



**ALPHA
OMEGA**
SAFETY SOLUTIONS

UTILITY & CREW SAFETY REFERENCE

FIELD GUIDE

**Hierarchy of Controls
Sections 1 – 6**



ALPHA OMEGA SAFETY SOLUTIONS

AUGUST 2026 EDITION

ABOUT THIS GUIDE

A quick-reference standard for crews handling energized lines, transformers, and insulated protective equipment, aligned to OSHA/MIOSHA. Every page is color-coded to the control level it belongs to — the color on the header rule, the footer tab, and the figure captions tells you which hierarchy you are working in.

Purpose

To consolidate safety and operational standards into a quick reference format for workers handling energized lines, transformers, and insulated protective equipment aligning with OSHA/MIOSHA standards.

Objective

Equip workers with the knowledge and skills to identify risks, safely handle equipment, and maintain compliance with safety standards.

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01	ELIMINATION	Isolate, test, ground — remove the energy before the work starts
02	SUBSTITUTION	Energized work methods, cover-up, and minimum approach distance
03	JOB SITE AWARENESS	Body and equipment placement, traffic control, poles, excavation
04	COMMUNICATION OF HAZARDS	Job briefings, hand signals, tags, hazard reporting
05	FIELD CONTROL	Hot-line tag, clearance tags, two-employee rules
06	PPE / IPE	Rubber goods, arc-rated clothing, climbing, inspection intervals

The hierarchy at a glance

Strategy sits at the top: eliminate the hazard, or substitute a safer method. Work methods sit below it. Read it as a funnel — every level you drop, more of the risk is still live and riding on you.

HIERARCHY OF CONTROLS



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Every lettered section in the guide, in page order.

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HIERARCHY 1 OF 6 · YOUR STRATEGY

ELIMINATION

PURPOSE

To consolidate safety and operational standards into a quick reference format for workers handling energized lines, transformers, and insulated protective equipment aligning with OSHA/MIOSHA standards.

OBJECTIVE

Equip workers with the knowledge and skills to identify risks, safely handle equipment, and maintain compliance with safety standards.

The four elements

01 Elimination

The complete act or process of removing all potential sources, including feed, backfeed, and stored energy. This method involves the lowest amount of risk.

02 Isolation

Includes system neutral. The separation of a part of the system from all other sources — back-feed, solar, induction, generation, capacitance — to ensure that it is not electrically connected to any other part.

03 Insulating

A technique used to prevent accidental electrical contact with energized parts by using insulating tools.

04 Grounding

The process of connecting equipment or an electrical system to the earth, providing a path for fault currents and preventing the buildup of hazardous voltages.

A

General Grounding Procedures

1 De-energizing

- **Lockout/Tagout:** All electrical and mechanical energy sources must be rendered inoperative and locked or tagged out before employees enter enclosed spaces.
- **Disconnection:** Tag equipment as de-energized. Disconnect all lines, cables, or equipment not actively being worked on from power sources.

2 Safety Assumptions

Never assume a line is safe until confirmed.

- Treat all previously energized conductors as energized until isolated, tested, and grounded.
- Exercise extreme caution with neutral wires just as you would with active energized wires.

3 Voltage Testing

MANDATORY STEP BEFORE INSTALLING GROUNDS

All de-energized conductors and equipment must always be thoroughly tested for voltage prior to attaching any grounding devices — per OSHA.

4 Grounding Steps

Strict procedural sequence must be followed.

Attaching sequence

Connect the **ground end first**, then connect the other end using proper insulating tools.

Removing sequence

Disconnect the **line or equipment end first**, using certified insulating tools.

B Overhead Grounding Methods

1 Equal Potential Grounding

PREFERRED METHOD

Used when workers are on a structure.

- **Installation procedure:** Use a chain binder with a personal protective ground attached, secured below the lineman's working position.
- Extend grounds to the system neutral, or take steps to isolate completely if neutral is inaccessible.
- **Grounding connections:** Connect grounds from the chain binder to one phase, then short-circuit to the other phases.
- **Ground removal:** Reverse the installation order to remove grounds safely.

2 Dual Point Grounding

- Acceptable when equal potential grounding isn't possible — for example mid-span or downed lines.
- Grounds must be placed as close as practical to the work area.

3 Bracket Grounding

- If single-point grounding is impractical (e.g. downed wires), install grounds on both sides of the work area but not further than adjacent structures.
- If **all** conductors are broken, a neutral jumper must be used to establish a system bond.

