

Chapter E 143

SUPPLY SYSTEMS; RULES FOR EMPLOYEES
DOING SPECIALIZED WORK

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E 143.01 Supply stations and switchboards. (1) APPLICATION OF RULE. Engineers, machine attendants, switchboard operators, and helpers shall study and strictly observe the following in addition to all the general sections E 142.01 to E 142.05 which apply to their work.

(2) CARE ABOUT MACHINES. Do not allow oil cans, tools, dusters, or wiping cloths to catch in moving parts of machinery. In passing any switchboard or machine in operating, do not touch it unnecessarily nor allow metal tools or other metal objects to touch the apparatus or connections. Do not use iron or tin oil cans near field magnets, and use only dusters and wipers with insulating handles on or about exposed live parts. Employees about to work on normally moving parts of remotely controlled equipment during periods of rest, shall be protected against their accidental starting by "Men at work" or equivalent signs first being placed on the starting devices, and by locking or blocking these where practicable. All employees shall, before starting any work, satisfy themselves that all these protective devices have first been installed. (See section E 142.03). Do not use a metal bar to turn over the motor of any energized machine. Do not use a metal rule or tape or metal-reinforced fabric tape near live circuits. Do not use air hose with metallic covering or fittings around live electric apparatus or conductors. Do not use flashlight with metal case near live parts.

(3) CARE ABOUT LIVE OR MOVING PARTS. (a) Do not work on or near exposed live or moving parts unless authorized to do such work, and then strictly observe the rules applying.

(b) When working near fuses and circuit breakers or other apparatus which may arc suddenly, be careful to avoid injury from their operation.

(c) When working on one section of a switchboard or in one compartment, mark it conspicuously and place barriers to prevent your accidental contact with live parts in that section or adjacent sections.

(d) When working on or near live parts and standing on insulated stools or ladders, or when otherwise insulated from the ground, avoid handing metal tools or other objects to other persons who are not insulated.

(e) Do not stand on, sit on, or pass through belts, whether the belt is at rest or in motion.

(4) **HANDLING FUSES OR BRUSHES.** (a) In handling fuses of more than 750 volts, use the special rods or tongs and stand on insulating platforms or mats, where provided. Keep the body as distant and as far below as possible.

(b) Replace or remove link fuses from live terminals and handle brushes on live equipment only when absolutely necessary, and then with due precautions.

(5) **BATTERY ROOMS.** Smoking, or the use of open flames, or of tools which may generate sparks, should be avoided except when cells are not actively gassing and when prior ventilation has been ample. Sparks from frictional or static electricity should be avoided, as they may ignite the gas if discharged close to its source, as at the vent of a sealed-type cell during overcharging. The electrolyte of storage batteries, and spray containing electrolyte, are somewhat corrosive, particularly when concentrated by evaporation, and contact with body or clothes should be avoided. Do not handle live parts of batteries or their connections unless standing on insulating platforms or wearing suitable insulating boots.

(6) **WORKING IN ELEVATED POSITIONS.** When working in an elevated position, especially above live or moving parts, assure yourself of the security of your position and support, and take precautions to avoid dropping tools or materials.

(7) **HANDLING SWITCHBOARD EQUIPMENT.** All 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. When cable plug connectors are used, do not allow one end to remain hanging loose while the other end is connected to a live terminal. In handling instrument circuits, never open the secondary of a current transformer while it is alive.

(8) **REPORTING CIRCUIT TROUBLE TO CHIEF OPERATOR.** Report to your immediate superior or to the chief operator any unusual conditions of load and the indication of any accidental ground on an outgoing circuit.

(9) **REPORTING DEFECTS.** Promptly report to your superior any dangerous conditions of equipment or surroundings, including defective tools, switches, or protective devices, or live cases or frames of apparatus or instruments.

History: Cr. Register, November, 1961, No. 71, eff. 12-1-61.

