock is reduced by the dampness usually present in these and similar locations. The restricted spaces often bring the worker closer to equipment and wires than in other kinds of electrical work, and the imperfect illumination also makes special care necessary to avoid contacts. The human body and surrounding surfaces become more conducting if dampness exists, and electrical shocks are therefore more severe.

Cross References

This section cited in 34 Pa. Code § 39.461 (relating to general requirements).

§ 39.472. Live electrical parts.

(a) Before handling electrical equipment or wires, employes shall ascertain whether they are alive or dead. Employes should not work on live equipment or wires when the current may be shut off without interrupting necessary operations.

(b) No person shall touch or disturb any electrical equipment or wires without being authorized.

Cross References

This section cited in 34 Pa. Code § 39.461 (relating to general requirements); and 34 Pa. Code § 39.471 (relating to general requirements).

§ 39.473. Standing on ground.

(a) Employes shall not touch any electric wire, cable or third-rail, no matter how well it is insulated while standing on the ground or on any pipe, track, nail, or other conducting surface, unless insulated from the latter.

(b) Employes shall not touch the metal frame or case of a motor unless they are insulated from the ground or the frame is effectively grounded.

Cross References

This section cited in 34 Pa. Code § 39.461 (relating to general requirements); and 34 Pa. Code § 39.471 (relating to general requirements).

§ 39.474. Carrying tools.

(a) In carrying tools or metal implements in passageways containing electric wires, especially near exposed trolleys, employes shall not permit the tools or implements to touch such wires.

(b) In particular, employes shall not carry such objects on the shoulder when there are conductors overhead, nor carry objects on that side of passageways where third-rails or side trolley wires are exposed.

Cross References

This section cited in 34 Pa. Code § 39.461 (relating to general requirements); and 34 Pa. Code § 39.471 (relating to general requirements).

§ 39.475. Handling and repairing live parts.

(a) When necessary to handle or repair live trolley wires, third-rails, cables, motors, or other electrical equipment, employes shall wear suitable insulating gloves or stand on the waterproof insulating mats or platforms provided.

(b) Employes shall not rely entirely on gloves for protection. The gloves may have been punctured since they were previously tested.

(c) Before handling or making use of any electrical cable, employes shall carefully examine it to make sure that its insulation is not injured.

(d) Portable cables should be inspected at least once daily during the period of their use.

Cross References

This section cited in 34 Pa. Code § 39.461 (relating to general requirements); and 34 Pa. Code § 39.471 (relating to general requirements).

§ 39.476. Handling portable devices.

(a) In handling portable motors or lamps, employes shall ascertain that the external metal frame is not alive by contact with or leakage from live parts within.

(b) Employes shall have such portable devices inspected at least once daily during the period of their use.

Cross References

This section cited in 34 Pa. Code § 39.461 (relating to general requirements); and 34 Pa. Code § 39.471 (relating to general requirements).

§ 39.477. Fuses and switches.

(a) Employes shall not handle fuses or close switches or circuit breakers unless they are authorized to perform that special duty, and then they shall use the insulating handles or rods provided.

(b) Before closing switches employes shall ascertain whether other persons are endangered.

Cross References

This section cited in 34 Pa. Code § 39.461 (relating to general requirements); and 34 Pa. Code § 39.471 (relating to general requirements).

§ 39.478. Injuring cables and wires.

Employes shall not fire shots, handle tools, or perform other work in such a manner as to injure cables or wires in the vicinity. If doubt exists as to performance of such work, employes should consult a superior.

Cross References

This section cited in 34 Pa. Code § 39.461 (relating to general requirements); and 34 Pa. Code § 39.471 (relating to general requirements).

§ 39.479. Temporary wiring.

(a) Employes shall not arrange the wiring of any temporary circuit for earth return, nor use bare conductors, particularly the temporary portions of shot firing circuits and to the leads of portable motors and lamps.

(b) Employes shall not employ temporary circuits without seeing that there are installed at the junction with the permanent wiring, suitable disconnecting switches or plug connectors, arranged to disconnect all conductors of the temporary circuit by a single operation.

(c) For shot firing circuits their disconnectors should be left open until the shot is to be fired, and should preferably be arranged for locking in the open position.

Cross References

This section cited in 34 Pa. Code § 39.461 (relating to general requirements); and 34 Pa. Code § 39.471 (relating to general requirements).

§ 39.480. General precautions.

(a) Employes shall not get on or off locomotives or cars on the side where the trolley wire or third-rail is located.

(b) Employes shall not place combustible or explosive materials near electric wires, trolley tracks, third-rails, or motors.

(c) Employes shall not act in any way that may cause sparking, or expose parts that may arc or spark during operation, if any explosive gases are present.

Cross References

This section cited in 34 Pa. Code § 39.461 (relating to general requirements); and 34 Pa. Code § 39.471 (relating to general requirements).

§ 39.481. Reporting dangerous conditions.

Employes shall promptly report to a superior any dangerous or unusual conditions observed. In particular, they shall report the presence of gas, broken insula-

tors, bad insulation on wires, defective third-rail construction, live frames of motors, broken ground wires on motor frames, and sparking, arcing, or shocks, noticed at any point as well as any fallen, crossed, or abnormally sagging wires, whether electric wires or not. This includes trolley wires at switches and crossings and wires injured through falling roofs.

Cross References

This section cited in 34 Pa. Code § 39.461 (relating to general requirements); and 34 Pa. Code § 39.471 (relating to general requirements).

SIGNAL LINE OPERATION

§ 39.491. General requirements.

Men working on or near telephone and telegraph lines operated in connection with supply lines shall study and strictly observe this section and §§ 39.492—39.497 in addition to the general rules in §§ 39.331—39.371 and the special rules in §§ 39.411—39.419 and §§ 39.431—39.438 which apply to their work. Reference should also be made to Subchapter B (relating to electric safety regulations).

Cross References

This section cited in 34 Pa. Code § 39.461 (relating to general requirements).

§ 39.492. Official in charge of operations.

Reference should be made to § 39.51 (relating to definitions).

Cross References

This section cited in 34 Pa. Code § 39.461 (relating to general requirements).

§ 39.493. Precautions before climbing poles.

(a) Before climbing poles or other structures to work on or about signal lines, especially where occupied in common with, or running near power circuits, employes shall make a careful inspection to ascertain if possible whether there are any crosses with supply circuits.

