

Eversource Energy Emergency Response Program USER GUIDE

Eversource External Mutual Aid Safety Onboarding Guide

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Revision 8

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EVERSOURCE

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1 Objective

- 1.1 This user guide provides instructions that pertain to establishing and maintaining a safe working environment for all non-Eversource Energy personnel, Eversource employees, and the public.

2 Applicability

- 2.1 This procedure is used by non-Eversource Energy workers to guide them through what is expected of them before and during non-storm or storm restoration efforts.

3 Discussion

- 3.1 Thank you for assisting Eversource Energy in our efforts to provide power to our customers. The safety of every person who performs work on the Eversource System is of paramount importance to our company. Heightened safety awareness is required during non-storm and storm restoration efforts when large groups of personnel are operating under difficult conditions to restore power to our customers.
- 3.2 Each non-Eversource crew member (contractor and outside utility) is required to be on-boarded prior to the start of restoration work.
- 3.3 The General Foreman or Foreman/Lead assigned to crews for the contractor and/or outside utility will be responsible for taking applicable safety onboarding and disseminating the information to their assigned crews.
- 3.4 Existing contractor crew leads already on Eversource property prior to a storm event (for example, Contractors of Choice (COC)), require a formal on-boarding that is valid for **one (1) year**.
 - 3.4.1 Formal on-boarding for a non-COC, as well as Foremen/Leads from a COC company but traveling from an area outside our service territory (CT/MA/NH), are valid for **six (6) months**.
 - 3.4.1.1 COC's are considered to be contractors that support blue-sky, day-to-day work, with Eversource. If contractors are brought in from outside CT/MA/NH and are under a COC name, they will still be required to onboard and be considered a non-COC.
- 3.5 Both the on-boarding training and acknowledgement form are completed [electronically](#).
 - 3.5.1 **NOTE:** Aggregator companies (i.e. Parent companies that hire sub-subcontractors to work under the Parent Name), shall ensure that the Foreman/Leads from the hired companies complete the onboarding and acknowledgement form. Eversource requires that the name on a company truck matches with the name given on the acknowledgement form.
 - 3.5.2 **NOTE:** Aggregator companies shall identify themselves as the "Source" on their submitted roster and the "Contractor" shall be the hired company name that matches the name on their trucks.
- 3.6 When applicable, the Eversource Contact Person (Crew Guide or External Field Resource Coordinator (EFRC)) assigned to contractor/outside utility crews will be responsible for ensuring contractor/outside utility crews receive a proper safety briefing and system

updates on a daily basis.

- 3.7 Contractors/Outside Utilities shall review this information with your work group and make sure all employees are aware of the daily safety messages.
- 3.8 Any safety related questions or concerns must be addressed immediately. Do not wait to notify your assigned Eversource Contact Person (Crew Guide or External Field Resource Coordinator (EFRC)).
- 3.9 Safety questions or concerns can be sent directly to EversourceSafety@eversource.com.

4 Adherence

- 4.1 Adherence to proper safety policies and procedures is required at all times to ensure that worker safety is not compromised.
- 4.2 Non-Eversource personnel are expected to work to the required federally mandated Occupational Safety and Health Administration (OSHA) requirements and to the normal safety practices and policies of their home organizations with the following exception for distribution work only:
 - 4.2.1 Minimum of Class II high voltage rubber gloves and rubber sleeves (rated sleeves while aloft) (or higher rated gloves and sleeves dependent upon actual system voltages exposure) are required to be worn at all times whenever an employee is exposed to conductors which may be energized or become energized, including any conductor which is effectively grounded.
 - 4.2.2 A minimum of Class II rubber gloves is required to be worn at all times when utilizing any type of insulated (tested and inspected) live line tool. Any deviations must be approved by the Director of Safety or his designee.
 - 4.2.3 Arc rated face shields and hoods/or balaclava to protect the head, face, and neck are required while working aloft on energized lines with an arc energy > 9 cal/cm² and required for opening and closing (the making or breaking of primary load) when operating overhead primary switching devices (e.g., cutouts, disconnects, Trip Savers, etc.) aloft.
- 4.3 Your personal safety and welfare are our first priorities. Please ensure that you and your co-workers work carefully and always follow the safety rules required by your company. The following Safety Guidelines highlight some of what is expected of you while you are working for Eversource.

5 References

- 5.1 OSHA 29 CFR 1910.269 and 29 CFR Part 1926: Occupational Safety and Health Administration, Occupational Safety and Health Standards.
- 5.2 ANSI Z133.1-2017: American National Standard Institute for Arboricultural Operations.
- 5.3 [Eversource Electric Mutual Aid Safety Onboarding](#)

6 Safety Guidelines

- 6.1 **All Injuries are Preventable**

6.1.1 Injuries are preventable through hazard/risk assessments, job safety briefings, a proactive approach to solving issues, and a commitment by all to the elimination of unsafe acts. Safety is a core value.

6.2 People are the Most Critical Element

6.2.1 You are personally responsible for your safety and the safety of others, and you must be committed to creating a safe and healthy work environment. Your hazard awareness, questioning attitude, and actions could save a life.

6.3 A Strong, Visible Leadership Commitment at Every Level is Essential

6.3.1 Safety leadership is critical at every level. Your commitment is critical to our success. When it comes to safety, we are all leaders, regardless of our position or title.

6.4 All Operating Exposures and Hazards Can Be Controlled

6.4.1 Effective Hazard Assessment and communication prevent incidents and injuries.

6.5 Management Must Monitor Safety Performance

6.5.1 Management monitors observations and investigations, analyzes trends, and provides proactive leadership for the continuous improvement of our safety program.

6.6 Employees Are Trained and Responsible for Safely Performing these Skills on the Job

6.6.1 Employees must insist that safe work procedures and rules are followed when performing all assigned tasks.

6.7 Safety Participation is Not an Option; it is an Expectation and a Condition of Employment

6.7.1 Your positive attitude and behavior regarding safety require a proactive mindset. When you approach any job, always have a questioning attitude.

6.8 Off-the-Job Safety and Wellness are Important Parts of the Safety Efforts

6.8.1 Safety is a way of life both on and off the job, for a better work life and beyond.

7 Eversource - Contractor/Outside Utility – Worker Responsibilities

7.1 Summary

7.1.1 OSHA's final rules for Transmission, Distribution, and Generation (1910.269, General Industry and 1926 Subpart V, Construction) include new or revised provisions on transferring information to contractors. The new provisions include requirements for Eversource and contract employers to exchange information on known hazards on the existing conditions, characteristics, design, and operation of Eversource's installation.

7.2 Objective

7.2.1 This policy provides instructions that pertain to establishing and maintaining a safe working environment for contract employees working on the Eversource operating system. The Eversource Information Transfer Policy is designed to meet the requirements set forth in 29 CFR 1910.269 and 29 CFR Part 1926 Subpart V.

7.3 Eversource Responsibilities

- 7.3.1 Before work begins, Eversource informs contract employers of:
- 7.3.2 The characteristics of Eversource's installation that are related to the safety of the work to be performed and are listed in Existing Characteristics and Conditions (i)-(v).
- 7.3.3 This requires Eversource to provide known information based on Existing Characteristics and Conditions (i)-(v).
- 7.3.4 Conditions that are related to the safety of the work to be performed, that are listed in Existing Characteristics and Conditions (vi)-(vii) and that are known to Eversource.
- 7.3.5 Eversource need only provide information to contract employers that can be obtained from its existing records through the exercise of reasonable diligence.
- 7.3.6 Information about the design and operation of Eversource's installation that the contract employer needs make the assessments required by this section.
- 7.3.7 Any other information about the design and operation of Eversource's installation that is known by Eversource, which the contract employer requests and that are related to the protection of the contract employer's employees.

7.4 Contractor/Outside Utility Responsibilities

- 7.4.1 Contract employers comply with the following requirements:
- 7.4.2 The contract employer ensures that each of its employees is instructed in the hazardous conditions relevant to the employee's work that the contract employer is aware of as a result of information communicated to the contract employer by Eversource.
- 7.4.3 Before work begins, the contract employer advises Eversource of any unique hazardous conditions presented by the contract employer's work.
- 7.4.4 The contract employer advises Eversource of any unanticipated hazardous conditions found during the contract employer's work that Eversource did not mention under our responsibilities. The contract employer provides this information to Eversource upon discovering the hazardous condition.
- 7.4.5 The contract employer and Eversource coordinate their work rules and procedures so that each employee of the contract employer and Eversource is protected as required under this section.
- 7.4.6 The standard requires that contractors conduct a detailed pre-job briefing to cover all known hazards including the below mentioned characteristics and conditions.
- 7.4.7 The contract employer has each General Foreman or Foreman/Lead, responsible for crews, responding for storm response complete the safety onboarding training.
- 7.4.8 When each crew lead has finished the safety on-boarding, complete the [verification form](#).

7.5 Worker Responsibilities

- 7.5.1 Comply with required federally mandated OSHA requirements and to the normal safety practices and policies of their home organizations (and Eversource's distribution rubber glove and sleeve requirement) to assure employee safety, the safety of other utility

employees and the public, and the protection of Eversource and public property.

- 7.5.2 Immediately report to your Eversource Contact Person (Crew Guide or External Field Resource Coordinator (EFRC)) any injuries, near miss events, and unsafe conditions.
- 7.5.3 Do not proceed with work unless familiar with the materials and equipment to be used and/or a clear understanding of work to be performed.
- 7.5.4 Request instruction from the Eversource Contact Person (Crew Guide or External Field Resource Coordinator (EFRC)) in charge of your work group if in doubt as to the proper procedures for assigned work.

8 Existing Characteristics and Conditions

Existing characteristics and conditions of electric lines and equipment that are related to the safety of the work to be performed are determined before work on or near the lines or equipment is started. Such characteristics and conditions include, but are not limited to:

8.1 Nominal Voltages of Lines and Equipment

- 8.1.1 System Voltages – Grounded Wye, Unigrounded Wye, and Delta Primary Circuits
- 8.1.2 Each operating company within Eversource has its own distribution system voltage safety requirements and design considerations. System-specific voltages are detailed in *Section 4.7, System Voltages - Grounded Wye, Unigrounded Wye, and Delta Primary Circuits*.

8.2 Minimum Approach Distances (MAD)

- 8.2.1 Refer to the applicable Minimum Approach Distance chart listed in *Table 2: OSHA Minimum Allowable Working Distance for Qualified Employees* on page 24.

8.3 Presence of Hazardous Induced Voltages

- 8.3.1 Induced voltages can originate from various sources on an electrical system. These include customer generation/back feed, lightning, parallel conductors running adjacent to energized conductors by means of electromagnetic field transference, and other naturally occurring conditions.
- 8.3.2 Conductors should always be isolated, tested, and grounded to eliminate the possibility of this type of situation.
- 8.3.3 If Eversource is aware or made aware of any circumstances that could result in induced voltages, information is transferred to the contractor.

8.4 Presence of Protective Grounds and Equipment Grounding Conductors

- 8.4.1 Protective Grounds limit the voltage rise at the work site to a safe value in those cases where the equipment or line being worked upon is accidentally energized. They also provide a means for fault current to flow in case of accidental energization, allowing upstream protective devices to trip. An additional function of protective grounds is to protect against capacitive or inductively coupled voltage from adjacent parallel energized lines or capacitively coupled voltage from adjacent equipment.

8.4.2 Each operating company within Eversource has its own Protective Grounding requirements based on the application and voltage.

8.5 Locations of Circuits and Equipment

8.5.1 The locations of circuits and equipment, including electric supply lines, communication lines, and fire protective signaling circuits are covered in the job briefing and can be accomplished by using one or more of the following methods:

- 8.5.1.1 Distribution Control Center or Transmission Control Center personnel
- 8.5.1.2 Project or Construction compliance personnel
- 8.5.1.3 Visual inspections performed by crew prior to beginning work
- 8.5.1.4 Documentation contained in work packets or designs
- 8.5.1.5 System Maps

8.6 Condition of Protective Grounds and Equipment Grounding Conductors

8.6.1 Proper protection and performance of protective grounding equipment requires a detailed visual inspection before each use, careful handling of equipment during use, and thorough cleaning and proper storage of equipment after use.

8.6.2 Cleaning of protective grounding equipment is necessary not only for visual inspections but to preserve the equipment's electrical integrity and protection, as well as to extend the life of the equipment.

8.6.2.1 Grounding conditions are maintained by each operating company within Eversource.

8.6.2.2 Theft of system and/or down grounds can be a common occurrence throughout the Eversource system and is considered prior to commencing work.

8.7 Condition of Poles

8.7.1 Each operating company within Eversource has its own procedure establishing a uniform approach for wood pole inspection, treatment, restoration, and replacement.

8.7.2 Eastern MA

8.7.2.1 Poles that pose a dangerous condition are noted as such on the inspection sheet and the supervisor is notified of the condition.

8.7.2.2 Pole Tag C, as shown in *Figure 1 Pole Tag C*, shall be affixed to the damaged pole adjacent to the pole marker.

8.7.2.3 The arrow on the tag should point towards the defect in the pole (either up or down).



Figure 1 Pole Tag C

8.7.3 CT/NH/Western MA

8.7.3.1 Poles that pose a dangerous condition are noted as such and the supervisor is notified of the condition.



Figure 2 "B" Pole Tag – Normal Reject or Reinforceable Poles

8.7.3.2 "B" pole tag is a metal tag that measures 2" high X 2-1/2" wide with a clear aluminum arrow on a red background.

8.7.3.3 The tag serves as a warning that the pole is defective and should not be climbed and supporting conductors should not be removed without additional suitable support.

8.7.3.4 "C" pole tag measures 2" high X 2-1/2" wide with a clear aluminum arrow with an "X" inscribed in a circle imposed on the shaft of the arrow on a red background.

8.7.3.5 A priority pole is one that is in imminent danger of falling because it is completely decayed across the grain or has a hollow heart with sound wood on the outer shell of one-inch thickness or less.