E 143.02 Meters. (1) **APPLICATION OF RULE.** All meter setters and testers shall study and strictly observe the following in addition to all the general sections E 142.01 to E 142.05 which apply to their work.

(2) **TAPED JOINTS.** Never leave joints or loose ends of wires untaped unless otherwise protected.

(3) **CARE ABOUT LIVE PARTS.** Do not use bare fingers or hands to determine whether a circuit is alive. Never remove or replace fuses in live circuits of more than 750 volts except by means of the suitable appliances provided.

(4) **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.

(5) **CURRENT-TRANSFORMER SECONDARIES.** Before working on an instrument or other device in a current-transformer secondary circuit, always bridge the device with jumpers, so that the circuit cannot be opened at the device. Never open such a circuit at meter connections until it has been bridged elsewhere.

(6) **SPECIAL TOOLS.** Use only hand tools suited to the work being done and so reduce the danger of short-circuits.

(7) **REPORTING DEFECTS.** Promptly report to your immediate superior any live meter case or any condition of a meter or its connections, of the interior wiring or of overhead lines, or your own or other utilities, which might endanger life and property.

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E 143.03 Testing. (1) **APPLICATION OF RULE.** All electrical testers, helpers, and others working about electrical tests shall study and strictly observe the following, in addition to all the general rules in sections E 142.01 to E 142.05. Owing to the diversified character of testing work this study should usually extend also to the special rules in sections E 143.04 to 143.05.

(2) **AUTHORIZATION OF WORK.** Do not work on or about equipment or lines without first receiving authorization from the person in charge.

Note: If such equipment or lines are under control of a chief operator, this authorization must come from him. This will include the attaching of tags at the proper points and the observation of all rules for general operation in section E 142.01.

(3) **CHECKING OF CONDITIONS.** (a) Thoroughly familiarize yourself with all conditions surrounding equipment or lines to be tested before making any change in these conditions.

(b) Do not make any change in equipment or lines unless you fully understand the effect of the change.

(c) Be very careful of capacity effects of transformers and other high-voltage apparatus, the discharge from which may be very dangerous if passed through the body. Ground the coils before touching them.

(4) **FOREMAN.** One properly qualified person shall be in immediate charge of all testing work, or all of the workmen shall be instructed as to the work they are to perform and the employee instructing them shall be considered in charge of the work.

(5) **WARNINGS AND BARRIERS.** (a) Display danger signs and erect suitable guards about all 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 must be guarded, suitable portable or temporary guards and warning signs shall be used.

(6) **REQUIREMENT FOR TWO WORKMEN.** No person should work alone in testing or experimental work on or about parts on which the voltage can exceed 750 volts, except in routine testing where the live parts are properly guarded.

(7) **REPORTING DEFECTS.** Promptly report to your immediate superior any conditions of equipment or lines under test which may endanger life or property.

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E 143.04 Overhead lines. (1) **APPLICATION OF RULE.** Linemen and assistants and groundmen, in construction, extension, removal, or repair work, shall study and strictly observe the following, as well as all the general rules in sections E 142.01 to 142.05 which apply to their work.

(2) **TESTING STRUCTURES BEFORE CLIMBING.** Before climbing poles, ladders, scaffolds, or other elevated structures, first assure yourself 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 your weight.

Note: Poles may be tested for decay near the ground line with a bar, screw driver, or other tool, and sounded for decay at the center by rapping with a heavy tool or block of wood.

If poles or crossarms are apparently unsafe because of decay or unbalanced tensions of wires on them, they should be properly braced or guyed before they are climbed.

(3) **USE OF POLE STEPS.** If poles are stepped, make use of such steps in climbing.

(4) **UNSAFE SUPPORTS.** Do not support yourself by pins, brackets, or conductors.

(5) **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.

(6) **CARE ABOUT LIVE PARTS.** (a) Do not go among any wires until you know their voltage.

(b) Leaning over and crowding through unprotected wires should be avoided wherever possible.

(c) Place yourself so that you will not be liable to fall on wires should an accident occur.