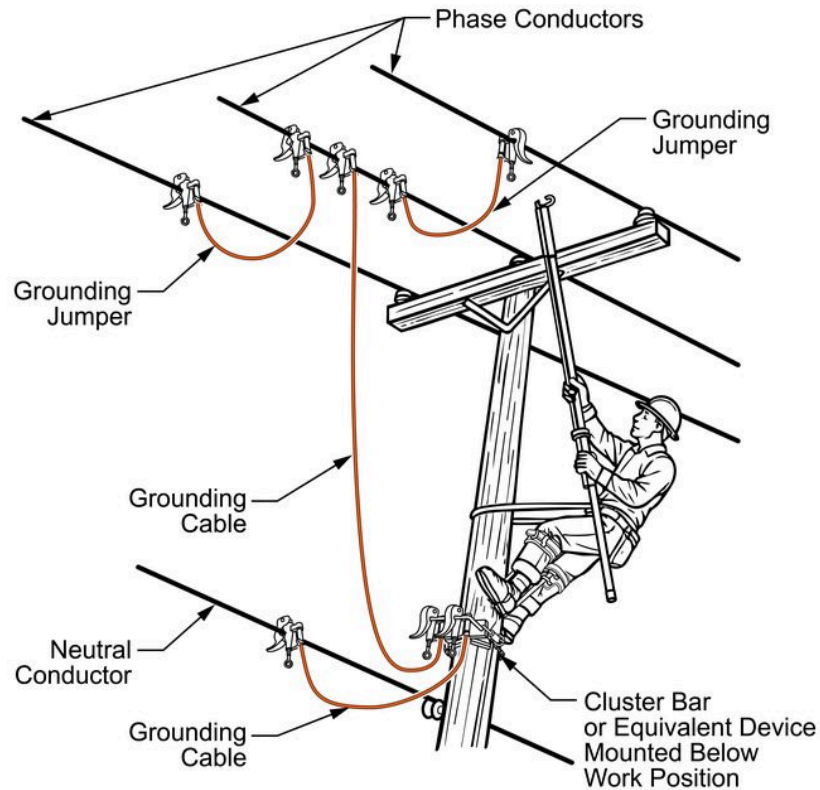


Figure 1-1 – Equal potential grounding

Preferred method. Cluster bar or equivalent device mounted below the work position.

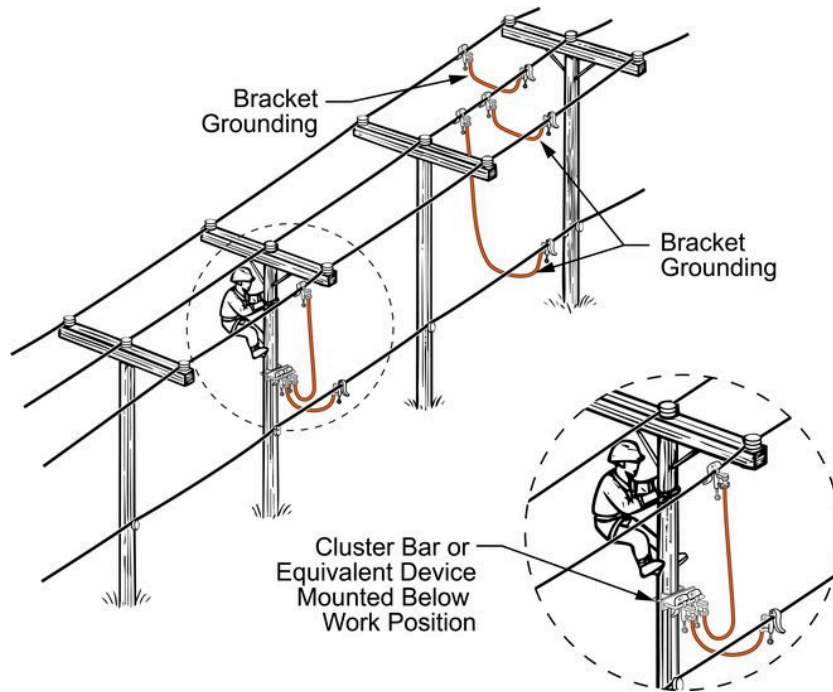


Figure 1-2 – Dual point grounding

Grounds placed each side of the work area, as close as practical.