Figure 3 "C" Pole Tag – Danger Reject Poles

Warning: Do not rely on pole markings as an indication of the pole integrity. It is the responsibility of the individual to ensure the pole is safe to climb by first testing the pole using appropriate work methods. **Warning**

8.8 Inspection & Testing of Poles Prior to Climbing or Working

8.8.1 Inspect for pole inspection and defect pole markers. Inspect for buckling at the ground line and for an unusual angle with respect to the ground. Buckling and odd angles could indicate that the pole has rotted or is broken.

8.8.2 Inspect for cracks. Horizontal cracks perpendicular to the grain of the wood can weaken the pole. Vertical cracks, although not considered to be a sign of a defective pole, can pose a hazard to the climber, and the employee should keep his or her gaffs away from them while climbing.

8.8.3 Inspect for hollow spots and woodpecker holes, which can reduce the strength of a wood pole.

8.8.4 Rotting and decay are cutout hazards and are possible indications of the age and internal condition of the pole.

8.8.5 One large knot or several smaller ones at the same height on the pole could be evidence of a weak point on the pole.

8.8.6 Evidence of the existence of a former ground line substantially above the existing ground level can be an indication that the pole is no longer buried to a sufficient extent.

8.8.7 Soft, wet, or loose soil might not support any changes of stress on the pole.

8.8.8 Burning from transformer failures or conductor faults could damage the pole so that it cannot withstand mechanical stress changes.

8.8.9 Climbing wet or slippery poles due to conditions such as rain, ice, or snow are cutout hazards. If the pole can be safely climbed, the climber must take care to keep hands on the driest part of the pole at all times.

8.8.10 Hammer Test: Rap the pole sharply with a hammer weighing about three pounds, starting near the ground line, and continuing upwards circumferentially around the pole to a height of approximately 6 feet. The hammer will produce a clear sound and

rebound sharply when striking sound wood. Decay pockets will be indicated by a dull sound or a less pronounced hammer rebound. Also, prod the pole as near the ground line as possible using a pole prod or a screwdriver with a blade at least 5 inches long. If substantial decay is encountered, the pole is considered unsafe.

- 8.8.11 Rocking Test: Apply a horizontal force to the pole and attempt to rock it back and forth in a direction perpendicular to the line. Caution must be exercised to avoid causing power lines to swing together. The force can be applied either by pushing with a pike pole or pulling with a rope. If the pole cracks or leans during the test, it is considered unsafe.

To reiterate, pole markings are not a substitute for checking a pole before climbing, placing a ladder against the pole, or changing loading on the pole or adjacent poles.

8.9 Environmental Conditions (Relating to Safety)

- 8.9.1 Each operating company within Eversource has its own work methods and procedures to identify environmental conditions related to safety, including but not limited to:

- 8.9.1.1 Asbestos
- 8.9.1.2 Cable Abnormalities
- 8.9.1.3 Chemical Exposure
- 8.9.1.4 Enclosed/Confined Space
- 8.9.1.5 Flammable Atmospheres
- 8.9.1.6 Flooding
- 8.9.1.7 Ignition Sources
- 8.9.1.8 Insects and Animals
- 8.9.1.9 PCBs
- 8.9.1.10 Traffic Areas

If Eversource is aware or made aware of any circumstances that could result in an environmental condition related to safety, information is communicated through the Eversource Contact Person (Crew Guide or External Field Resource Coordinator (EFRC)).

9 Daily Safety Messages (Storms Only)

- 9.1 During most events, daily safety messages are developed and distributed to all crews involved in restoration efforts.
- 9.2 Safety messages typically include a weather forecast, summary of significant safety events, pertinent safety topics, and safety contact names and numbers.
- 9.3 These briefings are sent out by Eversource Safety and go to all email addresses on file for the storm. Briefings can also be [found here](#) on Eversource.com.
- 9.4 When applicable, the Eversource Contact Person (Crew Guide or External Field Resource Coordinator (EFRC)) assigned to contractor/outside utility crews will be responsible for ensuring contractor/outside utility crews receive a proper safety briefing and system updates on a daily basis.
- 9.4.1 Contractor/Outside Utility Crew Leads are responsible for delivering/communicating the messages to their crews.

10 Communicating to Defuse Potentially Threatening/Violent Behavior

- 10.1 Assume that the customer has a right to be angry; always acknowledge the problem.
- 10.2 Project calmness: move and speak slowly, quietly, yet confidently.
- 10.3 Be respectful.
- 10.4 Be an empathetic listener: listen carefully and patiently (this can be hard when a person is upset). Focus your attention on the person.
- 10.5 Don't get right in front of the person, maintain a relaxed posture.
- 10.6 Form some bond or connection.
- 10.7 Use delaying tactics to help the person calm down (for example, offer a drink of water in a paper cup).
- 10.8 Don't blame the company or someone else in the company. Call local police (911) if you feel threatened and, once you are safe, report the incident to your Eversource Contact Person (Crew Guide or External Field Resource Coordinator (EFRC)).

11 Response to a Serious Accident

- 11.1 Before performing work, know the location of the nearest medical facilities. **KNOW YOUR EXACT LOCATION BEFORE STARTING WORK.**
- 11.2 In case of an accident of a serious nature, which is defined as any situation involving treatment beyond first aid that includes any electrical contact/flash, follow this procedure:
 - 11.2.1 Call 911 for help.
 - 11.2.2 Immediately notify your Eversource Contact Person (Crew Guide or External Field Resource Coordinator (EFRC)). - (See *Attachment 2, Critical Eversource Contacts*)
 - 11.2.3 Advise your Eversource Contact Person (Crew Guide or External Field Resource Coordinator (EFRC)) of the following:
 - 11.2.3.1 Company name
 - 11.2.3.2 Crew Lead name
 - 11.2.3.3 Truck Number
 - 11.2.3.4 Type of accident
 - 11.2.3.5 Number of persons injured
 - 11.2.3.6 Location of accident
 - 11.2.4 If the location is not accessible to a vehicle, post an employee to direct responders as near as possible to the scene of the accident.
 - 11.2.5 Advise what is being done for the injured.
 - 11.2.6 Keep someone, if available, standing by the radio or phone to take or give additional information.
 - 11.2.7 Do not give the name of the injured over the radio. Call the Eversource Contact Person (Crew Guide or External Field Resource Coordinator (EFRC)) by phone as soon as possible and furnish this information.
 - 11.2.8 The Eversource Contact Person (Crew Guide or External Field Resource Coordinator

(EFRC)) makes notifications to Safety and the System EOC.

12 Conducting a Documented Job Briefing

- 12.1 Documented job briefings are performed at each work site to review and emphasize the specific safety requirements of the project and the potential hazards of the job prior to beginning work.
- 12.2 In assigning an employee or a group of employees to perform a job, the employer provides the employee in charge of the job with all available information that relates to the determination of existing characteristics and conditions required of the work.
- 12.3 A briefing shall be conducted at any time the scope of the job changes.

12.4 **Examples are what need to be covered on a Job Brief are as followed:**

- 12.4.1 Hazards associated with the job
- 12.4.2 Work procedures involved with the job
- 12.4.3 Special precautions
- 12.4.4 Energy Source Controls
- 12.4.5 Personal Protective Equipment (PPE)
- 12.4.6 Emergency Procedures

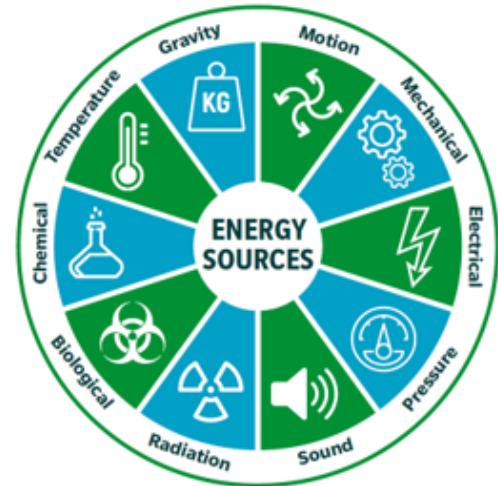


Figure 4: Energy Wheel

13 System Voltages – Grounded Wye, Unigrounded Wye, and Delta Primary

NOTE

Due to back-feed conditions that can result from loads that are connected phase to phase on Delta and Unigrounded circuits, all phase conductors can still remain energized even after any given single-phase device (such as a cutout or switch) is opened. Open all three phases if it is necessary to de-energize a circuit.

Circuits

- 13.1 Eversource's primary circuits are connected in Grounded WYE, Unigrounded Wye, and Delta configurations. Ask your Eversource Contact Person (Crew Guide or External Field Resource Coordinator (EFRC)) for specifics on the local area voltages and circuit configuration, and review Attachment 5, Work Site Grounds for guidelines.
- 13.1.1 Grounded Wye primary circuits consist of three primary phase conductors and a multi-grounded neutral. Transformers are typically connected between the phase conductor and the neutral.
- 13.1.2 A Delta and Unigrounded Wye primary circuit consists of three primary phase conductors for three- phase feeders and two primary conductors for single-phase taps. Transformers and side taps are connected phase to phase. They do not have a multi-

grounded neutral like on grounded wye circuits.

13.2 System Protection includes Smart Switches, Reclosers (located in the field and substations), Sectionalizers, TripSavers and Fused Disconnects.

13.2.1 For Switching & Tagging, Circuits are opened and tagged through local Eversource personnel. Station switching is performed by substation crews and remotely using SCADA.

13.2.1.1 Refer to Attachment 4, Eversource Fusing Cards for state-specific fusing guidelines.

13.2.1.2 Eversource provides external storm support with an awareness guide of common devices on our electric system.

13.2.1.3 [Eversource Recloser-Sectionalizer Device Guide](#)

14 Table 1: Eversource Nominal System Voltages

ES PRIMARY DISTRIBUTION VOLTAGES PER COMPANY				
Voltage	Company			
	Connecticut	New Hampshire	E Massachusetts	W Massachusetts
2,300V Delta				
2,160/3,740 V		X	X	
2,400/4,160 V	X	X	X	X
4,800/8,320 V	X	X	X	X
4,800/8,320 Delta	X			
7,200/12,470 V		X		
7,620/13,200 V	X		X	
7,967/13,800 V	X	X	X	X
11,450 kV	X			
13,200/22,860 V	X		X	X
14,000/24,940 V	X		X	
19,920/34,500kV	X	X	X	
26,558/46,000 V		X		
27,600 V Delta	X			

15 Personal Protective Equipment (PPE)

15.1 Fall Protection

15.1.1 At heights above four feet, 100% fall protection is required for qualified employees who climb or change locations on poles, towers, or similar structures.

15.1.2 100% fall protection is required when working out of a Material Handler/Digger Derrick Bucket or any other aerial device.

15.2 Head & Eye Protection

15.2.1 Protective headgear (hard hat) shall be worn at work locations.

15.2.2 Hardhats must meet ANSI Z89.1 Type 1 or 2, Class E or G.

15.2.3 Safety glasses shall be worn in work locations.

15.2.4 Safety glasses must meet ANSI Z87.1-2020.

15.2.5 Arc rated face shields and hoods/or balaclava to protect the head, face, and neck are required while working aloft on energized lines with an arc energy $> 9 \text{ cal/cm}^2$ and also required for opening and closing (the making or breaking of primary load) when operating overhead primary switching devices (e.g., cutouts, disconnects, Trip Savers, etc.) aloft.

15.3 Foot Protection

15.3.1 Safety footwear shall be worn at work locations.

15.3.2 Work activities expose workers to high risk of foot injury such as falling or rolling objects or objects piercing the sole and where an employee's feet are exposed to electrical hazards.

15.3.3 Safety shoes must meet ASTM F 2413-18, M/I/C/75, and Electrical Hazard (EH) rated.

15.4 Body Protection

15.4.1 Clothing worn by employees in the performance of their duties must be suitable for the work to be performed and the conditions under which the work is to be performed.

15.4.2 Fire resistant (FR) clothing shall be worn in work areas when working on or near electrical parts or equipment at 50 volts or greater.

15.4.3 Minimum of 8 cal/cm^2 ARC FLASH rated class 2.

15.4.4 High visibility traffic vest (Class 3) or clothing when exposed to traffic.

15.4.5 Minimum of Class II high voltage rubber gloves and rubber sleeves (rated sleeves while aloft) (or higher rated gloves and sleeves dependent upon actual system voltages exposure) are required to be worn at all times whenever an employee is exposed to conductors which may be energized or become energized, including any conductor which is effectively grounded.

15.4.6 Class II rubber gloves are required to be worn at all times when utilizing any type of insulated (tested and inspected) live line tool. Any deviations must be approved by the Director of Safety or his designee.

15.4.6.1 Class 0 – low voltage rubber gloves can be worn to make repairs on the house side of secondary service drops.

15.4.6.2 Rubber sleeves are not required when working on the house end of a service.

15.4.6.3 Any further deviations must be approved by the Director of Eversource Safety or designee.

16 Fitness for Duty

16.1 The use of illegal drugs and alcohol are strictly prohibited while working for Eversource.

16.2 No one is to report for work while under the influence of either.

16.3 You are required to comply with all commercial driver's license rules and Department of Transportation rules and regulations pertaining to use of drugs and alcohol.

16.4 Non-compliance with these rules is grounds for immediate dismissal from working.

17 Working Hours

- 17.1 Outside crews are expected to adjust to local work schedules, which for extended restoration situations, can typically involve maximized daytime and minimized nighttime hours.
- 17.2 No individual is expected to work when fatigue affects their ability to work safely.
- 17.3 Sleeping is not allowed in the vehicle while on duty.

18 Use of Pole Banners

- 18.1 Pole banners are intended as an informational work control barrier for highlighting energy isolation points while crews are working beyond a protective device on primary lines. Installed pole banners alert personnel at the feed side that there are crews working on the circuit. Crew information (Name, Contact Phone Number) must be located on the pole banner.

NOTE: Other normal crew protections must also take place, such as lifting taps and grounding. The banner alone is not a protection method and should never be treated as such.

- 18.2 During storm restoration, crews can apply pole banners even when working with a System Operations Center (SOC) clearance, to alert anyone coming upon a visible break or isolating device that there are crews working.
- 18.3 All employees and contractors need to understand and respect the pole banners as an informational method to warn you of personnel working on a circuit. If your work includes a device within or at the boundary where a pole banner is installed, use the information on the tag or the banner to contact the personnel working on the circuit prior to beginning any work.