(d) Do not depend on the insulating covering of wires, and treat all lines as alive unless they have been properly killed (except communication lines known to be clear).

(e) Avoid use of hand lines or measuring tapes containing metal strands.

(f) In handling dangerous switches or fuses, do so only by means of suitable insulating handles, rods, or tongs.

(7) **WHEN TOUCHING LIVE PARTS.** (a) When working on live equipment or wires never allow any portion of the body to come in contact with any live or grounded part other than that worked on.

(b) While touching supply wires or equipment, avoid as far as possible touching ground wires, guy wires, span wires, metal pipes, metal poles, metal sheaths, communication wires or equipment, transformer cases, hangers, and other metal fixtures.

Note: Communication wires are included principally because of their liability of being grounded. The other equipment and wires listed may become either alive or grounded.

While touching communication wires or equipment, metal sheaths, metal pipes, ground wires, or metal fixtures on poles, avoid as far as possible touching supply wires or equipment, guy or span wires.

(8) **PROTECTING TRAFFIC.** (a) When working overhead, 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

where practicable. Pole holes and obstructions along public highways and other frequented places shall be protected by watchmen or by suitable guards or danger signals so located as to be conspicuous to traffic.

(b) When working overhead, or hoisting or lowering materials above places where frequent traffic occurs, a man should be stationed to warn passers-by.

Note: Where traffic is light, warning signs or barriers may be used in lieu of watchmen. Where traffic is congested, it may be necessary to rope off the space.

(9) AVOID FALLING OBJECTS. Do not unnecessarily stand where you can be struck by materials dropped by men working overhead.

(10) STRINGING LINES. (a) Never string wire near live lines except by means of suitable insulating hand lines or other appliances. Avoid bringing them in contact with the live wires. Regard them as live wires of the same voltage because of their liability to come in contact with the live wires.

(b) Never change the strains on a pole by adding or removing wires until assured that the pole will stand the altered strains.

(c) In stringing wires do not allow them to sag so as to endanger vehicles or pedestrians below, unless traffic is intercepted by watchmen or otherwise.

(11) REPORTING DEFECTS. Report promptly to your immediate superior any dangerous conditions of your own or other utilities observed arising from defective insulators, pins, crossarms, abnormally sagging wires, etc.

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E 143.05 Series street lamps. (1) APPLICATION OF RULE. All series-lamp trimmers, hangers, and inspectors shall study and strictly observe the following, in addition to the general rules in sections E 142.01 and E 142.05 and the special rules under the sections for overhead and underground operation, respectively, in sections E 143.04 and E 143.07 which apply to their work.

(2) PRECAUTIONS 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.

(3) HANDLING SERIES LAMPS. Trimmers, inspectors, or patrolmen shall wear suitable insulating gloves and stand on insulating stools, platforms, or tower wagons, or on dry, well seasoned wood poles while touching series lamps or their cut outs, when these are alive. Where insulating stools, platforms or tower wagons are used which provide sufficient insulation from ground for the voltages to be handled, the insulating gloves may be dispensed with.

(4) BRIDGING SERIES LAMPS. Before working on lamps or other devices in live series circuits always bridge the device with jumpers such as series lamp cut outs usually provide.

Note: This will insure that the circuit will not be opened at the device, and possibly be completed through your body or will not arc at the point of opening and burn you.

(5) 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 all persons whose safety may be affected are informed.

(6) **PERIODICALLY DISCONNECTED CIRCUITS.** If circuits, such as series lamp circuits, are not effectively grounded during the idle period, all rules for handling live parts shall be strictly observed.

(7) **REPORTING DEFECTS.** Report promptly to your immediate superior any abnormally sagging wires, broken insulators, leaning poles, defective pole steps, broken globes or lamp supports, and other defects giving rise to a dangerous condition of your own or other utilities, or any indication of voltage on lines supposed to be dead.