(b) Employes shall apply mechanical tests as far as practicable to messenger wires before trusting the wires to carry their weight.

Cross References

This section cited in 34 Pa. Code § 39.461 (relating to general requirements).

§ 39.494. Approaching supply lines.

(a) Employes shall avoid contact with wires other than those they know to be signal wires, assuming such other wires always to be alive. Signal wires in trouble may be in contact with supply lines at some distant point and should be treated with proper care.

(b) Employes shall not approach any supply line or supply equipment within the distance given in §§ 39.364 and 39.365 (relating to voltages between 750 and 7,500; and voltages above 7,500), unless they comply with the rules of that section, as far as they apply.

Cross References

This section cited in 34 Pa. Code § 39.461 (relating to general requirements).

§ 39.495. Touching equipment.

While handling signal lines, metal sheaths, or signal equipment employes shall avoid touching guy or span wires and supply lines or equipment, especially standing on or touching transformer cases, bangers or connections. While touching open signal lines employes shall avoid contact also with grounded parts such as sheaths and ground wires.

Cross References

This section cited in 34 Pa. Code § 39.461 (relating to general requirements).

§ 39.496. Stringing wires.

(a) When stringing wires or cables over or under supply lines, employes shall avoid any possibility of their coming in contact, and shall not string them above live supply lines where it is practicable to avoid it.

(b) If liability of contact cannot be entirely avoided, the lines being handled shall be treated as alive, unless they are effectively grounded, and the rules in §§ 39.361—39.371 so far as they are applicable, shall be carefully observed.

Cross References

This section cited in 34 Pa. Code § 39.461 (relating to general requirements).

§ 39.497. Reporting dangerous conditions.

Employes shall promptly report to the proper official abnormally sagging wires, broken or defective insulators, pins, crossarms, defective poles or any other dangerous conditions of their own or other utilities.

Cross References

This section cited in 34 Pa. Code § 39.461 (relating to general requirements).

COMMERCIAL TELEPHONE AND TELEGRAPH SYSTEMS**§ 39.501. General requirements.**

This section and §§ 39.502—39.546 shall also apply to fire and police alarm systems, district messenger systems and other signal systems not operated in connection with supply lines.

RULES FOR EMPLOYER—SIGNAL SYSTEMS**§ 39.511. Distribution and enforcement of rules.**

(a) The employer shall furnish to each regular employe working on or about commercial telephone or telegraph equipment or lines, safety rules governing his conduct while so engaged, and shall take suitable means to secure the compliance of employes with such rules.

(b) The safety rules furnished to any employe may be in such form as the employer may determine are best suited to the needs of individual employes. They shall, however, include the principles set forth in the provisions of §§ 39.511—39.515 (relating to rules of employer—signal systems), or at least such part thereof as is applicable to the work in which the employe is engaged, and shall not conflict with these rules.

(c) If a difference of opinion arises with regard to the meaning or application of these rules, or as to the means necessary to carry them out, the decision of the employer or his authorized agent shall be final, subject to an appeal, if taken, to the regulative body having jurisdiction.

Cross References

This section cited in 34 Pa. Code § 39.501 (relating to general requirements).

§ 39.512. Address list and emergency rules.

(a) Rule books should contain or be accompanied by all of the following:

- (1) A list of names and addresses of those physicians and members of the organization who are to be called upon in emergencies.
- (2) A copy of rules for first aid, resuscitation and fire extinguishment.

(b) These should also be kept in conspicuous locations in central stations, on line wagons, and in other locations if the number of employes and nature of the work warrants.

Cross References

This section cited in 34 Pa. Code § 39.501 (relating to general requirements); and 34 Pa. Code § 39.511 (relating to distribution and enforcement of rules).

§ 39.513. Instructing employes.

(a) Employes regularly working on or about signal equipment or lines, if their duties render such training necessary, shall be thoroughly instructed in approved methods of first aid, resuscitation, and fire extinguishment, and, if advisable, regularly drilled.

(b) Groups of employes, such as commercial telephone operators, shall be thoroughly drilled to make prompt and orderly exit from buildings in case of fire.

Cross References

This section cited in 34 Pa. Code § 39.501 (relating to general requirements); and 34 Pa. Code § 39.511 (relating to distribution and enforcement of rules).

§ 39.514. Qualifications of employes.

The employer shall use every reasonable means and precaution to assure himself that each employe is mentally and physically qualified to perform his work in accordance with this subchapter, and that he is not addicted to the use of intoxicants and habit-forming drugs.

Cross References

This section cited in 34 Pa. Code § 39.501 (relating to general requirements); and 34 Pa. Code § 39.511 (relating to distribution and enforcement of rules).

§ 39.515. Protective devices.

(a) There shall be provided in conspicuous and suitable places in stations and on line wagons a sufficient supply of suitable protective, first aid and fire-extinguishing equipment to enable employes to meet the requirements of this subchapter. The devices and equipment shall be inspected or tested to insure that they are kept in good order.

(b) The following is a list of suitable devices and equipment, the kinds and numbers of which depend on the requirements of each case:

- (1) First aid outfits.
- (2) Insulating wearing apparel, such as insulating gloves, boots and shields.
- (3) Safety belts.
- (4) Fire-extinguishing apparatus.

Cross References

This section cited in 34 Pa. Code § 39.501 (relating to general requirements); and 34 Pa. Code § 39.511 (relating to distribution and enforcement of rules).

GENERAL RULES FOR EMPLOYES—SIGNAL SYSTEMS**§ 39.521. Heeding warnings, warning others.**

Employes should be cautious, heed warning signs and signals, and always warn others when seen in danger near equipment and lines.

Cross References

This section cited in 34 Pa. Code § 39.501 (relating to general requirements).

§ 39.522. Inexperienced or unfit employees.

Employes shall not do work for which they are not properly qualified on or about equipment or lines, except under the direct supervision of an experienced and properly qualified person.

Cross References

This section cited in 34 Pa. Code § 39.501 (relating to general requirements).

§ 39.523. Electrical supply equipment or lines.

(a) Workmen whose duties do not require them to approach or handle electrical supply equipment and lines should keep away from such equipment or lines.

(b) Electrical supply equipment and lines should always be considered as alive unless positively known to be dead.