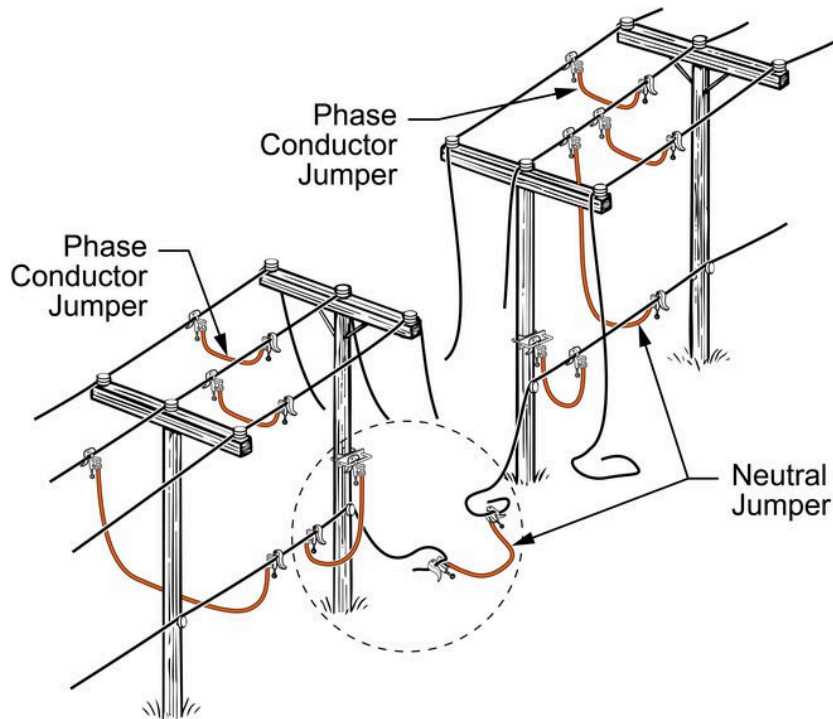


Figure 1-3 – Bracket grounding

Neutral jumper establishes the system bond when all conductors are broken.

Underground Distribution (URD) Grounding

1 Capacitive charges

Treat URD cables as energized due to potential residual capacitance. Apply grounds to prevent static arcs.

2 De-energized equipment

- Provide visible open break (switch, jumpers)
- Conduct voltage test with proper tester
- Ground the equipment

3 Backfeed prevention

Ground secondary conductors to prevent backfeed. Bond X1, X2, X3 together, pull meter, or drop legs from transformer.

4 Proximity grounding

Ground de-energized cables as close to the designated work location as possible.

5 High voltage cables (>600 V)

De-energize and ground all high-voltage cables and associated apparatus prior to initiating cutting or splicing.

6 General circuit grounding

Ensure you isolate, equipotentially ground, or bracket ground all circuit conductors prior to starting work.

7 Entering enclosed space

- Before employees enter any enclosed space, render all electrical and mechanical energy sources inoperative and locked out, and place adjacent energized circuits in hot line tag or non-reclose.
- If required, drain, vent, and clean the space prior to entry. A minimum **15-minute air change** before entry is recommended.
- 20 kV dielectric rubber boots must be worn when entering manholes, vaults, or underground spaces where energized conductors are present.

QUICK REFERENCE

- **Verify safety:** Always confirm visible isolation and test for voltage before grounding.
- **Equipotential grounding:** Use whenever workers are near structures or climbing.
- **Capacity & integrity:** Ensure equipment handles anticipated fault currents. Double-check all connections before beginning work and strictly adhere to removal procedures.

D

Ground Lead Specifications

GROUND LEAD REQUIREMENT

Ground leads must conduct anticipated fault current and have a minimum conductance of No. 2 AWG copper.

1 Testing without grounds

Grounds may be removed during testing. Workers must use insulating equipment and remain isolated from hazards.

2 Grounding electrode

Ensure resistance to ground is low enough for personnel safety and prompt operation of protective devices.

3 Grounding tower / poles

Use tower clamps capable of handling anticipated fault current during operations.

4 Remote work on cables

Isolate cables at terminal, or equipotentially / bracket ground at work location. Neutral must be opened on both sides.

5 Step potential protection

- Employee in charge will deem when to wear 20 kV dielectric rubber boots.
- Boots should be worn when patrolling in low visibility (night / snow / fog) unless the circuit has been tested and grounded, removing the hazard.
- 20 kV boots are **not** the primary means of protection from voltage presence.

6 Temporary grounds

Install temporary grounds across open circuits when a circuit is opened — for example jumpers or cutting slack.

E Tagging Overview Procedures

See **HIERARCHY 5 · FIELD CONTROL, P64** for tag types and authority.