18.4 Specific Requirements

- 18.4.1 Application and removal of the pole banners and tags are the responsibility of each qualified crew. Only Eversource-approved pole banners and tags are used (see *Figure 4* and *Figure 5*).
- 18.4.2 Pole banners should be applied on the pole where the open device is located.
- 18.4.3 Pole banners do not need to be applied from a bucket.
- 18.4.4 A banner information tag must be completed and inserted into the pocket of the traditional pole banner or written directly on the banner when using the disposable banners.
- 18.4.5 Multiple banners are allowed; however, an additional banner cannot be installed without first contacting the person who installed the original banner. Refer to the information tag or the banner for the contact's name.
- 18.4.6 If the Eversource Contact Person (Crew Guide or External Field Resource Coordinator (EFRC)) cannot be reached, contact the appropriate governing switching authority to remove the banner, for example the SOC or the local district if switching is

decentralized.

18.4.7 Qualified crews install the pole banners and information tags, and they remain in place until the work is complete (for the day), all grounds have been removed, and all workers and equipment are in the clear.

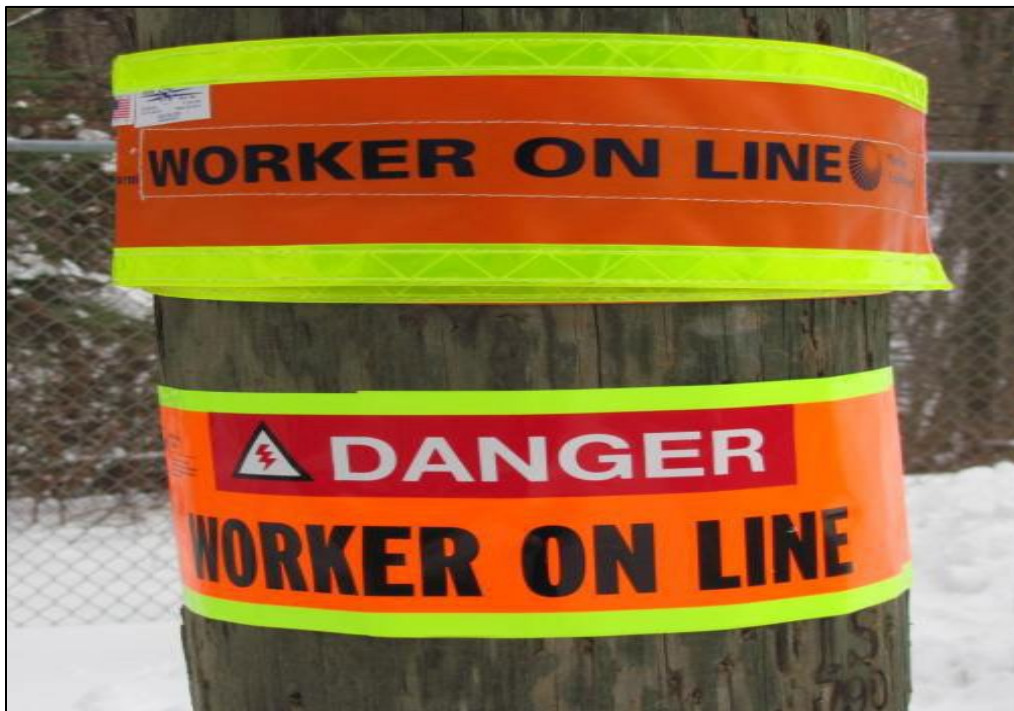
18.4.8 If a pole banner is applied at a work site, contact the person on the tag before starting any work.

⚡ Warning! NEVER ENERGIZE A LINE WHEN A POLE BANNER IS STILL APPLIED AT AN ENERGY ISOLATION DEVICE!

Figure 5
Traditional Velcro Pole Banner with Tag.



Figure 6
Traditional Velcro Pole Banner (top). Disposable Pole Banner (bottom)



19 Managing Arc Flash Hazards

19.1 The National Electric Safety Code (NESC) requires electric utilities to perform an arc flash hazard analysis for employees who work on or near energized conductors. If the arc flash energy is greater than 2 cal/cm^2 , employees are required to wear clothing or a clothing system (for example, layered) that has an effective arc rating not less than the anticipated level of arc energy, and minimize the duration of work performed or use hot stick techniques. The outer layer of FR clothing must be a minimum of 8 cal/cm^2 .

19.2 **Additional requirements include protecting the head and face when arc flash exposure is $\geq 9 \text{ cal/cm}^2$. The following guidelines should be followed when in the Eversource service territory:**

19.2.1 Include a discussion of arc flash hazards in each job briefing.

19.2.2 If performing live line work:

19.2.2.1 Request the available arc flash energy from your Eversource Contact Person (Crew Guide or External Field Resource Coordinator (EFRC)) for each specific work location.

19.2.2.2 If the arc rating of your clothing meets or exceeds the arc flash energy at your work location, perform the assigned work using your normal work practices.

19.2.2.3 If the arc flash energy at your work location exceeds the rating of your FR clothing or your normal work practices, request hot-line tag protection if available (hot line tag applies a high-speed curve that limits arc flash energy and defeats automatic reclosing).

19.2.3 If Eversource cannot provide the available arc flash energy or if the conditions listed

above cannot be met, then the work must be performed with hot sticks or once de-energized.

19.2.4 See your Eversource Contact if you have any questions.

20 Distribution Switching and Tagging Requirements

20.1 Energizing or de-energizing of nomenclature (numbered) switches and three phase devices is done only under the supervision of an Eversource employee qualified on the authorized person list (APL).

20.2 During storm restoration, we can operate our system radially. This means if there is an alternate supply to the line being worked on; the device is tagged out under the dispatcher's name. Any work being performed along the backbone remains under dispatcher jurisdiction. There can be times (rights-of-way, for example) when we use an alternate source to pick up customers.

20.3 Outside utility crews and contractors can work with the approval of local Eversource management on portions of radial side taps. The person in charge assumes responsibility for opening all cutouts, disconnects, jumpers, taps, and other means through which KNOWN sources of electric energy can be supplied.

NOTE

This does not relieve the employee of the responsibility to test for potential and appropriately ground the line(s) and/or equipment for possible sources of backfeed such as transformers and laterals, which are not considered to be known sources. The device must be rendered inoperable (that is, remove the cutout doors and high side taps if possible).

21 Contractors/Outside Utilities Not on the Authorized Person List Working on Eversource Apparatus

21.1 An Authorized Person must hold clearance and direct switching for all work to be performed by non- Eversource work crews protected by three phase main line devices such as station breakers, three phase reclosers, and so on.

21.2 A Non-Authorized Qualified Person can switch under the direction of an Authorized Person.

22 Mutual Assistance in Storm Emergencies by Foreign Utility Crews

22.1 Authorized Eversource Employees that have been given Delegated Controllership of distribution feeders, can direct foreign crews to utilize their own protective procedures (such as tagging) to protect themselves during storm restoration efforts.

23 Control of the Electrical System

23.1 The System Operator is the controller of the transmission, distribution, substation, and network systems used to energize or de-energize circuits or apparatus. No device under the control of System Operations, whether on a line or in a station, can be operated without permission from the System Operator, except under the following circumstances:

23.1.1 **Controllership delegation** is given and documented by the System Operator to only an

Authorized Person.

23.1.1.1 All delegated Controllership is performed with the same operational rigor as if issued through the System Operator.

23.1.2 Radial Side Tap Use

23.1.3 When an Authorized worker or contractor, or a Qualified contractor during emergency storm restorations, is dispatched to an outage on an overhead fused radial side tap, the dispatched crew automatically has Controllership of that area and is responsible for all tagging, including the use of pole banners.

23.1.4 The responding crew(s) notify the System Control Center once onsite, and request System Operator direction if overhead fuse(s) needed for isolation are found closed.

23.1.5 A switching order from the System Operator is not required to energize the area once repairs are made and a patrol has been completed by the worker.

24 Roles & Responsibilities of Clearance Holders and Switchers

24.1 Individuals have roles and responsibilities that must be fulfilled, in addition to the duties and responsibilities of the System Operator. This section outlines those responsibilities, based on role.

24.2 Clearance Holder

24.2.1 Under a Clearance situation, the Clearance Holder can operate a device within a Zone of Protection under certain conditions outlined in Eversource's Switching and Tagging Procedure *ESOP-100, Device Operation within a Zone*.

24.3 Emergency Conditions

24.3.1 Under emergency conditions that endanger life or property, a Qualified Person working for Eversource can only perform switching by opening apparatus to relieve the condition without first contacting the System Operator.

24.3.2 The person performing the emergency switching assumes full responsibility for the switching (opening only) and must relay all details to the System Operator immediately.

24.3.3 If a device is opened for any reasons, it may not be closed without the Authorized Person receiving permission to do so from the System Operator.

24.4 Tagging by Contractors and Outside Utility Crews

24.4.1 Contract crews that have been dispatched to an overhead fused radial side tap can use their own protective procedures/tagging to protect themselves.

24.4.2 Eversource Authorized Persons that have been given Controllership of distribution feeders during emergency events can direct mutual assistance foreign utility contract crews to use their own protective procedures/tagging to protect themselves during emergency restoration efforts.

24.4.3 Contractors may use their company tags and tracking for secondary/peripheral circuits.

25 Control Room System Operator Duties

25.1 The System Operators and System Operator Supervisors and Managers must:

- 25.1.1 Be employed by Eversource.
- 25.1.2 Be responsible for all aspects of system operations for Eversource electric and for the coordination of emergency restoration.
- 25.1.3 Make final decisions regarding restoration and system configuration issues.
- 25.1.4 Escalate restoration strategies to upper management.
- 25.1.5 Stand up, organize, and lead a situational call any time a significant event has been determined to have occurred.
- 25.1.6 Be the critical driver in improving the overall outage and event response.
- 25.1.7 Have the authority to independently act to secure the system.
- 25.1.8 Have the highest priority of ensuring the safety of co-workers and members of the public.
- 25.1.9 Give authorization to work after necessary precautions are taken.
- 25.1.10 Order qualified field personnel to operate switches or devices.
- 25.1.11 Verify the Limits of a Zone of Protection or Permission Zone and that circuit/apparatus involved is isolated from all Known Sources of Voltage.
- 25.1.12 Verify that the Clearance, Permission, Non-Reclosing Assurance (NRA) Holder is on the Authorized Persons List.
- 25.1.13 Record all system configuration changes and tags that have been ordered on or removed from equipment under their jurisdiction.
- 25.1.14 If any doubts arise regarding the qualifications or knowledge of an Authorized Person, stop the job, and communicate the facts to the individual's supervisor.
- 25.1.15 Issue, accept release of, and transfer Clearances, Permissions, and NRAs, and document the information.
- 25.1.16 Issue and accept Release of Guarantees with Foreign Utilities or Generators.
- 25.1.17 Accept guarantees from Foreign Utilities or Generators.
- 25.1.18 If required, verify with the Clearance of Permission Holder that phasing is checked and proven correct before equipment is returned to service.

26 Switcher Duties

26.1 The Switcher must:

- 26.1.1 Be an Eversource employee, contractor working for Eversource, or a CONVEX/ESCC Participant employee that is also an Authorized Person.
- 26.1.2 Always follow the Six Steps of Perfect Switching (see *Attachment 3*)
- 26.1.3 Wear appropriate PPE at all times during switching.

26.1.4 Have appropriate knowledge of the type of apparatus that is to be operated.

NOTE

A non-Authorized but Qualified Person can perform switching under the direct supervision of an Authorized Person at the switching location. This usually occurs for the purposes of training or emergency response support.

27 Clearance or Permission Holder Duties

27.1 The Clearance or Permission Holder shall:

- 27.1.1 Be an Eversource employee, contractor working for Eversource, or an Eversource Participant employee who is also an Authorized Person.
- 27.1.2 Have appropriate knowledge to understand the Limits and Ground locations that define the Zone of Protection or protective boundary for which they are requesting Clearance.
- 27.1.3 Have the ability to direct the work to be done.

27.2 Perform the following steps when requesting a Clearance or Permission:

- 27.2.1 Obtain the Clearance Zone of Protection or Permission Zone from the System Operator for all isolating devices necessary to isolate the circuit or apparatus being worked on from all Known Sources of Voltage.
- 27.2.2 Communicate the transmission, distribution, or substation apparatus to be worked on. (The Limits of the Clearance or Permission must be adequate for the work to be performed. A clearance or Permission can only be obtained by an Authorized Person.)
- 27.2.3 If more than one crew is working under a single tagout or Worker Grounds are installed, use and maintain a Field Tracking Form that is up to date per Eversource Switching and Tagging ESOP-100.

27.3 When releasing a Clearance or Permission, perform the following steps:

- 27.3.1 If all work is complete, notify the System Operator that all personnel are in the clear, equipment is clear of minimum approach distance, worker grounds have been removed, and the Isolated Area is ready to return to service.
- 27.3.2 If work is NOT complete, notify the System Operator of the status of work remaining.

27.4 Responsibility for Switching all Equipment Properly – Switching Orders

- 27.4.1 The System Operator and the Switch Person are both accountable for the proper performance of the switching.
- 27.4.2 Effective communication during switching is paramount. Communications between the System Operator and the Switch Person performing the switching and tagging are person-to-person whenever possible.
- 27.4.3 When the System Operator cannot talk directly to the Switch Person doing the switching and tagging, orders can be relayed through another Authorized Switch Person, who can communicate with both the System Operator and Switch Person performing the

switching and tagging operations.

- 27.4.4 To provide the best check and balance possible, a pre-switch brief is initiated by the System Operator.
- 27.4.5 All switching and tagging orders are given and received over recorded communications channels.
- 27.4.6 The preferred communications path is using the radio system, whenever practical. It is the responsibility of the System Operator to enforce this. In cases where this mechanism is not practical, telephone lines can be used with the approval of the System Operator, provided they are on a recorded channel.
- 27.4.7 All conveyances of switching orders commence with an appropriate phrase denoting the commencement of switching such as, "This is a switching order ..."
- 27.4.8 All switching orders received from the System Operator are read back verbatim. In all cases of unplanned switching, the switching step(s) are written down before they are performed.