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E 143.06 Communication circuits used in connection with supply lines. (1) **APPLICATION OF RULE.** All men working on or near telephone and telegraph circuits operated in connection with supply lines shall study and strictly observe the following in addition to all the general rules in chapter E 142 and the special rules in sections E 143.04 and E 143.07 which apply to their work. For rules governing the operation of commercial communication lines see chapters E 144 and E 145.

(2) **TITLE OF OFFICIAL IN CHARGE.** In those rules where the words "chief operator" are used the official in charge of safeguarding operation is to be understood.

(3) **PRECAUTIONS BEFORE CLIMBING POLES.** Make a careful inspection to ascertain if possible whether there are any crosses with supply circuits before climbing poles or other structures to work on or about communication wires, especially where such poles or structures are occupied in common with, or located near power circuits. Apply mechanical tests as far as practicable to messenger wires before trusting the wires to carry your weight.

(4) **APPROACHING SUPPLY WIRES.** Avoid contact with all wires other than those you know to be communication wires, assuming such other wires always to be alive. Do not approach any supply wire or supply equipment within the distances given in subsections E 142.03 (2) and (3), unless you can comply with all the rules under that chapter as far as they apply.

Note: Communication wires in trouble may be in contact with supply wires at some distant point, and should be treated with proper care.

(5) **TOUCHING EQUIPMENT.** (a) While handling communication wires, metal sheaths, or communication equipment avoid touching guy or span wires and supply wires or equipment. Especially avoid standing on or touching transformer cases, hangers, or connections.

(b) While touching open communication wires avoid contact also with grounded parts, such as sheaths and ground wires.

(6) **STRINGING WIRES.** (a) When stringing wires or cables over or under supply lines avoid any possibility of their coming in contact. Do not string them above live supply lines where it is practicable to avoid it.

(b) Where liability of contact cannot be entirely avoided, the lines being handled shall be treated as alive (unless they are effectively

grounded), and the rules of section E 142.03, so far as they are applicable, shall be carefully observed.

(7) **REPORTING DANGEROUS CONDITIONS.** Promptly report to the proper official abnormally sagging wires, broken or defective insulators, pins, crossarms, defective poles, or any other dangerous conditions of your own or other utilities.

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E 143.07 Underground lines. (1) **APPLICATION OF RULES.** All cable splicers and other workmen in underground construction or operation shall study and strictly observe the following, in addition to the general rules in sections E 142.01 to E 142.05, which apply to their work.

(2) **GUARDING MANHOLES, HANDHOLES, AND STREET OPENINGS.** When removing manhole or handhole covers or making excavations, 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.

Exception: Red lights are not required on private right of way or at other locations not accessible to vehicular or pedestrian traffic.

(3) **TESTING FOR GAS.** Do not enter manholes until you have assured yourself that the manholes are free from dangerous gases, by testing with approved testing devices, by ventilation, or by other adequate methods. (See section E 145.03(2), for testing for gas).

(4) **WATCHMAN ON SURFACE AT MANHOLES.** Do not enter a manhole unless a temporary cover is placed over the opening or a watchman is stationed at the surface. Where any gas is liable to be present always see that the watchman is stationed at the surface. Where any hazard is involved do not leave a manhole unwatched until all workmen are out.

(5) **AVOIDING FLAMES.** Do not smoke in manholes and avoid as far as practicable open flames or torches in or near manholes. Avoid sparks in handling live parts or cable sheaths, and avoid igniting the flux in soldering and wiping joints. In using hot paraffin see that it does not reach a temperature at which it will ignite. (See subsection E 145.03(4) for avoiding flames).

(6) **PULLING CABLES.** When pulling in cables make sure that the gear cannot slip so as to injure workmen. Avoid the danger of having the hands drawn into the tackle by the pulling line.

(7) **UNIDENTIFIED CABLES.** If lines and cables are not properly identified by markings or positions, do not work upon them.