1 Placement of Tags

- Install tags at all opening points on overhead and underground systems.
- Ensure tags are properly filled out to clearly identify the equipment or circuits being worked on.



Figure 1-4 – Individual lockout tag

Front and reverse



Figure 1-5 – Group lockout tag

Removed only when all workers have signed off

2 Crew-specific tags

Each independent crew must use its own tag when working on lines, equipment, or circuits.

3 Multiple open points

If multiple open points are used, tags must be installed at all open points — ATR loops, normal opens, opposing circuit ties.

4 Tag removal

Tags must be removed only by the Person In Charge or a person designated by the person in charge.

5 Deactivated controls

Tag any control that is to be deactivated during work on energized or de-energized equipment or circuits.

6 Rendering equipment inoperable

Where possible by design, all de-energized equipment and circuits must be rendered inoperable. Tags must be attached at all points where the equipment or circuits could be energized.



Figure 1-6 – OCR pole lockout tags

Tags at every opening point

7 Tag placement for identification

Place tags in locations that clearly and plainly identify the specific lines, equipment, or circuits being worked on.



Figure 1-7 – Worker on line sign

Visible to all personnel in the work area

QUICK REFERENCE – TAGS

- Ensure every tag is filled out clearly and completely.
- Each crew must have its own tag to avoid confusion.
- Never remove a tag unless you are the original installer or have been authorized by them.
- Double-check that all potential energization points are tagged and rendered inoperable where possible.
- Place tags where they are clearly visible to all personnel in the work area.
- Always communicate when installing or removing tags. Notify when all crews are down and in the clear.

F

Unsafe Structures & Hazardous Chemicals

Remove the hazard — not just the exposure.

Structural hazards

Address excavation cave-ins with benching or shoring.

Defective poles

Remove hazardous poles, ladders, and rigging before changing strain.

PCB spills

Clear and clean spaces affected by PCB spills before entry.

Confined spaces

Prohibit compressed-gas bottle storage in confined spaces.

G

Testing and Test Facilities Safety

SAFE SEQUENCE

Control the hazard before testing begins — 1. Isolate → 2. Ground → 3. Verify

Before testing

01 General testing safety – train & control

Training: Train employees in safe work practices before they enter any test area, especially around high voltage (1,000 V+) or high power.

Access control: Allow only authorized personnel. Use guardrails, fences, or barriers; assign test observers at temporary sites.

02 Test area security – guard & monitor

Barricading: At temporary sites, position observers to monitor the entire area and prevent unauthorized entry.

Control access: Keep employees outside the hazard zone around equipment that may become energized.

03 **Grounding & safety precautions – isolate, ground, protect**

Grounding: Keep conductive parts grounded. Treat ungrounded terminals as energized.

Visible grounds: Apply after de-energizing, using proper insulating tools connected solidly.

Return conductors: Use isolating ground-return conductors during high-power testing. Otherwise, protect against hazardous step and touch potentials.

During & after testing

04 **Hazardous conditions & equipment – ground & discharge**

Equivalent ground: When the equipment grounding conductor cannot be used, provide an equivalent ground and clearly mark it in the test setup.

Before entry: After de-energizing, apply grounds to high-voltage terminals and any other exposed terminals.

Cable ground: Temporarily short the primary cable to ground — or the capacitor's positive terminal to ground — to discharge capacitance. Bleed capacitance per OSHA guidelines.

05 **Test equipment protection – bond & contain**

Trailers & vehicles: Ground the chassis of field test trailers or vehicles. Avoid hazardous touch potentials through bonding, insulation, or isolation of conductive parts.

Cables & wiring: Contain test leads, meter connections, and control wiring in a grounded metallic sheath, terminating them in a grounded metallic enclosure before they leave the test area. Otherwise, use measures that provide equivalent safety.

06 **Instrument isolation – isolate & interlock**

Isolate meters and instruments with exposed terminals from test personnel. Metal compartments must have viewing windows and interlocks that cut off power when the cover is opened.

Live-Dead-Live Procedure

Step 1 Initial live

Purpose: Verify testing device functionality.

Procedure: Test on a known live source above 600 volts. Use a calibrated, voltage-rated tester or multimeter. Confirm expected voltage reading.

Compliance: OSHA and NFPA 70E 110.4(A)(5).

Step 2 Dead test

Purpose: Verify target circuit is de-energized.

Procedure: Follow lockout/tagout procedures. Test for absence of voltage across all phases and neutral connections.