28 Communicating Switching

- 28.1 Use effective communication and professionalism during switching.
- 28.2 Use Three-Part Communication for all switching orders.
- 28.3 Whenever possible, use person-to-person communications during the switching and tagging process.

29 Releasing a Clearance

- 29.1 A Clearance is released by the Clearance Person and acknowledged by the System Operator utilizing the proper formal language and Three-Part Communication techniques.
- 29.2 Prior to the Release of a Clearance to the System Operator, the Clearance Person(s) shall:
 - 29.2.1 Determine the overall status of the work (work complete or work not complete) and determine if the affected lines or apparatus are ready for service.
 - 29.2.2 Determine that all persons working under their Clearance and equipment are clear of the lines or apparatus.
 - 29.2.3 Determine that Worker Grounds, if applied, have been removed.

30 Safety STOP – Switching

- 30.1 If either the System Operator or the Switch Person determines that there is a safety or operational concern, they safely stop all switching, communicate these concerns to each other, and if necessary, obtain direction from their supervisors before proceeding.

31 List of Tags Used During Switching (Distribution & Transmission

31.1 Clearance Tags

- 31.1.1 The placement of Clearance Tags does not imply that Grounds are installed. Visible breaks and Grounds are required under a Clearance when practicable.
- 31.1.2 Placed on Limits in the open position for known sources.
- 31.1.3 Ensure that a tagged device is not to be operated.
- 31.1.4 Establish a Zone of Protection, which is isolated from all Known Sources of Voltage with visible breaks and Grounded where practical.
- 31.1.5 Equipment is tested for potential and grounded.
- 31.1.6 Allows the application of the test potential with the Zone of Protection provided that all other Clearance Holders for that Zone of Protection have been released and express authorization from the System Operator is granted.
- 31.1.7 **An example of a Clearance Tag use is when minimum approach distances cannot be maintained.**



31.2 Permission Tags

- 31.2.1 Are placed on limits in the open position.
- 31.2.2 Ensure that a tagged device will not be operated.
- 31.2.3 Shall be used on a normally closed source device in the open position, which could be used on a normally open-source device in the open position to establish a Permission Zone for work on lines or equipment using Live Line Work Methods.
- 31.2.4 Allow the application of test potential within the Permission Zone, provided that all other Permission Holders for that Permission Zone have been released and express authorization from the System Operator is granted.
- 31.2.5 **Examples of Permission Tag uses include:**
 - 31.2.5.1 Overhead repairs when switches are opened for emergencies. Conductors shall be treated as energized, using Live Line Work Methods.
 - 31.2.5.2 For work that does not require Clearance Zone of Protection but requires equipment to be de-energized.



31.3 Non-Reclosing Assurance (NRA) Tags

- 31.3.1 Placed on device(s) and/or associated supervisory controls to prevent automatic or manual line re-energization.
- 31.3.2 May include enabling Hot Line Tag for Arc Flash Protection.
- 31.3.3 An NRA tag and a Caution tag can be applied on the same device.
- 31.3.4 **An example of NRA tag use is when a breaker or equipment reclosing is off.**



31.4 CAUTION Tags

- 31.4.1 Indicate that a device should not be operated until the instructions documented on the Caution tag are complied with.
- 31.4.2 May be placed on electrical apparatus in any position.
- 31.4.3 Must not be used to establish a Zone of Protection.
- 31.4.4 Can be applied on the same device with any other tag type.
- 31.4.5 Must be used by the System Operator to track devices out of their normal configuration when ordered in switching.
- 31.4.6 **Examples of Caution Tag uses include:**
 - 31.4.6.1 To track System Operator Grounds in the field.
 - 31.4.6.2 To indicate ground continuity through a closed disconnecting device.
 - 31.4.6.3 To prevent operation of switching devices opened on precaution in support of work on another asset (network feeder put on the ground bus as a precaution, and so on).
 - 31.4.6.4 To identify a device unsuitable for normal operation or to highlight special operating restrictions documented on the tag that must be complied with before device operation.



32 Grounding of Equipment

- 32.1 All conductors and equipment are to be treated as energized until tested, found to be de-energized, and equipotential grounded.
 - 32.1.1 Equipotential grounding must be used; if not, live line technique shall be performed.
- 32.2 Protective grounding equipment shall be capable of conducting the maximum fault current that could flow at the point of grounding for the time necessary to clear the fault.
 - 32.2.1 Distribution Ground Size Requirements per Circuit can be on our website under [Eversource Grounding Requirements](#).
 - 32.2.2 These grounding requirements are broken down by the state you are operating in.
- 32.3 Protective grounding equipment shall have an ampacity greater than or equal to that of 1/0 AWG.
- 32.4 Examples are provided in *Attachment 3* and *Attachment 5 (Six Steps to Perfect Switching*

and *Work Site Grounds*, respectively).

33 De-energizing and Grounding Lines and Equipment

- 33.1 Lines are tested and found absent of potential voltage before installing grounds or performing work on lines and equipment.
- 33.2 After de-energizing lines, temporary protective grounds are installed.
- 33.3 When an employee attaches a ground to a line or to equipment, the employee attaches the ground end connection first and then attaches the other end by means of a live-line tool.
- 33.4 When an employee removes a ground, the employee removes the grounding device from the line or equipment using a live-line tool before he or she removes the ground-end connection.
- 33.5 If potential is detected, stop work until the source is located and corrected. Customer generation is considered a source of potential.
- 33.6 Always wear approved PPE while testing and grounding the equipment.

34 Backfeeds

- 34.1 Backfeeding occurs when electric power is induced into the local power grid. Backfeeds must be discussed in every Safety Briefing and necessary precautions taken.
- 34.2 Common backfeeds include improperly installed generators, distributed generation (for example, photovoltaic solar power), cable TV systems (for example, video-ready access devices), and utility protection devices (such as a recloser).
- 34.3 **Always test for potential** and the presence of backfeed.

35 Gloving Requirements

- 35.1 At a minimum, each employee needs to follow the rules and regulations set by their company and follow all rules and regulations in accordance with OSHA standards with the exception of the following rule for distribution work only:
 - 35.1.1 Minimum of Class II high voltage rubber gloves and rubber sleeves (rated sleeves while aloft) (or higher rated gloves and sleeves dependent upon actual system voltages exposure) are required to be worn at all times whenever an employee is exposed to conductors which may be energized or become energized, including any conductor which is effectively grounded.
 - 35.1.2 Class II rubber gloves are required to be worn at all times when utilizing any type of insulated (tested and inspected) live line tool. Any deviations must be approved by the Director of Safety or his designee.

36 Live Line Tool Requirements

- 36.1 Live-line tools and equipment are used to work on energized circuits and equipment when the practices and procedures of hands-on rubber gloving are not utilized.
- 36.2 Live Line tools may also be used on de-energized but not effectively grounded

conductors.

36.3 Class II rubber gloves are required to be worn at all times when utilizing any type of insulated (tested and inspected) live line tool.

36.4 Only one operation at a time should be performed on the same structure or pole.

36.5 Users are ultimately responsible for the protective qualities of live-line tools. Users are also responsible for identifying tools whose protective qualities have been compromised and removing those tools from service.

36.6 OSHA regulation 10 CFR 1910.269(j) (2) requires the following precautions for live-line tools:

36.6.1 Each tool is wiped clean and visually inspected for defects before use each day.

36.6.2 A tool is removed from service for testing if a defect or contamination present could adversely affect protective properties.

36.6.3 Tools used for primary employee protection (such as hot sticks) are removed from service every two years for examination, cleaning, repair, and testing.

36.6.4 Only live-line tools constructed of FRP are permitted for use at Eversource. Use of wooden live-line tools on live or de-energized lines or equipment is prohibited.

36.7 Work is performed from a safe position maintaining a minimum clearance from energized parts.

36.8 At a minimum, the OSHA requirements listed in *Table 2* must be followed.

NOTE: If your company requirements are stricter, they supersede the OSHA requirement.

37 Table 2: OSHA Minimum Approach Distance for Qualified Employees

Minimum Allowable Distances – Qualified		
Voltage	Phase to Ground (Distance in Feet/Inches)	Phase to Phase (Distance in Feet/Inches)
50 to 300	Avoid Contact	Avoid Contact
301 to 750	13.1"	13.1"
751 to 5,000	2'1"	2'1"
5,001 to 15,000	2'2"	2'3"
15,001 to 36,000	2'7"	2'11"
36,001 to 46,000	2'10"	3'3"
46,001 to 72,500	3'4"	4'
72,600 to 121,000	3'4"	4'3"
121,001 to 145,000	3'10"	4'10"

145,100 to 169,000	4'4"	5'5"
230,000	5'3"	7'6"
345,000	8'6"	12'6"

38 Tree Trimming and Clearing

38.1 All line clearance tree and brush work for Eversource is performed in compliance with all applicable federal, state, and local laws and regulations. Because of the high-level, quality workmanship required, contractors employ only supervisory and field personnel that are thoroughly skilled and qualified in distribution line clearance and work to ANSI Z-133.1 2017 and OSHA 29 CFR 1910.269 standards.

39 Distribution Tree Worker Request for De-Energizing and Grounding

39.1 All conductors and equipment are treated as energized until tested, found to be de-energized, and grounded.

39.2 Qualified Line Clearance Tree Trimmer (LCTT) or Qualified Line-Clearance Arborist (LCA) can remove branches that are contacting exposed energized conductors or equipment or that are within the minimum approach distances only using insulating equipment.

39.3 Workers maintain minimum approach distances and do not allow conductors to come in contact with their bodies. When insulated tools cannot safely be used, the line is de-energized and grounded according to OSHA standards and this safety guideline. An LCTT/LCA can request grounding for work on any tree they determine cannot be safely completed with the line energized.

39.4 **The following list describes how an LCTT/LCA can request that a line be de-energized and grounded when tree work cannot be performed safely with the line energized. (See *Attachment 1, Definitions* for definitions and acronyms.)**

39.4.1 The LCTT/LCA advises the Eversource Contact that the tree work cannot be completed with the line energized and requests that the line be de-energized and grounded.

39.4.2 A qualified Eversource employee discusses the proposed tree work with the LCTT/LCA and develops a plan for de-energizing and grounding the line and communicating with the LCTT/LCA.

39.4.3 The qualified Eversource employee coordinates the planned switching and grounding through the SOC or designated authority.

39.4.4 The qualified Eversource employee de-energizes the line, tests for potential, and grounds the line in conformance with Eversource Grounding Procedures.

39.4.5 The qualified Eversource employee advises the LCTT/LCA that the line has been de-energized and grounded in preparation for the necessary tree work.

39.4.6 The LCTT/LCA acknowledges that the line is de-energized and grounded, notes this on their Job Brief, applies an LCTT/LCA pole banner to the pole(s) where grounds are placed, and performs the tree work. Upon completion, the LCTT/LCA notifies the qualified Eversource employee that the work has been completed and that all tree crew

personnel and equipment are clear of the line.

39.4.7 The qualified Eversource employee coordinates the re-energization of the line through the SOC or designated authority.

39.4.8 The qualified Eversource employee verifies that all personnel and equipment are in the clear and the line is safe to re-energize and then re-energizes the line.

40 Additional Emergency Restoration Safety Requirements for Tree Crews

40.1 In addition to working to the OSHA 29 CFR 1910.269 and ANSI Z133.1 safety standards, Eversource requires compliance with the following two safety rules for all line-clearance contractors:

40.1.1 Elevator Lift Devices: The following rule applies to contractors performing tree work using an aerial lift manufactured with an elevator lift device between the truck chassis and lower boom.

40.1.2 All ground workers of the contractor maintain a minimum clearance of three feet from aerial lifts (including body, chassis, and outriggers) and all attached equipment (such as chippers) and do not operate any attached equipment while the aerial lift is performing line clearance operations. This rule does not apply to emergency rescues.

40.2 **Operations between conductors:** No tree worker places or moves their bucket between the primary and other electric or communications lines. This policy is followed regardless of the distance between the primary and other electric or communications lines.

40.3 **Minimum Requirements for Tools & Equipment:** In addition to the normal tree work tools including two chain saws, ropes, pole pruners, and hand tools, each crew is required to:

40.3.1 Be prepared for night work with one permanent or temporary directable, truck-mounted, spotlight per vehicle and one large (approximately 9 volts or equivalent) portable hand light.

40.3.2 Be prepared to stay overnight if dispatched to a foreign location.

40.3.3 Be prepared, in winter, for ice and snow with tire chains and repair links, non-skid wheel chocks and the proper clothing for current conditions, especially, rain gear (including boots) to protect from precipitation and warm clothing in the event of cold weather.