Cross References

This section cited in 34 Pa. Code § 39.501 (relating to general requirements).

§ 39.524. Safe supports and safety belts.

(a) *Safe supports.* Employes should not support themselves on any portion of a tree, pole structure, lamp bracket or similar fixtures on poles, scaffold, ladder, roof, skylight or other elevated structure without first making sure that the supports are strong enough, reinforcing them if necessary. Portable ladders should be in a safe position before being climbed. The slipping of a ladder at either end should be carefully guarded against, especially where the surfaces are smooth or vibrating. Insecure makeshift substitutes for ladders should not be used. An employe should never trust his weight on thin wooden boxes, sinks, washbowls, windows, shelves, or chair backs. A ladder should not be placed upon a box, barrel, or other movable or insecure object. Care should be taken to see that chairs, rolling ladders, and similar equipment are in first-class condition before being used.

(b) *Safety belts.* Employes should not work in elevated positions unless secured from falling by suitable safety belt or other adequate means, sometimes including suitably located pole-steps. Before an employe trusts his weight to the belt he should determine that the snaps or fastenings are properly engaged and that he is secured in his belt.

(c) *Safety ropes.* Ropes used for supporting boatswain's chairs, platforms, or for other purposes on which the security of the employe depends shall be frequently inspected to assure that they are maintained in good condition.

Cross References

This section cited in 34 Pa. Code § 39.501 (relating to general requirements).

§ 39.525. Duties of foreman.

(a) Each foreman in charge of work shall see that the safety rules are observed by the employes under his direction. He shall make all necessary records and report to his superior when required. He shall permit only authorized persons to approach places where work is being done. He shall adopt such precautions as are within his power to prevent accidents, and prohibit the use of any tools or devices not suited to the work in hand or defective. Reference should also be made to § 39.317 (relating to responsibility).

(b) The qualified persons accompanying uninstructed workmen or visitors near electrical equipment or lines shall take precautions to provide suitable safeguards and see that the safety rules are observed.

Cross References

This section cited in 34 Pa. Code § 39.501 (relating to general requirements).

§ 39.526. Handling live parts.

No employe should touch, with bare hands, any exposed ungrounded live part above 150 volts to ground, unless he is insulated from other conducting surface, including the ground itself. When employes necessarily touch, at the same time, two parts between which a considerable potential exists, insulating gloves or other protection shall be used.

Cross References

This section cited in 34 Pa. Code § 39.501 (relating to general requirements).

§ 39.527. Power circuits in central offices.

(a) When making repairs on electric light or power circuits, the circuits shall, whenever possible, be made dead.

(b) If practicable, moving apparatus, such as fans, shall be stopped before working upon it.

(c) Only duly authorized persons shall be admitted to central office transformer vaults or battery rooms.

(d) Care shall be used while working on or near circuits over 150 volts to ground, particularly in alternating current districts.

Cross References

This section cited in 34 Pa. Code § 39.501 (relating to general requirements).

§ 39.528. Handling fuses or brushes.

(a) When inspecting or changing fuses, care should be taken to prevent injury to the eyes. If it is necessary to handle the fuses, the circuit should be cut off if possible.

(b) When working on the brushes of a machine in operation employees shall use care not to break a circuit, the flashing of which may injure the eyes or burn the hands. If it is necessary to remove a brush from the holder, the machine shall be shut down.

Cross References

This section cited in 34 Pa. Code § 39.501 (relating to general requirements).

§ 39.529. Battery room.

Employees shall not smoke or cause arcing in storage-battery rooms. The use of open flames should be avoided, especially while the cells are gassing, and should be permitted only in special cases under the direct supervision of an experienced person and after the room has been thoroughly ventilated.

Cross References

This section cited in 34 Pa. Code § 39.501 (relating to general requirements).

OVERHEAD LINE OPERATION—SIGNAL SYSTEMS**§ 39.531. Testing structures before climbing.**

(a) Before climbing poles, ladders, scaffolds, or other elevated structures employees shall first insure that the pole, ladder, scaffold, tree, crossarm, messenger wire, cable car, or boatswain's chair, or other elevated support is strong enough to safely sustain their weight.

(b) On pole replacement work no pole shall be climbed for the purpose of clearing it of all wires and cables without first guying or bracing the pole securely. Where poles or crossarms are apparently unsafe from decay, or have unequal strains of wires on them, they should be properly braced or guyed, if necessary, before they are climbed.

(c) An uncoiled handline, rope, or wire of any sort should not be fastened to the employe while climbing a pole, but where this is necessarily done the employe should exercise due care to prevent the line from catching on obstructions.

(d) In climbing poles careful watch should be kept for nails or other foreign attachments which may catch in the clothing and cause a fall.

Cross References

This section cited in 34 Pa. Code § 39.501 (relating to general requirements).

§ 39.532. Use of pole steps.

(a) When poles are stepped, employes should make use of such steps in climbing, first making sure that the steps are firmly set in solid material before trusting one's weight upon them. On icy poles, particular attention should be paid to each step.

(b) Employes shall not support themselves by pins, brackets, or conductor wires.

Cross References

This section cited in 34 Pa. Code § 39.501 (relating to general requirements).

§ 39.533. Spurs.

Spurs with gaffs worn short shall not be used. The gaff on spurs shall be kept sharp, and spurs shall fit properly. Spurs shall not be worn on work for which they are not required, nor while men are traveling to or from work.

Cross References

This section cited in 34 Pa. Code § 39.501 (relating to general requirements).

§ 39.534. Approaching supply line.

(a) Employes shall avoid contact with wires other than those known to be signal wires, assuming such other wires always to be alive. Signal wires in trouble may be in contact with supply lines at some distance point, and should be treated as live supply lines unless known to be free from any dangerous voltage.

(b) Employes shall not approach any supply line or supply equipment within the distances of §§ 39.364—39.365 (relating to voltages between 750 and 7,500; and voltages above 7,500), unless they comply with the requirements of that section.

Cross References

This section cited in 34 Pa. Code § 39.501 (relating to general requirements).

§ 39.535. Touching equipment.

While handling signal lines, metal sheaths, or signal equipment, employes shall avoid touching trolley or arc lamp span wires and supply lines or equipment, and especially shall avoid standing on or touching transformer cases, hangers or connections.