Compliance: OSHA and NFPA 70E 120.1(5).

Step 3 Re-confirm live

Purpose: Re-verify testing device functionality.

Procedure: Re-test on the known live source. Confirm expected voltage reading.

Compliance: NFPA 70E 110.4(A)(5).

Rigging Equipment Guidelines

1 General safety

- Use rigging equipment of proper strength and type for the task.
- Do not load rigging equipment beyond its rated capacity.
- Do not use rigging equipment if the load rating tag is missing.

2 Inspection

- Inspect slings, fastenings, and attachments before each use for damage or defects.
- Tag and remove damaged or defective equipment from service.

3 Prohibited practices

- Do not use makeshift lifting devices made from bolts, rods, or reinforcing steel.
- Avoid shortening slings with knots, bolts, or other makeshift devices.

4 Load handling

- Balance loads in basket hitch slings to prevent slippage.
- Secure slings to loads using hooks with retaining devices, shackles, or positive latching mechanisms (unless in basket configuration).
- Protect slings from sharp edges with padding.

5 Usage best practices

- Do not pull slings from under loads resting on them.
- Ensure slings are long enough to maximize the angle between sling legs and the horizontal plane.
- Avoid side loading of eye bolts.

6 Shackles and hooks

- Do not replace shackle pins with nonapproved devices like bolts.
- Use hooks with retaining devices and load them in the saddle, not at the tip.
- Replace hooks with cracks, throat openings >15% of normal, or twists >10°.

7 Hoisting and handling materials

- **Prohibited materials:** Avoid using wire rope or other conductive materials to hoist transformers, poles, or other materials near energized, non-grounded high-voltage lines.
- Do not use metallic slings (chains or cables) near energized equipment.
- **Control:** Maintain positive control of wire ropes at all times.
- **Conductivity:** Treat synthetic hoisting and pulling lines and ropes as conductive.

REFERENCE

For more details, consult MIOSHA standards for cranes, monorails, and rigging equipment. Always prioritize safety and ensure compliance with MIOSHA and your organization's policies.

HIERARCHY 2 OF 6 · YOUR STRATEGY

SUBSTITUTION

WARNING

Barehanded work on energized lines is

NOT APPROVED

PURPOSE

To establish effective safety protocols and emphasize the importance of procedures, safety equipment, and crew communication to enhance safety and operational efficiency.

OBJECTIVE

Equip workers with the knowledge and skills to work on energized lines, equipment, or higher risk job tasks.

Working On or Near Exposed Energized Lines

1 General requirements

- **Qualified personnel:** Only qualified employees or supervised trainees may work on or near exposed energized lines or equipment operating at 50 volts or more.
- **First aid & CPR:** For field work with two or more employees, at least two persons trained in first aid and CPR must be available.

2 Safety precautions

- **Minimum Approach Distance (MAD):**
Employees must maintain MAD from exposed energized parts unless insulated or protected by approved methods.
MAD CHART · FIGURE 3-1, P33
- **Conductive articles:** Employees must remove all conductive items — keychains, rings, watches — when near energized parts.

3 Neutral wire handling

Treat neutral wires with the same caution as energized wires.

4 Transformer safety

Short-circuit secondary windings of transformers before disconnecting devices.

5 Live-line work communication

Use clear communication methods. Apply protective relay features — Hot-Line Tag or Alternate Relay Settings — for additional protection.

Multi-employee operations

For multiple employees on or at the same pole, within MAD of each other, only one potential can be worked at the same time.