41 Minimum Approach Distances (MAD) for LCTT/LCA

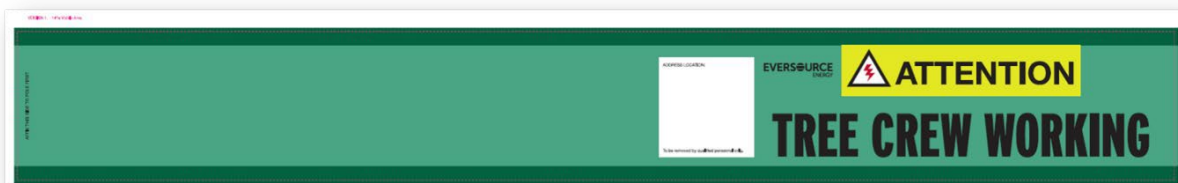
Minimum Approach Distances (MAD) from energized conductors						
	Altitude Correction Factor Sea Level to 5,000 ft. (0 – 1,524m)*		Altitude Correction Factor Sea Level 5,000 ft. to 10,000 ft, (1,524 – 3.048m)*		Altitude Correction Factor Sea Level 10,000 to 14,000 ft. (3.048 – 4,267m)*	
Voltage Range						
(Phase to Phase)	Phase-to-Ground		Phase-to-Ground		Phase-to-Ground	
kV	ft-in	m	ft-in	m	ft-in	m

0.050 to 0.300	Avoid Contact		Avoid Contact		Avoid Contact	
0.301 to .0750	1-02	0.356	1-04	0.407	1-06	0.458
0.751 to 5.0	2-03	0.686	2-06	0.762	2-09	0.839
5.1 to 15.0	2-03	0.686	2-07	0.788	2-10	0.864
15.1 to 36.0	2-08	0.813	3-01	0.940	3-04	1.016
36.1 to 46.0	2-11	0.889	3-04	1.016	3-08	1.118
46.1 to 72.5	3-06	1.067	4-00	1.220	4-04	1.321
7206 to 121.0	3-11	1.194	4-06	1.372	4-10	1.474
121.1 to 145.0	4-06	1.372	5-02	1.575	5-07	1.702
145.1 to 169.0	5-01	1.550	5-09	1.753	6-03	1.905
169.0 to 242.0	7-00	2.134	7-11	2.413	8-07	2.617
242.1 to 362.0	11-09	3.582	13-06	4.115	14-07	4.445
362.1 to 420.0	14-08	4.471	16-09	5.106	18-02	5.538
420.1 to 550.0	17-06	5.334	20-00	6.096	21-08	6.604
550.1 to 800.0	23-09	7.239	27-02	8.281	29-05	8.967
* From 29 CFR 1910.269 Tables R-6 and R-7 altitude corrected (R-5) for 1,5000 m, 4,200 m						

42 Line Clearance Tree Trimmer (LCTT)/Qualified Line Clearance Arborist (LCA) Pole Banner

- 42.1 LCTT/LCA pole banners are intended as a visual, informational, and work control barrier used to provide awareness that a Tree Crew is working downstream of an open protective device. Tree crews could be engaged in work that may include live line methods, patrolling the circuit, or cutting operations (aloft/ground).
- 42.2 When a tree crew is working on a de-energized circuit, a pole banner should be installed by either the Line Clearance Tree Trimmer or a Qualified Line-Clearance Arborist to provide awareness a Tree Crew is on the circuit.
- 42.3 Normal LCTT/LCA crew protections shall take place, such as insulated tools, minimum approach distances, and work from an insulated bucket; however, when that work cannot be completed safely, an LCTT/LCA crew will request isolation and grounding. The LCTT/LCA pole banner is an extra indication on top of standard circuit patrol safety precautions.
- 42.4 During storm restoration, LCTT/LCA crews can apply pole banners to alert anyone coming upon a visible break or isolating device, that there are LCTT/LCA crews working. All employees and contractors must understand and respect the pole banners as an informational method to warn them of personnel working on a circuit and make communication effort prior to re-energization.
- 42.5 An LCTT/LCA pole banner is not tracked by Eversource Arborists or the SOC.
- 42.6 An LCTT/LCA pole banner does not have "DO NOT OPERATE" authority and is only intended as an informational indication.

- 42.7 Application and removal of the pole banners and tags are the responsibility of each LCTT/LCA crew.
- 42.8 LCTT/LCA pole banners are for visual and informational purposes. They are intended to provide an indication that an LCTT/LCA crew is working on the circuit.
- 42.9 If applied, LCTT/LCA pole banners are to be applied on:
- 42.9.1 The pole where requested grounds are installed (if de-energized and grounded)
 - 42.9.2 The pole with the closest protective device feeding the work location (if de-energized)
- 42.10 Pole banners do not need to be applied from a bucket.
- 42.11 A banner information tag must be completed and inserted into the pocket of the traditional pole banner or written directly on the banner when using the disposable banners.
- 42.12 Information shall include Company Name, Contact Name and Phone Number, Supervisor Name and Phone Number.
- 42.13 Multiple banners are allowed; however, an additional banner cannot be installed without first contacting the person who installed the original banner. Refer to the information tag or the banner for the contact's name.
- 42.14 If the contact person listed on the tag of the banner cannot be reached, call your Eversource Contact Person (Crew Guide or External Field Resource Coordinator (EFRC)) or the SOC.
- 42.15 LCTT/LCA crews install the pole banners and information tags, and the tags remain in place until their work is complete (for the day).
- 42.16 When LCTT work is completed on the circuit, the LCTT/LCA crew shall remove their banner.



43 Traffic Control




- 43.1 Traffic control meets the Federal Highway Administration's *Manual on Uniform Traffic Control Devices* (MUTCD) guideline. Minimize traffic hazards by establishing a good work area protection zone. This zone of protection needs to:
- 43.1.1 Warn oncoming travelers of your presence.
 - 43.1.2 Establish a zone or barrier that gives you enough time to react to an out-of-control traveler.
 - 43.1.3 Guide traffic in an orderly direct path around you and your work zone.

- 43.2 All workers, who are exposed either to traffic (vehicles using the highway for purposes of travel) or to work vehicles and construction equipment within the work zone must wear high-visibility safety apparel that meets the Performance Class 3 requirements of the ANSI/ISEA 107–2015.

44 Vehicle Safety and the Federal Motor Carrier Safety Regulations

- 44.1 All vehicular equipment provided and used by outside crews must be fully equipped and must comply with all applicable state and federal laws and regulations as well as applicable safety standards, including, to the extent applicable, ANSI 92.2-2021, requiring dielectric testing of vehicles with insulated vehicle- mounted elevating and rotating aerial devices. Commercial vehicles must be maintained in compliance with the Federal Motor Carrier Safety Regulations (FMCSR).
- 44.2 Vehicles equipped with wheel chocks must be chocked while parked.
- 44.3 Vehicles, including load, must never exceed the registered gross vehicle weight.
- 44.4 Objects must not extend beyond the sides. Exceptions can be allowed with special permits.
- 44.5 Material, coils of wire, scrap bags, tools, or tool buckets are not to be hung from the rear of vehicles where they can create a tripping hazard or obscure lights, reflectors, or license plates.
- 44.6 Loose material is secured from falling onto the roadway.

45 Environmental Management

STORM SAFETY BRIEFING		EVERSOURCE
Safety first and always		CT/MA/NH
<h3>Environmental Spills during Storm Restoration</h3> <p><i>During an ERP, Eversource personnel and contractors that encounter spills or leaking oil-filled equipment are required to take immediate action and provide correct details to ensure compliance.</i></p>		
 <p>CT</p> <p>LEAKING Oil-Filled Equipment. This includes seeping or weeping. If you are NOT an environmental contractor, DO NOT transport from its original location.</p> <p>NOT LEAKING, Oil-Filled Equipment Transport to the applicable work center and store in the proper storage area.</p> <p>Steps for Spills and Leaking Equipment — Remember ABC:</p> <p>A: Assess and contain the spill (berm with spill kit if available). B: Bag the leaking equipment and leave at the original location. C: Call the Environmental Event Room at 888-957-7455.</p> <p>Reminder — Leaking equipment <u>must not be</u> transported from its outage location to any other location, e.g., work centers or staging areas. Equipment <u>should be disconnected</u>, bagged and made accessible.</p>	 <p>MA</p> <p>LEAKING Oil-Filled Equipment. This includes seeping or weeping. Eversource personnel bag and transport to the applicable work center and store in the proper storage area.</p> <p>NOT LEAKING, Oil-Filled Equipment Eversource personnel transport to the applicable work center and store in the proper storage area.</p> <p>Steps for Spills and Leaking Equipment — Remember ABC:</p> <p>A: Assess and contain the spill (berm with spill kit if available). B: Bag the leaking equipment or place in overpack drum. C: Call the System Operations Center: EMA North 844-200-1201 EMA South 508-732-4303 WMA 413-787-9043</p> <p>Reminder — Leaking equipment <u>must not be</u> transported from its outage location to any staging area. If the spill can't be contained or cannot be brought back to the work center, contact the SOC who will contact the on call Environmental Coordinator (EC). The EC will provide further guidance. In this case equipment <u>should be disconnected</u>, bagged and made accessible.</p>	 <p>NH</p> <p>LEAKING Oil-Filled Equipment. This includes seeping or weeping. Eversource personnel bag or place in overpack drum and transport to the applicable work center and store in the proper storage area.</p> <p>NOT LEAKING, Oil-Filled Equipment Eversource personnel transport to the applicable work center and store in the proper storage area.</p> <p>Steps for Spills and Leaking Equipment — Remember ABC:</p> <p>A: Assess and contain the spill (berm with spill kit if available). B: Bag the leaking equipment or place in overpack drum. C: Call the NH System Operations Center State Wide at 603-634-2400.</p>
<p>FOR ALL THREE STATES</p> <p>Provide accurate and complete information:</p> <ol style="list-style-type: none"> Pole or Pad Number Street address referencing nearest house number and cross street Town Your Name and callback number Estimated quantity of oil released Impacted surfaces, including observation of any waterway impact Equipment manufacturer, serial #, ppm PCB of the transformer (nameplate/sticker) If the area is safe/accessible for our spill cleanup vendor 		

46 DigSafe/Call Before You Dig (CBYD)

- 46.1 Connecticut State law requires contacting *Call Before You Dig* prior to doing any excavation, whether it is within the street or on private property. Excavation is defined as, “any operation for the purpose of movement or removal of earth, rock, or other materials in or on the ground, or otherwise disturbing the subsurface of the earth by the use of powered or mechanized equipment.” Obtain information by calling, in Connecticut, 1-800-922-4455.
- 46.2 Massachusetts and New Hampshire State laws require contacting *DIG SAFE* prior to doing any excavation, whether it is within the street or on private property. Excavation is defined as, “any operation in which earth, rock, or other materials in or on the ground is moved, removed, or otherwise displaced by means of any tools, equipment, or explosive.” Obtain information by calling 1- 888-344-7233.

Revision History

Revision Number	Date	Reason for Revision
Rev 0	1/26/2015	Original issue <ul style="list-style-type: none"> • Applied Eversource branding/numbering • Updated Minimum Allowable Distances
Rev 1	9/29/2015	<ul style="list-style-type: none"> • Updated Contact Information • Updated Work Site Ground diagrams • Incorporated Content from Appendix I: Eversource Information Transfer Policy (April 27, 2015) • Updated Contact Information in Attachment 2 and Attachment 3.
Rev 2	05/04/2017	<ul style="list-style-type: none"> • Removed Section 3.1 and replaced it with Section 4.1 • Update Host Employer Information in Section 4.1 • Updated Subject Matter Expert • Moved Section 4.35 to 4.1 • Added language on delegation of controllership in 4.14 • Added 4.36, DigSafe and Call Before You Dig (CBYD) • Added LCTT/LCA Pole Banner
Rev 3	06/01/2018	<ul style="list-style-type: none"> • Updated standard references • Inserted images of color tags for T&D Switching and Tagging • Updated nominal system voltages • Updated definitions in Attachment 1 • Updated contact information in Attachments 2 and 3 • Updated medical issues in Attachment 4 • Updated Switching and Tagging process to reflect ESOP-100, Pole Banners for LCTT
Rev 4	12/20/2019	<ul style="list-style-type: none"> • Updated contact list attachment • Added fusing cards in attachment • Added Six Steps to Perfect Switching attachment
Rev 5	09/23/2020	<ul style="list-style-type: none"> • Added additional environmental spill instructions
Rev 6	01/14/2022	<ul style="list-style-type: none"> • Update NRA Tag • Update voltage table • Updated on-boarding requirements
Rev 7	02/27/2023	<ul style="list-style-type: none"> • Formatting changes • PPE requirement changes • Attachment renumbering and consolidation
Rev 8	02/29/2024	<ul style="list-style-type: none"> • Revised Line Clearance Tree Trimmer (LCTT)/Qualified Line Clearance Arborist (LCA) Pole Banner requirements

Attachment 1: Definitions

Authorized Person	<p>A Qualified Person who has been deemed competent to perform one or more of the following activities and whose name and authorized category(s) are on the Eversource Authorized Person List:</p> <ul style="list-style-type: none"> • Request Clearances, Permissions, NRAs, Live Line Arrangements • Hold Clearances, Permissions, NRAs, Live Line Arrangements • Operator Switching and Tagging • Field Switching and Tagging • Delegated Controllership
Authorized Person List	The Authorized Person List identifies personnel by name or title who are authorized to hold Clearances/Permissions/NRAs/Live Line Arrangements, request Clearances/Permissions/NRAs/Live Line Arrangements, or to perform switching and tagging at designated locations on equipment under Eversource, a Member Company, or a Participant electric transmission or distribution jurisdiction.
Clearance Person	The Authorized Person that receives the Clearance and has responsibility before accepting the Clearance to understand and review with the System Operator that all switching, blocking, tagging, and grounding (where applicable) have been completed to ensure a safe work area. The Clearance Person is responsible for personnel assigned to work in the Zone of Protection.
Communications: Three Part	<p>Communications consisting of the following:</p> <ol style="list-style-type: none"> 1. Operating Instruction or message is issued. 2. Receiver repeats the Operating Instruction or message (not necessarily verbatim) or requests the Issuer repeat the Operating Instruction or message. 3. The Issuer confirms to the Receiver the repeat back is correct or reissues the Operating Instruction or message if the repeat back is incorrect or if requested to by Receiver. <p>If the Issuer receives no response or the Receiver is unable to understand after repeated attempts, the Issuer shall take alternative action (e.g. contact another person/ organization or utilize another communication path.)</p>
Controllership	Authorization given and documented by the System Operator to only an Authorized Person, or a Qualified contractor during emergency storm restorations, to assume all the duties and responsibilities of the System Operator for a radial side tap. This Authorized person is considered an Acting System Operator. (See also Delegated Controllership).
Dead	De-energized, tested for potential, and grounded.
De-Energized	Free from any electrical connection to a source of potential difference and from electric charge; not having a potential different from that of the earth.
EFRC	External Field Resource Coordinator - An Eversource employee or representative assigned to be a point person, provide work assignments, and direct outside crews.
Energized	Electrically connected to a source of potential difference, or electrically charged to have a potential different from that of the earth in the vicinity. Synonyms: current carrying; hot; live.
Equipotential	For the purposes of protective grounding, a near-identical state of electrical potential.