Cross References

This section cited in 34 Pa. Code § 39.501 (relating to general requirements).

§ 39.536. Care about electrical supply lines.

(a) Employes shall ascertain the voltage of all wires before going among them.

(b) Leaning over and crowding through unprotected supply wires should be avoided if possible. Employes shall place themselves so that they do not fall on supply wires if an accident occurs.

(c) Employes shall not depend on the insulating covering of wires, and shall treat all lines as alive unless they have been killed properly, except signal lines known to be clear.

(d) Employes shall treat as alive wires, unless thoroughly grounded, which are being strung near supply lines and regard them as being of the same voltage as the supply lines.

(e) Employes shall avoid use of handlines or measure tapes containing metal strands.

(f) When necessary to work in the vicinity of supply lines, transformers, and similar equipment, employes shall insure before starting work, that the position of the body is such that if they momentarily forget themselves or fall, no portion of the body may come in contact with the foreign wires or equipment. Employes shall have the supply lines approached killed if possible.

(g) Railway span wires, pull offs and trolley brackets shall be treated as if alive, even though equipped with strain or other insulators.

Cross References

This section cited in 34 Pa. Code § 39.501 (relating to general requirements).

§ 39.537. Stringing wires.

(a) Employes shall not string wires near live lines except by means of suitable insulating handlines or other appliances and shall avoid the use of wire or twisted pair as a substitute for a hand line.

(b) Wires should not be strung above live lines operating at over 750 volts, unless the wires being strung are effectively grounded or otherwise suitably protected, or in handling them the precautions are observed as provided in §§ 39.364 and 39.365 (relating to voltages between 750 and 7,500; and voltages above 7,500), for work on parts at the voltage of the lines concerned, and the spacings maintained.

(c) Employes shall not change the strains on a pole by adding or removing wires until assured that the pole is able to stand the altered strains.

(d) When wires are being pulled up on corner poles employes should stand in such a position that they cannot be struck by the wire in case it slips.

(e) Where it is necessary to remove signal wires below which are supply lines, power should be shut off of the supply lines where possible, and if this is not practicable, rope cradles and suitable guards should be erected. Extraordinary care should be exercised to prevent the signal wires from sagging into the supply lines.

(f) When running wires, cables, cable strand, span wires or guys across streets, sidewalks or highways, the coil or reel shall not be left unattended nor

shall the center of any span be permitted to sag sufficiently to come into contact with vehicles or pedestrians unless a helper is stationed to warn passersby until the slack is removed.

(g) When stringing wires for long distances, precaution shall be taken to prevent the possibility of vehicles or pedestrians coming into contact with the wire at the intersecting streets or highway crossings.

Cross References

This section cited in 34 Pa. Code § 39.501 (relating to general requirements).

§ 39.538. Protecting traffic.

(a) When working overhead, employes shall keep tools and materials not in use in proper receptacles; tools or materials should not be thrown to or from the man on the pole, but should be raised or lowered by means of a handline, using a proper receptacle. Also tools and loose materials should not be left at the top of poles, ladders or other elevated structures.

(b) Workmen shall not stand where they may be struck by materials dropped by men working overhead.

(c) Pole holes and obstructions shall be protected by watchmen or by suitable guards and danger signals or lights in a location conspicuous to traffic.

(d) When working overhead or hoisting or lowering materials above places where traffic occurs, a man should be stationed to warn passersby.

(e) If traffic is light, warning signs may be used in lieu of watchmen. If traffic is congested, it may be necessary to rope off the space.

Cross References

This section cited in 34 Pa. Code § 39.501 (relating to general requirements).

§ 39.539. Reporting dangerous conditions.

(a) Employes shall report promptly to immediate superiors any dangerous conditions of their own or other utilities observed arising from defective insulators, pins, crossarms, abnormally sagging wires, and the like.

(b) Immediately dangerous conditions shall be guarded until they are made safe.

Cross References

This section cited in 34 Pa. Code § 39.501 (relating to general requirements).

UNDERGROUND LINE OPERATION—SIGNAL SYSTEMS

§ 39.541. Guarding manholes, handholes, and street openings.

When removing manhole or handhole covers or making excavation, employes shall promptly protect the opening with a barrier, temporary cover, or other suit-

able guard, and see that danger signals or red lights are displayed in a location conspicuous to the traffic until permanent covers are in place or the excavations are filled.

Cross References

This section cited in 34 Pa. Code § 39.501 (relating to general requirements).

§ 39.542. Testing for gas.

(a) Employes shall not enter manholes until they have ascertained that such manholes are free from dangerous gases, as indicated by approved safety lamps, by ventilation, or by other adequate methods.

(b) When work is being carried on in manholes for any length of time where gas collects, suitable ventilation shall be provided or tests with the safety device should be repeated at regular intervals to make certain that gas is not accumulating in the manhole in dangerous quantities.

Cross References

This section cited in 34 Pa. Code § 39.433 (relating to testing for gas); and 34 Pa. Code § 39.501 (relating to general requirements).

§ 39.543. Watchman on surface at manholes.

(a) Employes shall not enter manholes unless a man is stationed at the surface.

(b) Employes shall not leave a manhole unwatched until workmen are out.

Cross References

This section cited in 34 Pa. Code § 39.501 (relating to general requirements).

§ 39.544. Avoiding flames.

(a) Employes shall not smoke in manholes, and avoid as far as practicable open flames or torches in or near manholes.

(b) If it is necessary to illuminate a manhole, electric lights only should be used. When doing this, it should be known that the leads, sockets, and connections are well insulated and in good condition in order to avoid the possibility of a spark. Special attention should be paid to the sparking of any motors used for ventilating purposes.

(c) Employes shall avoid sparks in handling live parts or cable sheaths, and avoid igniting the flux in soldering and wiping joints. In using hot paraffin they shall see that it does not reach a temperature at which it may ignite.

(d) In central office cable vaults tests shall be made for the presence of gas before using exposed flames, and such flames shall not be used in vaults where gas collects.

Cross References

This section cited in 34 Pa. Code § 39.435 (relating to avoiding flames); and 34 Pa. Code § 39.501 (relating to general requirements).

§ 39.545. Pulling cables.