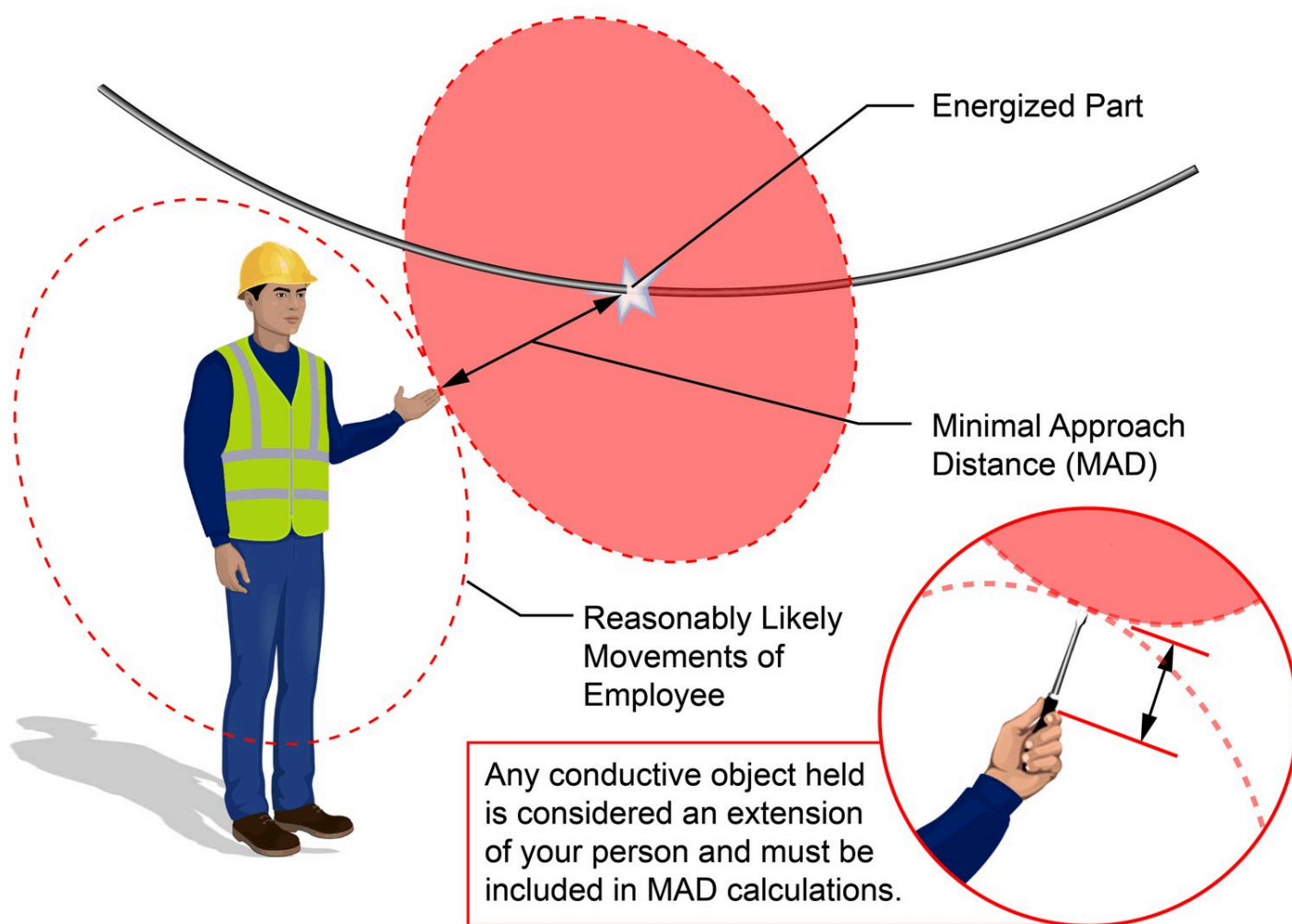


Figure 2-1 — Minimum approach distance around an energized part

Any conductive object held is an extension of your person and must be included in MAD calculations. Full MAD tables in Hierarchy 3, Section B.

SUMMARY OF KEY STEPS

- **Qualified personnel:** Ensure only qualified personnel with proper training and PPE are assigned to work on energized lines.
- **Maintain MAD:** Always maintain MAD and use approved insulating devices.
- **Conductive articles:** Remove all conductive items and confirm line status with proper voltage testing and grounding.
- **Communication:** Communicate live-line work clearly, using relay features where possible.
- **Precautionary default:** Always treat exposed lines as energized unless positively confirmed otherwise.

References: follow MIOSHA and OSHA standards covering Personal Protective Equipment, Safety-Related Work Practices, and Power Transmission and Distribution.

Working on Energized Lines with Live-Line Tools

1 General safety

- Always follow non-reclosing procedures for energized line work.
- Notify a supervisor immediately to report unplanned service interruptions.
- Use only approved live-line tools.

2 Pre-work inspections

Inspect structures, adjacent spans, and equipment for defects before starting work.

3 Use of rubber gloves

Rubber gloves are required for:

- Making / breaking circuits.
- When clearances from underbuilt circuits cannot be maintained.

4 Proper tool handling

- Never rely on another worker to hold live conductors clear of you.
- Use blocks to move heavy conductors safely and slowly.
- Avoid unrelated work on the same pole or structure during live-line work.

5 Communication and Protective Relays

Use visible methods and protective relays to signal live-line work in progress.