FMCSR	Federal Motor Carrier Safety Regulations.
Grounded	A system, circuit, or apparatus provided with a ground(s) for the purposes of establishing a ground return circuit and for maintaining its potential at approximately the potential of earth.
Isolated	Disconnected from all Known Sources of Voltage by open switches, disconnectors, jumpers, taps, or other means and absent of nominal voltages.
Known Source of Voltage	One side of an energized primary switch or device in the open position, which if placed in the closed position, would energize into a work zone. A generator identified on an Eversource primary circuit print supplying primary voltage, (e.g., solar/wind generator), is a Known Source of Voltage. A known customer generator, solar panel, or battery storage system on the load side of the customer's service disconnect switch is <i>not</i> considered to be a Known Source of Voltage as their designs are governed by the National Electric Code to sense loss of utility power and isolate automatically from the utility system.
LCTT (Line Clearance Tree Trimmer)/(LCA) Line Clearance Arborist	An individual who, through related training and on-the-job experience, is familiar with the equipment and hazards in line clearance and has demonstrated the ability to perform the special techniques involved.
Limits	Open devices that define a Zone of Protection for a Clearance or a Permission Zone for a Permission.
MUTCD	Manual of Uniform Traffic Control Devices
PCB	Polychlorinated Biphenyls
Protective Position	The tagged position of a mechanical or electrical device with a visible air gap that prohibits energization or the re-energization of a specific work area. Certain devices do not have visible air gaps but are considered Limits based on the device position that indicates an open state which is considered a protective position.
Qualified Person	<p>A person knowledgeable in the construction and operation of electric power generation, substation, and/or distribution apparatus involved along with the associated hazards in specific duties pertaining to electric operations. Field personnel shall have:</p> <ul style="list-style-type: none"> • demonstrated knowledge of the construction and operation of electric power generation, transmission, substation, or distribution apparatus that they will be involved with and, • demonstrated knowledge of the associated hazards and safety requirements related to specific duties pertaining to electric system operations. <p>System Operators shall have:</p> <ul style="list-style-type: none"> • completed a prescribed level of Operator Training
System Control Center	Any Eversource transmission or distribution Control Center.
System Operator	An Authorized Person, who directs, controls, monitors, and operates the electric system and its associated apparatus.
Switch Person	An Authorized Person that is knowledgeable in the operation of electrical apparatus for the purpose of switching and tagging of electrical circuits or apparatus. A non-Authorized (but Qualified) Person may switch under the direction of an Authorized Person.





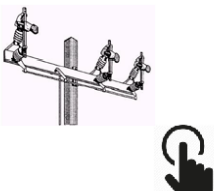

Visible Break	The air gap used to establish a Zone of Protection.
Zone of Protection	<p>An area isolated from all Known Sources of Voltage whereby the perimeter Limits are in their Protective Position and the work area is subsequently grounded (if practicable). Working without Grounds requires the following:</p> <ol style="list-style-type: none">1. The equipment is De-energized with Limits tagged.2. There is no possibility of contact with another energized source.3. The hazard of induced voltage is not present.4. Added safeguards are included where possible and approved work methods are followed.

Attachment 2: Critical Eversource Contacts

Connecticut				
CT Electric, Berlin CT – Incident Command Center (ICC - Storm Room); only available when ICC is activated. If no answer, contact Dispatch.			800-265-7492	
			860-665-6400	
CT Electric, Berlin CT – System Operations Center (Dispatch)			860-665-6400	
Massachusetts				
MA Electric West, Springfield, MA Operations Center (Dispatch)			413-785-1301	
			800-332-8697	
MA Electric Operations North (Boston)			844-100-1201	
MA Electric Operations South (Plymouth and New Bedford)			844-304-9718	
MA Electric Operations South (Cape and Vineyard)			844-304-9721	
MA Electric Operations West (Southborough)			844-200-1205	
New Hampshire				
NH System Operations Center (SOC), Distribution			603-634-2400	
NH Electric System Control Center (ESCC), Transmission			603-634-3576	
EMS				
Ambulance/Fire/Police			911	
Eversource On-Call Safety Hotline				
Name	Responsibility	Group	Location	Contact #
CT Safety Hotline	These hotline numbers are active 24 hours a day/7 days a week with an On-Call Safety Representative for any questions, concerns, response, etc.	Electric & Gas	Connecticut	860-665-3949
MA Safety Hotline		Electric & Gas	Massachusetts	413-787-9590
NH Safety Hotline		Electric	New Hampshire	603-634-2430

Attachment 3: 6 Steps to Perfect Switching

6 STEPS TO PERFECT FIELD SWITCHING

1		CARRY the SWITCHING ORDERS with you while switching	PROCEDURE USE
2		POINT TO the DEVICE ID name Plate to VERIFY the DEVICE LOCATION and YOUR LOCATION	STOP/THINK
3	 1, 2, 3, 4...	RECHECK the Switching Orders to ensure you are in the RIGHT LOCATION and have the RIGHT SEQUENCE for switching	THINK
4		VERIFY the <i>ANTICIPATED</i> DEVICE POSITION prior to switching	THINK AGAIN
5		PERFORM Switching Order	ACT
6		VERIFY the DESIRED switched device POSITION after switching	REVIEW

Attachment 4: Eversource Fusing Cards

Eastern Massachusetts – North

Issued	CONSTRUCTION STANDARD ELECTRIC OPERATIONS ORGANIZATION	C4040
		Revision #0

2.4/4.0 kV TRANSFORMER FUSING

SINGLE PHASE				
1 PH kVA	Overhead Fused		BAY-O-NET	
	Fuse	CATID	Fuse	CATID
10	6K	574280	-	-
15	10K	574075	-	-
25	15K	574281	25A D.E.	574178
37.5	20K	574076	40A D.E.	591587
50	30K	574282	50A D.E.	574179
75	40K	574077	-	-
100	50K	574078	65A C.S.	574279
167	80K	574080	140A C.S.	574180

THREE PHASE				
3 PH kVA	Overhead Fused		BAY-O-NET	
	Fuse	CATID	Fuse	CATID
75	-	-	25A D.E.	574178
112.5	-	-	40A D.E.	591587
150	-	-	50A D.E.	574179
225	30K	574282	-	-
300	40K	574077	65A C.S.	574279
500	65K	574079	140A C.S.	574180
750	100K	574081	-	-
1000	140K	574082	-	-

NOTES

D.E. - Dual Element
D.S. - Dual Sensing

C.S. - Current Sensing
H.A.O. - High Ampere Overload

Issued	CONSTRUCTION STANDARD ELECTRIC OPERATIONS ORGANIZATION	C4040N
		Revision #0

1.0 NORTH AREA FUSING SCHEDULE

8.0/13.8 kV TRANSFORMER FUSING

SINGLE PHASE				
1 PH kVA	Overhead Fused		BAY-O-NET	
	Fuse	CATID	Fuse	CATID
15	6K	574280	3A D.S.	577189
25	6K	574280	6A D.E.	574177
37.5	6K	574280	12A D.E.	574182
50	10K	574075	15A D.E.	409*
75 - 100	15K	574281	25A D.E.	574178
167	30K	574282	50A D.E.	574179
250 - 333	-	-	65A C.S.	574279
500	-	-	100A C.S.	574181
667	-	-	140A C.S.	574180
833	-	-	125A H.A.O.	520607

THREE PHASE				
3 PH kVA	Overhead Fused		BAY-O-NET	
	Fuse	CATID	Fuse	CATID
45	6K	574280	3A D.S.	577189
75	-	-	6A D.E.	574177
112.5	6K	574280	12A D.E.	574182
150 - 225	10K	574075	15A D.E.	409*
300	15K	574281	25A D.E.	574178
500	20K	574076	50A D.E.	574179
750	30K	574282	65A C.S.	574279
1000	40K	574077	65A C.S.	574279
1500	65K	574079	100A C.S.	574181
2000	80K	574080	140A C.S.	574180
2500	100K	574081	125A H.A.O.	520607


NOTES

D.E. - Dual Element
D.S. - Dual Sensing

C.S. - Current Sensing
H.A.O. - High Amp Overload

Eastern Massachusetts – North

Issued

CONSTRUCTION STANDARD
ELECTRIC OPERATIONS ORGANIZATION


C4040
Revision #0

**8.0/13.8 kV PADMOUNT/UG
TRANSFORMER FUSING**

SINGLE PHASE				
1 PH KVA	Externally Fused NX (Arc Strangled)		Canister Fused	
	Fuse	CATID	Fuse	CATID
25	-	-	6C	574033
50	-	-	18C	574034
75 - 100	25C	574122	30C	574035
167	35C	574123	40C	574036

THREE PHASE				
3 PH KVA	Externally Fused NX (Arc Strangled)		Canister Fused	
	Fuse	CATID	Fuse	CATID
112.5	10C	574071	10C	574037
150 - 225	12C	574125	12C	574133
300	25C	574122	25C	574038
500	30C	574126	40C	574039
750	50C*	574089	-	-
1000	60C*	574084	-	-
1500	80C*	574085	-	-
2000	130C**	574087	-	-
2500	160C**	574088	-	-

STEP-DOWN

1 PH	Config.	High	Low
50	Y-Y	10K	-
100	Y-Y	15K	-
167	Y-Y	30K	-
250	Y-Y	30K	-
333	Δ-Y *	Three phase recloser	Single phase recloser
333	Y-Y	40K	-
500	Δ-Y *	Three phase recloser	Single phase recloser
500	Y-Y	65K	-


NOTE: Δ-Y units require three phase protection

Type "E"

15kV Power Fuses for PME-9

Fuse	CATID
10E	577049
20E	577050
40E	577051
65E	577052
80E	577053
125E	577054
150E	577055
200E	577056

Issued

CONSTRUCTION STANDARD
ELECTRIC OPERATIONS ORGANIZATION


C4040
Revision #0

**2.4/4.0 kV PADMOUNT/UG
TRANSFORMER FUSING**

SINGLE PHASE				
1 PH KVA	Externally Fused NX (Arc Strangled)		Canister Fused	
	Fuse	CATID	Fuse	CATID
25	-	-	25C	574030
50	25C	574120	45C	574031
75	25C	574120	-	-
100	60C	574121	100C	574032
167	100C	574069	100C	574032
250	130C	574089	-	-

THREE PHASE				
3 PH KVA	Externally Fused NX (Arc Strangled)		Canister Fused	
	Fuse	CATID	Fuse	CATID
75	-	-	25C	574030
150	25C	574120	45C	574031
225	25C	574120	-	-
300	60C	574121	100C	574032
500	100C	574069	100C	574032
750	130C	574089	-	-

Capacitor Banks

Size	Fuse	CATID
4 kV	135	20K 574076
	150	30K 574282
	180	30K 574282
	300	50K 574078
	450	65K 574079
13.8 kV	450	30K 574282
	600	30K 574282
	900	50K 574078
	1200	50K 574078
	1350	65K 574079
	1500	80K 574080

**Line Fusing
K Link Fuses**

Fuse	CATID
6K	574280
10K	574075
15K	574281
20K	574076
30K	574282
40K	574077
50K	574078
65K	574079
80K	574080
100K	574081
140K	574082

600 Amp Switch

Fusing for 15.5 kV

Fuse	CATID
30*	574092
50	574091
65	574087
80	574088

*Use with fuse extender CATID 573997

For design notes, reference Std. No. D4040
Capacitor Fusing from Std. No. C4204
PME-9 Fusing from Std. No. C3809

Fuse Installation Notes

- A. All personnel performing fuse installations shall be trained on fuse applications, operating principles, and installation guidelines. Improper installation can easily damage fragile fuse links and they may fail prematurely.
- B. Follow all NSTAR safety procedures and PPE requirements when installing or removing fuses. Cutout, bayonet, or any other fuse shall only be connected to an energized primary circuit with an insulated shotgun or switch stick – never open or close in a fuse by hand.
- C. The internal condition, or continuity, of fuses must be confirmed with a continuity tester or multi-meter set on the ohms scale. Zero ohms is expected.
- D. Fuses can fail prematurely due to previous exposure to faults, overload, lightning, corrosion, and age. Do not increase fuse sizes without consulting fuse charts and reviewing upstream fuse coordination. Fusing size increases must be approved by engineering and updated on system records.
- E. When replacing blown fuses on delta connected transformers it is important to replace all three fuses if any one fuse is found blown due to fault. This is not necessary for wye primary connected transformers.

Effective Date: 02/27/23

Safety Onboarding Guide

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Eastern Massachusetts – South

Issued	CONSTRUCTION STANDARD ELECTRIC OPERATIONS ORGANIZATION 	C4040 Revision #0
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Grounded Y System - PADMOUNT TRANSFORMER FUSING

3740 Grd Y, 2160 L-N 4160 Grd Y, 2400 L-N		
1 PH	3 PH	Fuse
25	75	25A D.E.
37.5	112.5	40A D.E.
50	150	50A D.E.
100	300	65A C.S.
167	500	140A C.S.
250	750	140A C.S.

7620 Grd Y, 4400 L-N 8320 Grd Y, 4800 L-N		
1 PH	3 PH	Fuse
25	75	12A D.E.
50	150	25A D.E.
100	300	50A D.E.
167	500	65A C.S.
250	750	100A C.S.

13200 Grd Y, 7620 L-N		
1 PH	3 PH	Fuse
25	75	6A D.E.
37.5	112.5	12A D.E.
50	150	15A D.E.
75	225	25A D.E.
100	300	25A D.E.
167	500	50A D.E.
250	750	65A C.S.
333	1000	65A C.S.
500	1500	100A C.S.
667	2000	140A C.S.
833	2500	125A H.A.O.

22860 Grd Y, 13200 L-N		
1 PH	3 PH	Fuse
25	75	3A D.S.
37.5	112.5	6A D.E.
50	150	8A D.E.
75	225	12A D.E.
100	300	15A D.E.
167	500	25A D.E.
250	750	40A D.E.
333	1000	50A D.E.
500	1500	65A C.S.
667	2000	100A C.S.
833	2500	140A C.S.