When pulling in cables, employes shall insure that the gear does not slip so as to injure workmen. Employes shall avoid the danger of having the hands drawn into the tackle by the pulling line.

Cross References

This section cited in 34 Pa. Code § 39.501 (relating to general requirements).

§ 39.546. Reporting dangerous conditions.

Employes shall promptly report to their immediate superiors any dangerous condition of their own or other utilities, whether observed in underground or overhead construction, particularly unsanitary conditions, gas, or missing cable tags in manholes and abnormally sagging wires or broken supports in overhead construction.

Cross References

This section cited in 34 Pa. Code § 39.501 (relating to general requirements).

Subchapter C. HEAD AND EYE PROTECTION**GENERAL PROVISIONS**

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SPECIFICATIONS

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MANUFACTURE OF PROTECTORS

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Authority

The provisions of this Subchapter C issued under act of May 18, 1937 (P. L. 654, No. 174) (43 P. S. §§ 25-1—25-15), unless otherwise noted.

Source

The provisions of this Subchapter C adopted July 12, 1921; amended through March 15, 1970, unless otherwise noted.

Cross References

This Subchapter cited in 34 Pa. Code § 29.11 (relating to all installations); 34 Pa. Code § 33.27 (relating to eye protection); 34 Pa. Code § 39.25 (relating to apparel); 34 Pa. Code § 45.62 (relating to sawfiling machinery); and 34 Pa. Code § 47.167 (relating to maintenance).

GENERAL PROVISIONS**§ 39.551. Definitions.**

The following words and terms, when used in this subchapter, have the following meanings, unless the context clearly indicates otherwise:

Establishment—Any place within this Commonwealth where work is done for compensation, to whomever payable, supervision over which has been given by statute to the Department.

Goggles—An optical device worn before the eyes, the predominant function of which is protection to the eyes.

Helmet—A rigid device worn by the operator, which shields the eyes, face, neck, and a portion or all of the other parts of the head and is held in place by suitable means.

Hood—A device which completely covers the head, neck, and portions of the shoulders so as to exclude dust and flying particles.

Mask—A device worn before the eyes and a portion or all of the face, the predominant function of which is protection to the eyes and face.

Protector—A device which is placed in front of the eyes, face, or head to afford protection from the hazards in various industrial processes or from the natural elements.

Shield—A device to be held in the hand, or supported without the aid of the operator, the predominant function of which is protection to the eyes and face.

§ 39.552. Purpose.

This Subchapter pertains to head and eye protection within this Commonwealth, sets forth rules to safeguard the lives, limbs, and health of workers who engage in occupations requiring head and eye protection, places responsibility of complying with this Subchapter upon both employer and employe, and supplements all other regulations of the Department which apply in all matters not specifically covered by this Subchapter, which involve the lives, limbs and health of workers.

§ 39.553. Penalty.

Any person who violates any of the provisions of this Subchapter or any regulations of the Department, or who interferes with the Department or its duly authorized representative in the enforcement of such provisions or regulations shall be penalized under section 15 of act of May 18, 1937 (P. L. 654, No. 174) (43 P. S. § 25-15).

SPECIFICATIONS

§ 39.561. Protectors.

(a) *Classification.* Protectors, including goggles, helmets, shields, hoods and masks, shall be worn during hazardous processes or occupation.

(b) *Exception.* Protectors shall not be required if other approved safeguards are furnished which adequately protect the worker from the hazard.

(c) *Metal case with goggles.* A suitable individual unlined metal case, with rounded corners, capable of withstanding sterilization in boiling water, shall be furnished with each pair of goggles.

(d) *Inspection.* Protectors shall be frequently inspected by the employer or by his authorized representative for the purpose of assurance that they are in good condition. The Department or its authorized representative will, from time to time, inspect the protectors in use.

(e) *Interchanging between employes.* Protectors, except hand shields, shall not be interchanged among employes unless they have been sterilized between each change.

§ 39.562. Types of goggles.

Goggles shall be designated according to types, as follows:

- (1) *Type 1.* Goggles with rigid nonadjustable bridge (or adjustable metallic bridge) without side shields.
- (2) *Type 2.* Goggles with rigid nonadjustable bridge (or adjustable metallic bridge) with side shields.
- (3) *Type 3.* Goggles with flexibly connecting lens containers shaped to conform to the face.
- (4) *Type 4.* Goggles with or without side shields with lens of a diameter of not less than 1 3/4 inches. The goggles of type 4 need not conform to either the drop test or to the test for frames and shall be used only for light grinding and for work around furnaces.

§ 39.563. Classification of processes requiring protection.

The various processes in which the operator shall be given protection to the head, eyes or neck, shall be divided into seven groups, each of which requires a protector of a particular style. The examples, given under each of the following groups are only illustrative and are not intended as a complete list of the operations or processes in which protectors are necessary:

- (1) For protection from relatively large flying particles resulting from chipping, caulking and sledging in quarries, goggles of types 2 and 3 and masks may be used. For sledging in quarries, goggles of type 1 may also be used if the lenses are of extra thickness and at least 2 inches in diameter.
- (2) For protection from dust and light flying particles resulting from scaling, grinding, stone dressing and some woodworking operations, goggles of types 1, 2, 3 and 4 may be used.
- (3) For protection from splashing metal resulting from babbitting, pouring of hot metal, and dipping in hot metal baths, goggles of types 1, 2, and 3 and masks may be used. If goggles of type 1 are used, the lenses shall be not less than 2 inches in diameter. In the handling of hot metal, care shall be taken to eliminate moisture from the receptacle into which the metal is being poured. If type 3 eye cup goggles are used, they shall fit closely and the ventilating openings shall be covered so as to prevent the entrance of molten particles into the eye.
- (4) For protection from gases, fumes and liquids, including the handling of acids and caustics and dipping in galvanizing tanks and japanning, goggles of type 3 mask or hood may be used, except that in pot nitration processes the mask is the only approved form of protection.
- (5) For extra protection against dust and small particles from such work as sandblasting, a hood may be used.
- (6) For protection from injurious radiant energy, if a moderate reduction in the intensity of the visible radiant energy is required, goggles of types 1, 2 and 3, with lenses of approved protective glass or plastic, or masks or helmets with windows of approved protective glass or plastic, may be used. The lens or window may be divided so that the upper portion is plain transparent material and

the lower portion is approved protective transparent material. Furnace men shall be cautioned that cobalt glass is not effective in providing protection from ultraviolet radiant energy, which rays are injurious to the eyes. Employers and employes are urged to cooperate with the Department and with each other by not using lenses composed of cobalt glass, and, in their place, to use lenses which retard those rays that are injurious. Examples of such work involving radiant energy include oxyacetylene and oxyhydrogen welding and cutting, open hearth and Bessemer and crucible steel manufacturing, furnace work and electric resistance welding, exposure to glare in testing lamps, electric arc lamp testing, and spot welding with exposure to light rays.