Hot-Line Tag

Drastically reduces the fault current curve — **protects the worker.**

Alternate Relay Settings

Non-reclose (one shot) allows a higher fault current but does not allow the reclosures to continually cycle. Designed to **protect the system**, not the worker.

INCLEMENT WEATHER

Do not start planned live-line work during inclement weather.

Stringing Adjacent to Energized Lines

1 Safety practices

- **Communication:** Maintain reliable two-way communication between tugger operator, reel tension operator, and conductor follower.
- **Splicing conductors:** Bond conductor ends and ground them before splicing.
- **Work area restrictions:** Prohibit employees from being directly under operations during pulling activities.

2 Pre-stringing preparation

- **Induced voltage:** Evaluate switching or ground fault conditions for dangerous induced voltage.
- **Tension stringing:** Prevent unintentional contact between lines and employees.
- **Grounding of equipment:** Ground all pulling / tensioning equipment. Install ground between reel setup and first structure.

3 During stringing

Conductor grounding locations:

- First tower adjacent to setups.
- In increments no greater than 2 miles.
- Dead-end or catch-off points.
- Keep grounds in place until completed.

4 & 5 Grounding & work area

- Use live-line tools to place / remove grounds (except moving types).
- Remove grounds during final phase of aerial cleanup.
- Place ground within 10 feet of splice areas at ground level and bond ends together.
- Bond conductors to tower at isolated towers as necessary.

6 & 7 Towers & crews

- **Dead-end towers:** Ground all de-energized lines when working on dead-end towers.
- **Clipping crews:** Install individual grounds at every work location for protection.

8 Protective measures

- Disable source-side automatic reclosing before tension stringing.
- Use protective coverings to prevent contact with energized lines.
- Position equipment outside minimum approach distance; cover lines with insulating materials.
- Manage potential difference with reliable grounding, traveling grounds, equipment bonding, grounding mats, and barricades.

9 Post-stringing operations

Traveling grounds:

- Leave in place until conductor installation is completed between dead-end structures.
- Remove grounds promptly when conductors are being dead-ended.

10 Ungrounded conductors

Handle ungrounded conductors using appropriate live-line methods to ensure complete safety during operations.

D Tool Storage and Maintenance

1 Storage

Keep tools in dry, warm containers; never place on ground.

2 Daily inspections

Wipe clean, visually inspect, and remove defective tools.

3 Maintenance

Live-line tools for primary protection must be serviced **every 2 years**.

E Stringing or Removing De-energized Conductors

1 Pre-Stringing Preparation

Job briefing — outline the plan:

- Equipment & grounding devices to be used.
- Grounding procedures & crossover methods.
- Clearance authorizations required.

HAZARD MITIGATION

If a conductor may contact energized circuits or build up dangerous induced voltage, ground the conductor or insulate / isolate employees to prevent hazards.

2 Clearance authorization

For de-energized lines:

- Secure proper clearance authorization.
- Ground lines on both sides of crossover.
- Treat and work the line as energized if not grounded.

Crossing energized lines

For conductors over 600 volts:

- Use rope nets / guards to prevent contact.
- Isolate / insulate worker or conductor.
- Set protective relay to hot line tag.
- Apply running ground to line being strung.

3 Conductor control

Maintain positive control over conductors being strung or removed using:

- Adequate tension reels
- Guard structures
- Tie lines or equivalent methods

4 Post-stringing operations

- Install adequate grounds on all dead-end structures.
- Keep grounds intact until jumpers are installed or grounds are removed during final cleanup.
- Handle conductors to prevent accidental contact with energized circuits.

F

Operating a VAC Truck Near Energized Lines

Pre-work safety steps

01 Job planning

Conduct safety briefing to identify hazards & review MAD. Mark boundaries; confirm the truck won't encroach within 20 ft. **MAD CHART · FIGURE 3-1, P33**

02 Site & equipment inspection

Inspect site for energized lines, soil stability & obstacles. Check VAC truck / equipment and verify grounding and bonding. Ensure crew wears rubber gloves, arc PPE & footwear.

03 Assign roles

Operator: VAC truck operations. **Safety Watcher:** Monitors MAD, halts unsafe work. **Ground Crew:** Supports site tasks.

04 Establish safety controls

De-energize and ground lines when possible; use dielectric barriers if not. Ground and bond the VAC truck to mitigate static hazards.

During work

1 Safety watcher

Monitor equipment & work zone to ensure MAD compliance. Stop operations immediately if unsafe conditions arise.