Approved By: _____
Manager, Distribution
Technical Engineering

For design notes, reference Std. No. D4040
Capacitor Fusing from Std. No. C4204
PME-9 Fusing from Std. No. C3809

Issued	CONSTRUCTION STANDARD ELECTRIC OPERATIONS ORGANIZATION 	C4040S Revision #0
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2.0 SOUTH AREA FUSING SCHEDULE

Grounded Y System - OVERHEAD TRANSFORMER FUSING

3740, 4160 Grd Y			
1 PH	3 PH	Fuse	CLF
10	30	6T	12
15	45	10T	25
25	75	15T	25
37.5	112.5	25T	40
50	150	25T	40
75	225	40T	-
100	300	65T	-
167	500	100T	-
250	750	140T	-
333	1000	140T	-

7620, 8320 Grd Y 4400, 4800 L-N			
1 PH	3 PH	Fuse	CLF
10	30	3T	12
15	45	6T	12
25	75	6T	12
37.5	112.5	10T	25
50	150	15T	25
75	225	15T	25
100	300	25T	40
167	500	40T	-
250	750	65T	-
333	1000	100T	-

13200 Grd Y 7620 L-N			
1 PH kVA	3 PH kVA	Fuse	CLF
10	30	3T	12
15	45	3T	12
25	75	6T	12
37.5	112.5	6T	12
50	150	10T	12
75	225	15T	25
100	300	15T	25
167	500	25T	40
250	750	40T	-
333	1000	65T	-
500	1500	100T	-
667	2000	100T	-
833	2500	140T	-

22860 Grd Y			
1 PH kVA	3 PH kVA	Fuse	CLF
10	30	3T	12
15	45	3T	12
25	75	3T	12
37.5	112.5	6T	12
50	150	6T	12
75	225	6T	12
100	300	10T	12
167	500	15T	25
250	750	25T	40
333	1000	40T	-
500	1500	40T	-
667	2000	65T	-
833	2500	100T	-

For design notes, reference Std. No. D4040
Capacitor Fusing from Std. No. C4204
PME-9 Fusing from Std. No. C3809

Eastern Massachusetts – South

Issued	CONSTRUCTION STANDARD ELECTRIC OPERATIONS ORGANIZATION		C4040
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CAPACITOR BANK FUSING

KVAR	System Voltage (kV)	kVAR Per Phase	Fuse
150	4.16/2.4	1-50	30K
300	4.16/2.4	1-100	50K
450	4.16/2.4	1-150	65K
1800	13.2/7.62	3-200	80K
600	13.2/7.62	1-200	30K
1350	13.2/7.62	3-150	65K
600	22.8/13.2	1-200	20K
1800	22.8/13.2	3-200	50K

LINE FUSING

Fuse	Cat ID
3T	520718
6T	520730
10T	520748
15T	576384
25T	576385
40T	520751
65T	576386
100T	520753
140T	576387

CLF (K-Mate)

15kV K-Mate	FUSE	Cat ID
12K/8T	576133	
25K/15T	576134	
40K/25T	576135	
25kV K-Mate	FUSE	Cat ID
12K/8T	576086	
25K/15T	576087	
40K/25T	536187	

Bay-O-Net

FUSE	Cat ID
3A DS	577189
6A DE	574177
12A DE	574182
15A DE	409*
25A DE	574178
40A DE	591587
50A DE	574179
65A CS	574279
65A CS	574279
100A CS	574181
140A CS	574180
125A HAO	520607

DELTA SYSTEM TRANSFORMER FUSING

OVERHEAD			
Open Delta			
2 PH kVA	3 PH kVA	2400 Fuse	4800 Fuse
10	2-10	6T	3T
15	2-15	10T	6T
25	2-25	15T	6T
37.5	2-37.5	25T	10T
50	2-50	40T	15T
75	2-75	40T	25T
100	2-100	65T	40T
167	2-167	100T	65T

OVERHEAD			
3 Phase Closed Delta			
2 PH kVA	3 PH kVA	2400 Fuse	4800 Fuse
10	30	15T	6T
15	45	15T	10T
25	75	25T	15T
37.5	112.5	40T	25T
50	150	65T	25T
75	225	100T	40T
100	300	100T	40T
167	500	140T	100T

PADMOUNT			
(Bay-O-Net Fused)			
1 PH kVA	3 PH kVA	2400 Fuse	4800 Fuse
25	75	15A DE	6A DE
50	150	25A DE	15A DE
75	225	50A DE	25A DE
100	300	50A DE	25A DE
167	500	65A CS	50A DE

Fuse Installation Notes

- All personnel performing fuse installations shall be trained on fuse applications, operating principles, and installation guidelines. Improper installation can easily damage fragile fuse links and they may fail prematurely.
- Follow all NSTAR safety procedures and PPE requirements when installing or removing fuses. Cutout, bayonet, or any other fuse shall only be connected to an energized primary circuit with an insulated shotgun or switch stick – never open or close in a fuse by hand.
- The internal condition, or continuity, of fuses must be confirmed with a continuity tester or multi-meter set on the ohms scale. Zero ohms is expected.
- Fuses can fail prematurely due to previous exposure to faults, overload, lightning, corrosion, and age. Do not increase fuse sizes without consulting fuse charts and reviewing upstream fuse coordination. Fusing size increases must be approved by engineering and updated on system records.
- When replacing blown fuses on delta connected transformers it is important to replace all three fuses if any one fuse is found blown due to fault. This is not necessary for wye primary connected transformers.

Issued	CONSTRUCTION STANDARD ELECTRIC OPERATIONS ORGANIZATION		C4040
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STEP DOWN FUSING

Two to One (4800/2400 Step-down)			
kVA	Primary Fuse	New Secondary Fuse	Old Secondary *See Note
25	6T	None	6T
50	15T	None	15T
75	25T	None	25T
100	25T	None	25T
167	40T	None	40T
Two and Three Quarters to One (13200/4800 Step-down)			
kVA	Primary Fuse	New Secondary Fuse	Old Secondary *See Note
50	6T	None	10T
75	6T	None	10T
100	15T	None	25T
167	25T	None	40T
250	25T	None	65T
333	40T	None	-
Five and a Half to One (13200/2400 Step-down)			
kVA	Primary Fuse	New Secondary Fuse	Old Secondary *See Note
50	6T	None	15T
75	10T	None	25T
100	10T	None	25T
167	15T	None	65T
250	25T	None	65T
333	40T	None	-

STEP UP FUSING

Two to One (2400/4800 Step-up)			
kVA	Primary Fuse	New Secondary Fuse	Old Secondary *See Note
25	15T	None	6T
50	40T	None	8T
75	40T	None	10T
100	65T	None	20T
167	100T	None	25T
Two and Three Quarters to One (4800/13200 Step-up)			
kVA	Primary Fuse	New Secondary Fuse	Old Secondary *See Note
50	25T	None	3T
75	25T	None	6T
100	25T	None	10T
167	40T	None	10T
250	65T	None	15T
Five and a Half to One (2400/13200 Step-up)			
kVA	Primary Fuse	New Secondary Fuse	Old Secondary *See Note
50	25T	None	3T
75	40T	None	6T
100	65T	None	6T
167	100T	None	10T
250	140T	None	15T

◀ - Denotes: Minimum fusing of a 40T link is mandatory on the Primary side of the Step-up when feeding a URD system.

Note on secondary fusing: For new construction no secondary fusing will typically be designed. Fuse sizes shown in this table are for maintenance of existing installations. If secondary isolation with switches is still necessary, cutout fuse-holders can be installed with solid blades.

Western Massachusetts

Fuse Sizes for Overhead Transformers Type T Fuse Links

Single Phase				
Transformer Rating kVA	13200 V	7620 V 7970 V	4800 V	2400 V
1	6	6	6	6
10 – Note 3	6	6	6	10
15 – Note 3	6	6	6	10
25	6	6	10	15
37.5	6	6	15	25
50	6	10	15	40
75	10	15	25	65
100	15	25	40	65
167	25	40	65	100

Fuse Sizes for Overhead Transformers Type T Fuse Links

Three Phase					
Transformer Rating kVA	23000 V	13200 V 13800 V	8320 V	4800 V	4160 V
75	6	6	6	15	15
112.5	6	6	10	25	25
150	6	10	15	40	40
225	10	15	25	40	65
300	15	25	40	65	65
500	25	40	65	100	100

Notes

1. The outside legs of open delta banks should be fused as for single-phase transformers. The common leg should be fused as for a three-phase bank with a capacity of three times the rating of the larger transformer.
2. Large transformers and special installations will require individual consideration – consult Protection & Controls Engineering.
3. Since Eversource does not purchase conventional 10 kVA and 15 kVA transformers, the fusing is designed to protect against unnecessary upstream device operation.

ORIGINAL	FUSING FOR OVERHEAD TRANSFORMERS TYPE T LINKS				WMA
9/4/79					
APPROVED					
3/9/15					
	EVERSOURCE ENERGY	DESIGN & APPLICATION STANDARD	DTR 17.030	8	

New Hampshire

Transformer Rating kVA	Single Phase							
	2400V		4800V		7200V		19.9 KV	
	Fuse	CLF	Fuse	CLF	Fuse	CLF – Note 2	Fuse	CLF
1	3	N/A	N/A	N/A	3	12	3	12
10	6	N/A	3	N/A	3	12	3	12
15	10	N/A	6	N/A	3	12	3	12
25	15	N/A	10	N/A	6	12	3	12
37.5	20	N/A	10	N/A	10	25	3	12
50	30	N/A	15	N/A	10	25	3	12
75	40	N/A	20	N/A	15	25	6	12
100	50	N/A	30	N/A	20	40	6	12
167	–	–	–	–	30	65	10	25
250	–	–	–	–	50	80	15	25
333	–	–	–	–	–	–	20	40
500	–	–	–	–	–	–	30	65

Transformer Rating kVA	Three Phase							
	4160/2400Y		8314/4800Y		12470/7200Y		34500/19920Y	
	Fuse	CLF	Fuse	CLF	Fuse	CLF – Note 2	Fuse	CLF
30	6	N/A	3	N/A	3	12	3	12
45	10	N/A	6	N/A	3	12	3	12
75	15	N/A	10	N/A	6	12	3	12
112.50	20	N/A	10	N/A	10	25	3	12
150	30	N/A	15	N/A	10	25	3	12
225	40	N/A	20	N/A	15	25	6	12
300	50	N/A	30	N/A	20	40	6	12
500	100	N/A	50	N/A	30	65	10	25
750	–	–	–	–	50	80	15	25
1000	–	–	–	–	65	–	20	40
1500	–	–	–	–	100	–	30	65
2000	–	–	–	–	140	–	50	80
2500	–	–	–	–	–	–	50	80 – Note 7

Notes

1. Use specific sizes listed – no substitutions or additions are to be made without consulting Engineering.
2. CLF's at 12470/7200V will be at direction of Engineering only.
3. Install a CLF with all 34.5/19.92 kV transformers and banks.
4. Refer to **DTR 17.028** for CLF Voltage Rating and Stock Code number.
5. Fuse size is designed to provide approximately twice name plate continuous loading.
6. Risers for individual padmounted transformers will utilize the same fuse sizes. CLF's are required only for units that do not have internal fusing
7. Use an 80 K CLF with 2500 KVA padmount transformer, the cutout may not open for high current faults.

ORIGINAL	FUSING FOR OVERHEAD TYPE CONVENTIONAL TRANSFORMERS				
2/17/04					
APPROVED	TYPE T LINKS – NEW HAMPSHIRE				
02/12/15					
	EVERSOURCE ENERGY	DESIGN & APPLICATION STANDARD	DTR 17.027	3	

Connecticut

Fuse Sizes for Overhead Transformers Type K Fuse Links

Single Phase				
Transformer Rating kVA	13200 V	7620 V 7970 V	4800 V	2400 V
1	6	6	6	6
10 – Note 4	6	6	6	6
15 – Note 4	6	6	6	10
25	6	6	6	15
37.5	6	6	15	30
50	6	10	15	30
75	10	15	30	50
100	15	30	30	65
167	30	50	50	80

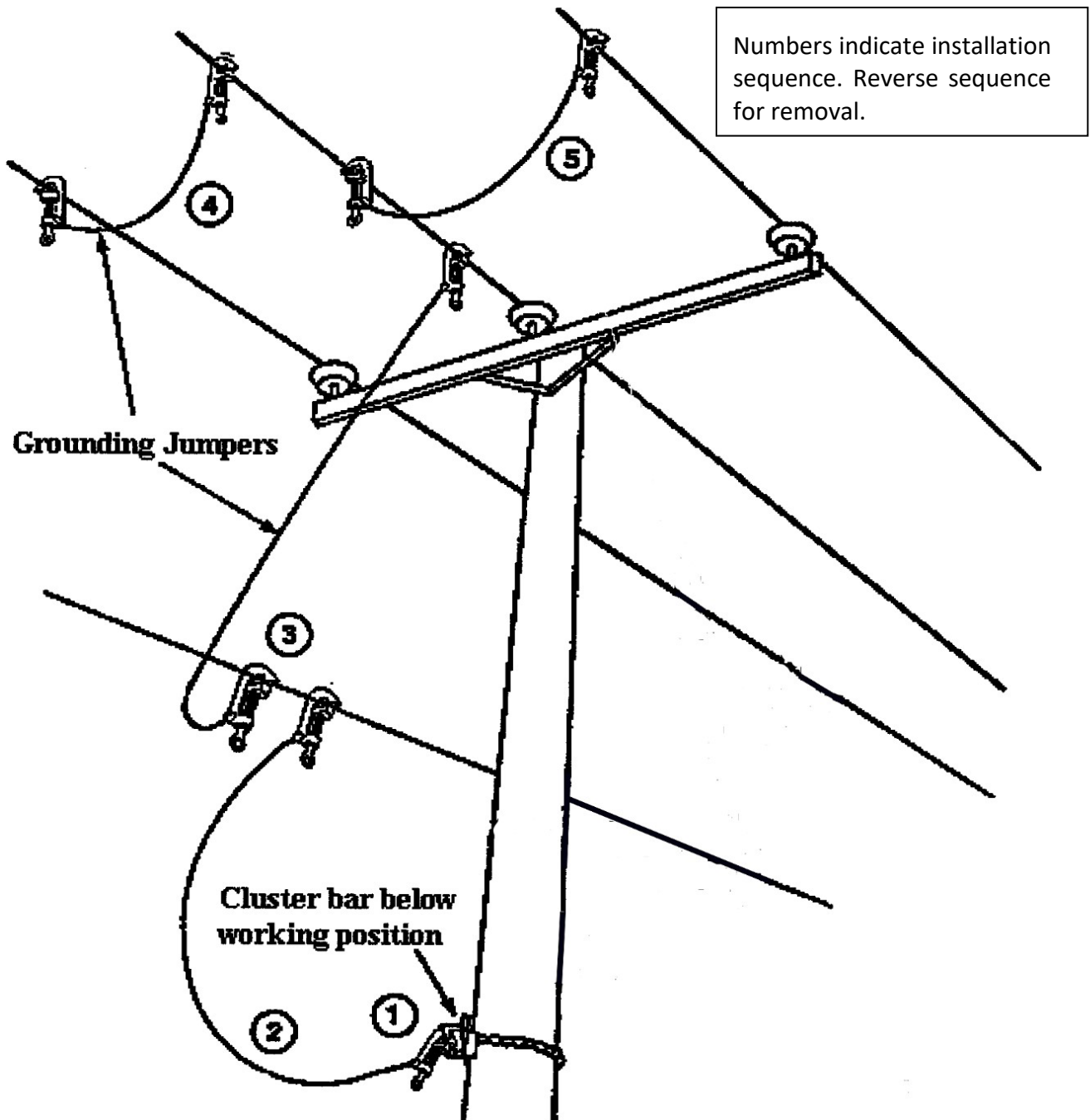
Fuse Sizes for Overhead Transformers Type K Fuse Links