(7) For protection from injurious radiant energy, if a large reduction of the visible radiant energy is required, helmets, hand shields or masks with windows of approved protective glass or plastic may be used. The work includes electric arc welding or cutting.

§ 39.564. Lenses for persons having defective vision.

When goggles are worn over spectacles with corrective lenses, the optical adjustment of the spectacles shall in no way be disturbed.

§ 39.565. Supply, repairing, replacement, and adjustment of protectors.

(a) *Replacement.* Employers shall keep in stock at all times for the use of employes and without charge, an adequate supply of different sizes of protectors and their repair parts and shall keep employes informed as to where such protectors or their parts may be obtained in the establishment. This does not apply to prescription goggles. Employers shall also be responsible for the proper replacement of protectors or their defective parts.

(b) *Adjustment of protectors.* Employers shall see that care is exercised in the adjustment of protectors that are not of the exact size, so that a maximum amount of comfort consistent with adequate protection is obtained for the employes.

(c) *Repairing of protectors.* Employes shall not wear defective protectors and shall be responsible for immediately reporting any broken, bent, or otherwise defective protectors and for making application to the employer for their repair or replacement.

§ 39.566. Sterilization of protectors.

Protectors shall be sterilized before issuance to the employes. Protectors after having been worn by an employe, shall be sterilized before reissuance to any other employe. The following are methods of sterilization:

(1) Immersion of goggles and cases in boiling water for a period of five minutes. This does not apply to protectors utilizing plastic lenses.

(2) Immersion of goggles and cases for ten minutes in a solution of formalin, made by placing three grams (not quite a teaspoonful) of 40% formaldehyde into a quart of water.

(3) Protectors and parts which would ordinarily deteriorate if they were sterilized by either of the above methods, shall be subjected to sterilization by antiseptic gases. An atmosphere of formaldehyde is suggested.

MANUFACTURE OF PROTECTORS

§ 39.571. Protectors.

(a) *Approval of protectors.* Protectors of each type to be used shall be submitted to the Board for approval. Protectors which do not meet the specifications and tests set forth in this subchapter shall not be used and the furnishing of substandard materials by manufacturers shall be sufficient cause for the revocation of the certificate of approval covering such protectors.

(b) *Design and construction of frames.* Protectors shall be substantially constructed and so designed as to permit the replacing of lenses or windows when necessary without the use of tools of special make or design.

(c) *Test for corrosion.* The effects of corrosion on the metal of the frame and shields shall be judged by immersing a pair of goggles in a boiling aqueous 10% (by weight) solution of sodium chloride for a period of 15 minutes. The frames upon being removed from this solution shall be immediately immersed in a 10% (by weight) aqueous solution of sodium chloride at room temperature. They shall then be removed from this solution and, without wiping off the adhering solution, allowed to dry for 24 hours. The metal parts shall then be rinsed in lukewarm water and allowed to dry. On inspection the surface shall be smooth. Goggles padded with suitable material so that the face is protected from metal contact need not withstand the corrosion test.

§ 39.572. Lenses and windows.

(a) *Design.* Protectors shall be so designed as to permit replacing the lenses or windows when necessary without the use of tools of special make or design.

(b) *Glass lenses and windows.* All lenses and windows of protectors shall be of a quality practically free from air bubbles, opalescence, waves, or other injurious defects or flaws. The front and rear surfaces shall be smooth and substantially parallel unless the lens is ground to provide proper optical correction for defective vision. All lenses shall bear some permanent distinctive marking by which the manufacturer, dealer or distributor may be readily identified.

(c) *Dimensions of clear glass lenses.* Lenses for goggles of types 1 and 2, if round, shall have a diameter of not less than 1 1/2 inches, and if oval, shall not be less than 1 1/2 inches by 1 15/16 inches. For goggles of type 3, round lenses shall have a diameter of not less than 1 1/2 inches and oval lenses shall have a vertical diameter of not less than 1 1/2 inches and a horizontal diameter of not less than 1 3/4 inches. For goggles of type 4, lenses shall not be less than 1 3/4 inches in diameter. Lenses shall transmit at least 80% of the light.

Cross References

This section cited in 34 Pa. Code § 39.577 (relating to goggle lenses and frames) and 34 Pa. Code § 39.578 (relating to goggle interior construction standards).

§ 39.573. Test for clear glass lenses.

A spherical steel ball 16 grams (0.565 ounces) in weight approximately 1.59 centimeters (0.625 inches) in diameter (weight shall be correct within 20%), shall be dropped once from a height of one meter (39.37 inches) on the center of the horizontal outer surface of the lens when held in a frame. The lens shall be supported by the rim of the frame only, on a rubber washer of 6.5 millimeters (0.25 inches) thick, held upon the top of a board or block of wood. If one out of six lenses that are tested is fractured in such a way that a fragment of glass weighing more than 25 milligrams leaves the bottom surface, four more lenses shall be tested, and if one of these lenses fractures in the manner described above, the lot shall be rejected.

§ 39.574. Lense standards.

(a) Approved-type goggles, hoods, shields, helmets and masks utilizing plastic lenses or windows may be used.

(b) Approval may be granted for each device for specific operations or processes only. For example, a goggle may be approved as a type 3 goggle for groups 1, 2 and 3 operations or processes, as defined in this subchapter). The basis of this approval shall be results of tests such as a drop test, needle penetration test, high velocity impact test, resistance to scratching and heat hazards, chemical tests and optical tests as may be specified by the Department. All tests shall be performed by a recognized testing laboratory.

(c) Goggles, the lenses of which provide the proper optical correction, shall be of sufficient strength to withstand the drop test. Optical corrective lenses shall be made under the direction of the manufacturer of the goggles.