(8) **TESTING AND SPLICING LIVE CABLES.** Always ascertain, if practicable, whether cables are alive, by testing with the test devices provided, before cutting into the cable sheaths. Live cable should be spliced only by men experienced in the work, and they should use extreme caution and suitable devices in so doing.

(9) **REPORTING DEFECTS.** Promptly report to your immediate superior any dangerous condition of your own or other utilities, whether observed in underground or overhead construction. Particularly report insanitary conditions, gas, or missing cable tags in man-

holes, and abnormally sagging wires or broken supports in overhead construction.

History: Cr. Register, November, 1961, No. 71, eff. 12-1-61.

E 143.08 Tunnel and subway. (1) **APPLICATION OF RULE.** 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 the following, in addition to the rules in sections E 142.01, E 142.02, E 142.03, E 143.01 and E 143.07, so far as they apply to their work.

(2) **DANGEROUS LOCATIONS.** 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 all surrounding surfaces becomes more conducting where dampness exists, and electrical shocks are, therefore, more severe.

(3) **LIVE ELECTRICAL PARTS.** Before handling any electrical equipment or wires make sure whether they are alive or dead.

Note: It is not advisable to work on live equipment or wires when the current can be shut off without interrupting necessary operations.

(4) **UNAUTHORIZED WORK.** Never touch or disturb any electrical equipment or wires without being authorized.

(5) **STANDING ON GROUND.** (a) Do not touch any electric wire, cable, or third rail, no matter how well it is insulated, while you are standing on the ground or on a grounded conducting surface, such as a pipe, track, or rail.

(b) Do not touch the metal frame or case of a motor if it is ungrounded, and you are in contact with ground or a grounded object.

Note: Remember that water and the surfaces of damp ground are conducting. Insulation on a wire may look perfect, but it frequently will not prevent shock.

(6) **CARRYING TOOLS.** In carrying tools or metal implements in passageways containing electric wires, especially near exposed wires, never permit the tools or implements to touch them. In particular, do not carry such objects on the shoulder when there are conductors overhead. Do not travel on that side of passageways where third rails or side trolley wires are exposed.

(7) **HANDLING AND REPAIRING LIVE PARTS.** (a) When necessary to handle or repair live trolley wires, third rails, cables, motors, or other electrical equipment, wear suitable insulating gloves or stand on the waterproof insulating mats or platforms provided, or obtain dry wood free from metal.

(b) Before handling or making use of any electrical cable, carefully examine it to make sure that its insulation is not injured.

(8) **INSPECTION OF PORTABLE CABLES.** Portable cables should be inspected at least once daily during the period of their use.

(9) **HANDLING PORTABLE DEVICES.** In handling portable motors or lamps, first make sure that the external metal frame is not alive by contact with or leakage from live parts within. Have such portable equipment inspected at least once daily during the period of their use.

(10) FUSES AND SWITCHES. Never handle fuses nor close switches or circuit-breakers unless you are authorized to perform that special duty, and then use the insulating handles or rods provided. Before closing switches first make sure that you are not endangering other persons.

(11) INJURING CABLES AND WIRES. Do not fire shots (blasting), handle tools, or perform other work in such a manner as to injure cables or wires in the vicinity. If in doubt, consult your superior.

(12) TEMPORARY WIRING. (a) Never use bare conductors nor arrange for earth return in the wiring of any temporary circuit.

Note: This particularly applies to the temporary portions of shot-firing circuits and to the leads of portable motors and lamps.

(b) Never employ temporary circuits without seeing that they 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.

(13) GENERAL PRECAUTIONS. Never get on or off locomotives or cars on the side where the trolley wire or third rail is located. Do not place combustible or explosive materials near electric wires, trolley tracks, third rails, or motors. Do nothing that will cause sparking, or expose parts that may arc or spark during operation, if any explosive gases may be present.

(14) REPORTING DANGEROUS CONDITIONS. Promptly report to your superior any dangerous or unusual conditions observed. In particular, report the presence of gas, broken insulators, 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. Report also 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.

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