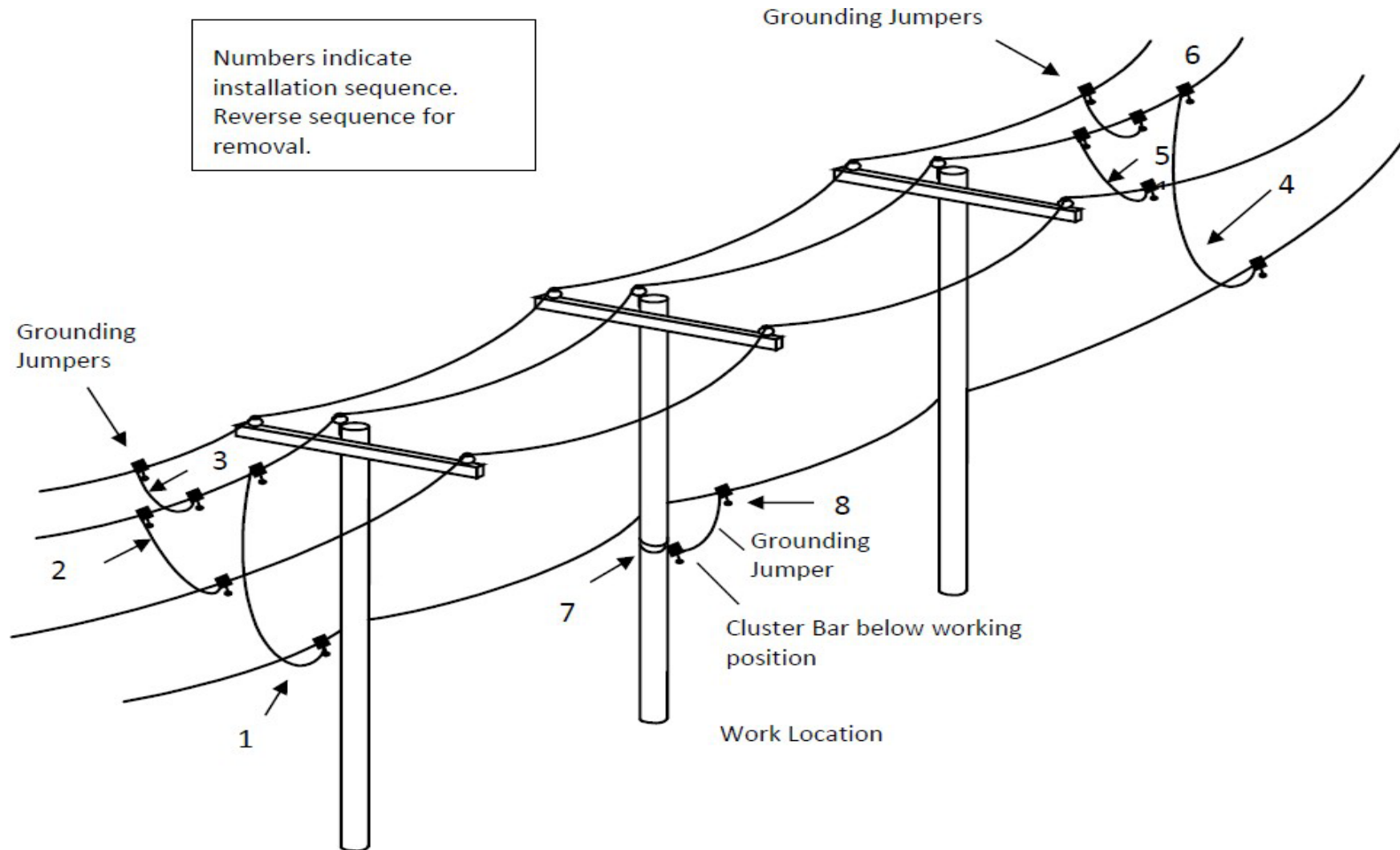
Three Phase					
Transformer Rating kVA	23000 V	13200 V 13800 V	8320 V	4800 V	4160 V
75	6	6	6	15	15
112.5	6	6	15	30	30
150	6	10	15	30	30
225	10	30	30	50	50
300	15	30	30	50	65
500	30	50	50	80	100

Notes

1. On the 4800 volt two-phase system, select fuse size on the basis of individual transformer rating rather than on the bank rating.
2. The outside legs of open delta banks should be fused as for single-phase transformers. The common leg should be fused as for a three-phase bank with a capacity of three times the rating of the larger transformer.
3. Large transformers and special installations will require individual consideration – consult Protection & Controls Engineering.
4. Since Eversource does not purchase conventional 10 kVA and 15 kVA transformers, the fusing is designed to protect against unnecessary upstream device operation.

ORIGINAL	FUSING FOR OVERHEAD TRANSFORMERS TYPE K LINKS				CT
5/4/79					
APPROVED	EVERSOURCE ENERGY				DESIGN & APPLICATION STANDARD
3/3/15					
<i>[Signature]</i>					DTR 17.029
					7

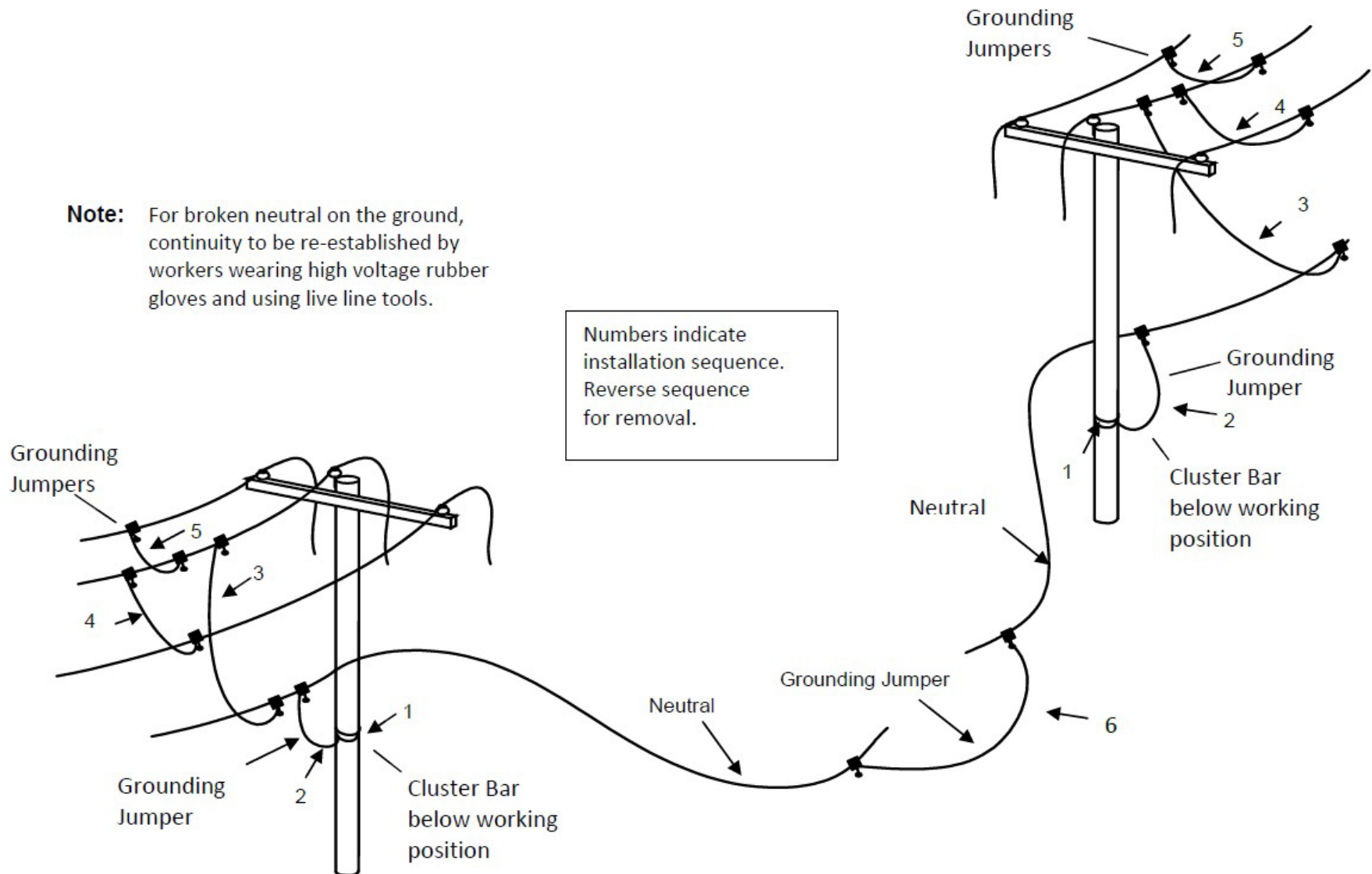
Attachment 5: Work Site Grounds

Bracket Grounds Distribution Line with Common Neutral

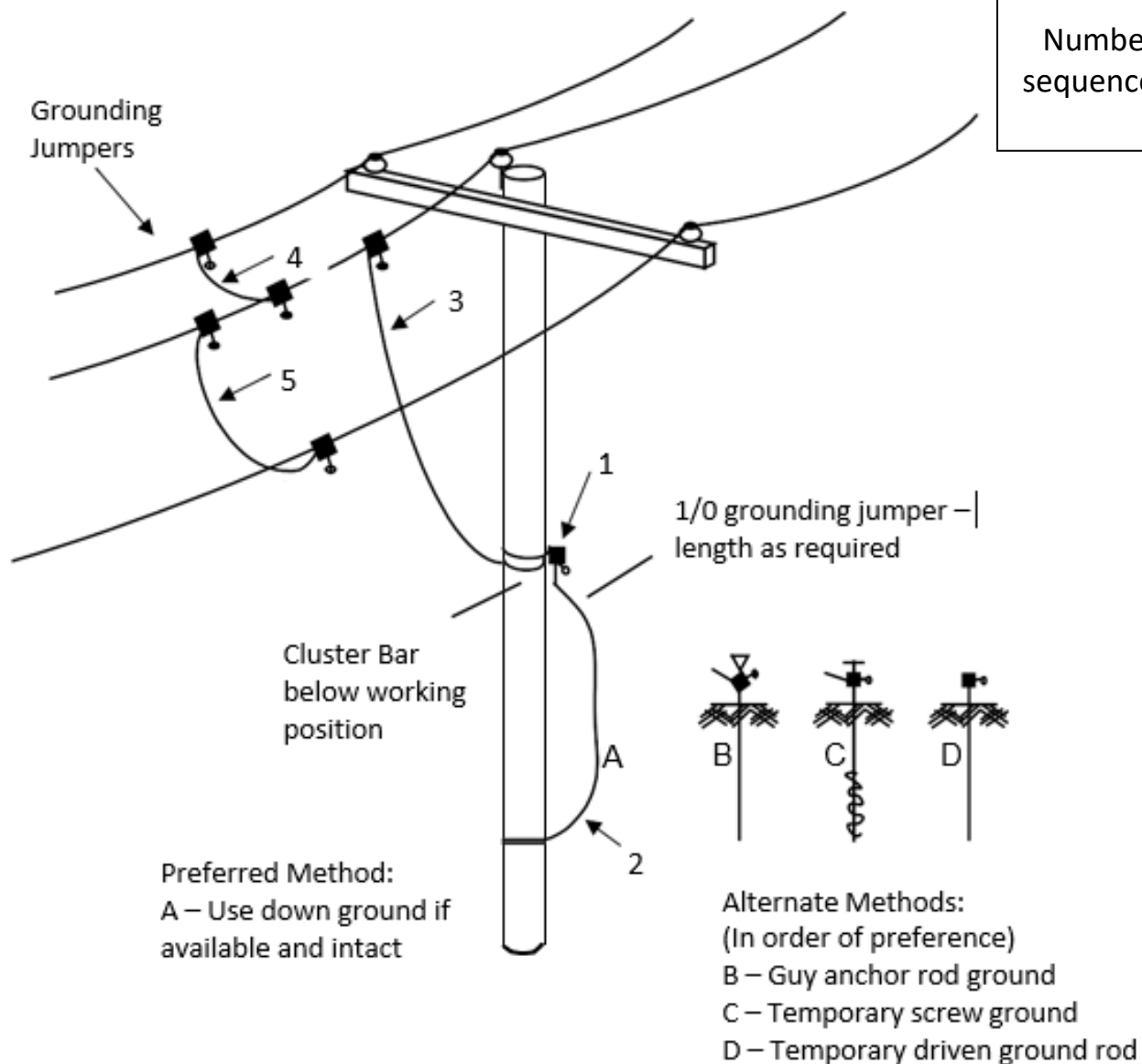
Broken Primary and Neutral Conductors

Note: For broken neutral on the ground, continuity to be re-established by workers wearing high voltage rubber gloves and using live line tools.

Numbers indicate
installation sequence.
Reverse sequence
for removal.



Grounding on a Delta or Uni-Grounded System



Notes

[illegible]