(d) Lenses on helmet windows shall transmit not more than 1.0% radiant energy of any wave length less than 365 millimicrons and not more than 50% of the total radiant energy incident upon them from a 200-watt, gas-filled, tungsten filament, electric incandescent lamp operating as commercially rated (approximately 0.8 watt per spherical candle). Transparent cover pieces shall be provided to protect the lenses and shall be reasonably free from flaws and of uniform thickness.

(e) Lenses or helmet windows shall transmit not more than 1.0% of radiant energy of any wave length less than 405 millimicrons and not more than 1.0% of the visible light and not more than 30% of the total radiant energy incident upon them from a 200-watt, gas-filled, tungsten filament, electric incandescent lamp, operating as commercially rated (approximately 0.8 watt per spherical candle). Transparent cover pieces shall be provided to protect the lenses and shall be reasonably free from flaws and of uniform thickness.

§ 39.575. Windows of masks.

(a) The windows of masks, if separate for the two eyes, shall be not less than 40 mm. (1.57 inches) in diameter and if combined into a single window, they shall be at least 10.8 by 5.1 mm. (4.25 by 2 inches).

(b) Windows shall be securely held and be easily removable. Transparent cover pieces shall be designed to protect these windows, and windows of masks shall be tested by being held in their regular mountings and cooled in water at a temperature of 20°C (68°F) for 15 seconds, then plunged into boiling water 100°C (212°F). The lenses shall withstand this test without cracking.

(c) Windows of shields shall not be less than 10.8 mm. (4.25 inches) in the horizontal direction and not less than 5.1 cm. (100 inches) in the vertical direction, and these windows shall be composed of approved glass or plastic for protection against radiant energy. Transparent cover pieces shall be provided to protect these windows and they shall be reasonably free from flaws and of uniform thickness.

(d) The windows of hoods shall be of clear transparent glass or plastic. This material shall be protected on the outer surface by means of wire gauze of not larger than No. 60 mesh.

(e) Lenses or windows shall be replaced whenever they become scratched, discolored or crazed sufficiently to make them unfit for optical use.

Cross References

This section cited in 34 Pa. Code § 39.579 (relating to masks); 34 Pa. Code § 39.581 (relating to shields); and 34 Pa. Code § 39.582 (relating to hoods).

§ 39.576. Goggle frames.

(a) Metal frames shall be made of a material that is able to withstand sterilization and which does not readily corrode or discolor the skin. Frames shall have a smooth finish. Each frame shall bear some permanent distinctive marking by which the manufacturer, dealer or distributor may be readily identified. This marking does not apply to goggles now in use.

(b) The frames of types 1 and 2 goggles having either adjustable or rigid bridges shall withstand the tests prescribed in this section and § 39.577 (relating to goggle lenses and frames). The frames of protectors having rigid bridges shall also withstand tests prescribed in subsections (c) and (d).

(c) Each frame tested shall have the right lens frame laid flat, with the outer surface of the lens downward, on a firm level support so that the left lens and half the bridge is allowed to project beyond the edge of the support. A spring balance shall be connected to the outermost portion of the frame of the left lens, and a downward force of 223 grams (8 ounces) shall be applied while the right lens frame is rigidly held. After removal of the load no permanent deformation shall be apparent in the frame.

(d) Each frame tested shall have the right lens frame held vertically in one hand and the lower edge of the left lens frame pressed against one of the platforms of an equal-arm balance having a weight of 1.82 kg. (four pounds) on the other platform. The pressure shall be increased until the weight is balanced, whereupon the frame is removed and examined for bending. After removal of the load no permanent deformation shall be apparent in the frame.

Cross References

This section cited in 34 Pa. Code § 39.577 (relating to goggle lenses and frames).

§ 39.577. Goggle lenses and frames.

(a) Lenses for goggles of types 1 and 2 shall be made to conform to the specifications as in § 39.572 (relating to lenses and windows) and every frame tested shall withstand without distortion the drop test.

(b) If the lens frames are rigidly joined by a separate bridge or nosepiece the joints shall be given tests to demonstrate their firmness and durability. Goggles which have already passed the strength test in § 39.576 (relating to goggle frames) and subsection (a) shall be used for this purpose. The lens frames with lenses in place shall be gripped one in each hand, the thumbs bearing on the outer surface and the fingers on the inner surface of the lenses at the point where the bridge is attached to the frame. The frames shall then be bent slowly, the direction of motion being in a plane perpendicular to the surface of the lenses until the outer ends of the frames touch. The frames shall then be bent back to their original shape and a careful inspection made for failure in the joints. All frames shall pass this test with no visible crack evidenced.

(c) If the bridge is constructed with individual members of the bridge in more than one plane parallel to the surface of the lenses, all of the members except those attached to the rims of the lens frames shall be cut in two and the above test applied to the remaining members.

(d) If goggles are provided with side shields, such shields shall be of metal, pliable leather, or collapsible material of suitable durability. The material shall be sufficiently flexible or malleable to permit adjusting to the contour of the face. The edges coming in contact with the skin shall be finished in a manner to prevent cutting the skin. If metal side shields are used, they shall be perforated, each hole not larger than 0.04 inch. If the side shields are of metal or of noncollapsible material, the construction of the goggles shall be such as to permit the folding of the temples so that they may be stored in a case or container. No part shall be composed of quick-burning material.

Cross References

This section cited in 34 Pa. Code § 39.576 (relating to goggle frames).

§ 39.578. Goggle interior construction standards.

(a) Temples shall be made of a material that withstands sterilization and does not readily corrode nor discolor the skin. Ear hooks for temples shall be flexible, properly bent to fit the ear, and finished or covered so as not to cut or irritate the skin. If a covering is used, it shall extend for half the length of the temples and be of a material which does not readily deteriorate in service. Temples shall be fastened to the frame with a screw or rivet in addition to the one which holds the lens in place. Temples shall fold over the lens when stored. No part shall be composed of quick-burning material.

(b) Short temples may be substituted for regular temples. They shall be made of a material that does not readily corrode or discolor the skin, and shall be attached to the frame in the same manner as, and be interchangeable with, the regular temples. A headband shall be fastened to the outer ends of the short temples and shall be adjustable as to length and easily replaceable. No part shall be composed of quick-burning material.

(c) In lieu of regular temples or short temples a headband or headgear shall be supplied of any suitable material and design that properly retains the goggles in position and affords comfort and protection to the wearer. Such headgear shall be adjustable as to size or shall be supplied in properly assorted sizes. No part shall be composed of quick burning material.

(d) Nose pieces, bridges, or connecting links between lens frames shall have the portions that come in contact with the skin of a material that do not readily corrode and do not discolor the skin. The construction shall be substantial and the nose piece, bridge or connecting link shall be securely fastened to the lens frames. If the weight of the goggles is borne by the bridge or nosepiece resting on the crest or sides of the nose of the wearer, such portions of the goggles shall afford comfortable bearing surfaces. The nosepiece, bridge, or connecting link shall be constructed so as to be readily adjustable, or the goggles shall be furnished in assorted sizes. No part shall be composed of quick-burning material.

(e) Eyecups shall be made of metal or of fiber or of other substantial material which withstand sterilization, shaped to fit the configuration of the face and shall be constructed so as to afford adequate ventilation. Parts touching the face shall be made of heat-insulating material and shall be properly edged to prevent cutting the face. The eyecup shall be flexibly connected with a coupling which permit ready adjustment; otherwise goggles shall be furnished in assorted sizes. The coupling or center piece shall be covered with or made of heat-insulating material which withstands sterilization and which may be readily renewed. Goggles shall be supplied with a headband or headgear of any suitable material and design so as to retain the goggles in their proper position. Each pair of goggles shall bear some permanent distinctive marking by which the source may be readily identified. No part shall be composed of quick-burning material.

(f) Lenses for goggles of type 3 shall be made to conform to the specifications set forth in § 39.572 (relating to lenses and windows).

§ 39.579. Masks.

(a) Masks shall be composed of vulcanized rubber, fiber, metal or equivalent material, which withstand sterilization, formed so as to protect the face of the operator above the mouth. Masks shall be supplied with a headband or headgear of any suitable design and material to retain the mask in proper position. Masks made of woven wire shall have openings not greater than 0.0295 inch (0.75 mm) fiber or equivalent material, which withstands sterilization. They shall bear a permanent and distinctive marking by which the manufacturer, dealer or distributor may be readily identified. No part shall be composed of quick-burning material.

(b) For use in electric arc welding the masks shall be constructed so as to be at least three inches from the eyes of the wearer and shall be of nonconductive material.

(c) Windows shall be made to conform to the specifications and tests in § 39.575 (relating to windows of masks).

§ 39.580. Helmets.

(a) Helmets shall bear some permanent distinctive marking by which the source may be readily identified. They shall be capable of withstanding sterilization.

(b) Helmets shall be of such size and so shaped that they protect the face from direct radiant energy.

(c) They shall be arranged so as to rest on the shoulders or chests, or they may be arranged so that they may be slipped back over the head of the operator when not in use.

(d) The weight of helmets that are arranged to be carried by the head of the operator shall not exceed 690 grams (24 ounces).

§ 39.581. Shields.

(a) Shields shall bear some permanent distinctive marking by which they may be readily identified. They shall be capable of withstanding sterilization.

(b) Shields shall be made of material which is a nonconductor of heat and electricity.

(c) Windows shall be made to conform to the specification in § 39.575 (relating to windows of masks).

(d) The shield shall be so formed that it fully protects the face of the operator and curve back on each side beyond the ears. The shield may be pivotally mounted on an adjustable headgear, so arranged that it may be tipped back or over the head of the operator when not in use. It shall be so mounted as to be not less than 2 inches (5.1 cm.) from the eyes.

(e) The face protector may consist of a shield of opaque material which is a nonconductor of heat and electricity arranged to be held in the hand. It shall be of such size and so shaped that it protects the face from all direct radiant energy and shall be provided with an opening fitted to carry windows, single or multiple.

§ 39.582. Hoods.

(a) Hoods shall be designed to cover the head and neck completely so as to effectively exclude dust and small particles.

(b) Windows shall conform to the specifications in § 39.575 (relating to windows of masks).

(c) Ventilation shall be secured from an external source of air, conducted to the operator by means of a hose. The air pressure shall be so reduced and the distribution of the air within the helmet shall be such that the employe is not subjected to physical discomfort during, or as a result of, his work.

(d) A separator trap shall be provided in the air line for the removal of oil, water and scale.

§ 39.583. List of occupations requiring protectors.

Persons engaging in any of the following occupations shall use protectors as prescribed for these occupations, or other approved equally effective protection shall be provided:

<i>Name of Occupation</i>	<i>Type of Protector</i>
Oxyacetylene and other compressed gas welding and burning	Type 3 goggles with suitable glass
Chipping	Types 2 and 3 goggles
Electric arc welding	Type 3 goggles with suitable glass and helmets with suitable glass
Electric welding	Type 3 goggles with suitable glass
Grinding wheel dressing and rough emery	Types 2 and 3 goggles
Iron tapping at cupola	Types 3 and 4 goggles
Sand and shot blasting	Hood
Thermit welding	Type 3 goggles with suitable glass
Operating cement guns	Hood

§ 39.584. Respirators.

(a) Respirators shall be of approved types. They shall be classified as follows according to the hazard they are designed to protect against, such as dust, fumes and mist or other atmospheric particulate matter:

(1) *Type A.* Mechanically generated dusts resulting principally from the disintegration of a solid, such as the dust clouds produced in the various pro-

cesses of mining, quarrying, and tunneling and the various industrial operations of grinding, crushing and general processing of minerals.

(2) *Type B.* Fumes of various metals (usually their chemical compounds, as oxides or carbonates), such as lead, mercury (except mercury vapor), manganese, copper, chromium, iron, cadmium, zinc, magnesium, aluminum, antimony and arsenic resulting from sublimation or the condensation of their vapor, or from the chemical reactions between their vapor and gases.

(3) *Type C.* Mists as produced by spray coating with paint and vitreous enamels, chromic acid mist as produced in chromium plating, and other mists of materials whose liquid vehicle does not produce harmful gases or vapors.

(4) *Types AB, AC, and the like.* Combinations of the preceding types.

(5) *Type D.* Combinations to include all of the preceding types.

(b) In addition to the types listed in this section, respirators for protection against a single substance of any of the above types of suspensions shall be approved as suitable for that substance.

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