2 Communication

Maintain continuous, clear communication among all crew members using reliable two-way radios or standard hand signals.

3 Weather monitoring

Actively monitor conditions and suspend all work during adverse weather such as high winds, heavy rain, or lightning storms.

Post-work steps

1 Shutdown and inspection

Safely power down and thoroughly inspect all operating equipment. Secure all tools and ensure the work site is left completely free of hazards.

2 Debrief

Conduct a structured post-job safety review with the entire crew to address safety performance, document challenges, and identify key operational improvements.

6

Working on Capacitors

VOLTAGE ASSUMPTION

Treat all line capacitors as energized at full voltage until they are removed from the line and terminals are short-circuited and discharged to ground using an approved method. Allow at least 5 minutes after deenergization before short-circuiting.

1 During work

Wear rubber gloves and use approved live-line tools for shorting and grounding terminals.

2 Avoid contact

Do not touch ungrounded capacitor cases until the capacitor is disconnected from the circuit and the terminals are shorted.

3 Storage safety

Ensure the terminals of all capacitors in storage are shorted for safety.

H

Working in an Energized Substation

1 Pre-work assessments

- Verify all personnel are qualified.
- Identify energized equipment and lines.
- Determine necessary protective equipment and precautions.

2 Energized lines and equipment

- Treat all lines and equipment as energized unless tested and grounded.
- Use rubber gloves for operating gang switches with metal handles.

3 Work practices

- Use fall protection for elevations over 4 feet.
- Cover all energized conductors within reach.
- Work from below energized parts when possible.
- Prohibit simultaneous work on different energized phases.

4 Equipment and tools

- Use non-conductive ladders near exposed lines.
- Avoid using conductive tools or dropping them on energized equipment.

I Battery Maintenance

1 Ventilation and safety

- Ensure adequate ventilation in battery rooms.
- Post signs: "Danger – No Smoking, Open Flames, or Ignition Sources."

2 PPE requirements

- Wear acid-resistant gloves, aprons, eyewear, and face shields.
- Use non-conductive tools when working near batteries. See [HIERARCHY 6 · PPE / IPE, P64](#)

3 Handling and mixing

Prevent sparks and short circuits when working on or cleaning batteries.

4 Disposal

- Dispose of batteries per environmental regulations.
- Store de-energized batteries in ventilated, ignition-free areas.

J Circuit Breaker Maintenance

1 Energy control

- Follow Lockout/Tagout procedures before testing or repairs.
- Confirm disconnects are fully open and test leads are connected below energized zones.

2 Safe testing practices

- Ground all testing equipment and vehicles to the substation ground.
- Avoid opening the secondary side of energized current transformers.

3 Employee safety

- Keep hands clear of mechanical closing mechanisms during breaker operations.
- Use ladders or other safe methods to connect test leads.

4 Additional notes

- **Induced voltage:** Exercise caution when working near de-energized but ungrounded equipment.
- **Job briefings:** Conduct prior to any work, detailing risks and procedures.
- **Compliance:** Follow OSHA 29 CFR 1910.269 standards.

Declassifying a Permit-Required Confined Space

01 Initial assessment

Identify the permit-required confined space and document its specific location. Review historical data, prior assessments, and any incident reports related to the space.

02 Hazard identification

Evaluate for atmospheric hazards (oxygen deficiency, toxic gases), engulfment and configuration risks, and any other recognized serious safety or health hazards.

03 Hazard elimination

Ensure all identified hazards are completely eliminated without entry. If entry is required, follow full permit procedures per 29 CFR 1910.146. **Forced air ventilation alone does not qualify as hazard elimination.**

04 Verification

Perform testing and inspection after elimination to confirm complete absence of hazards. Use calibrated instruments to test atmospheric conditions and ensure safe limits.

05 Documentation

Create a formal certification detailing the date of hazard elimination, the precise location of the space, and the signature of the authorized determiner. Must be accessible to all entering employees.

06 Reclassification

Once all hazards are confirmed eliminated, formally reclassify the space as non-permit. Maintain this reclassification only as long as the space remains completely hazard-free.

07 Continuous monitoring

Regularly monitor the space to guarantee that no new hazards develop during operations. If hazards arise, evacuate immediately, reassess, and revert to PRC status.

Enclosed space vs. confined space

Feature	Enclosed space	Confined space
Entry / egress	Limited but easy to manage	Restricted, difficult to navigate
Atmosphere	Safe, no expected hazards	Potentially hazardous (oxygen, toxins)
Hazards	Minimal, manageable	Significant, may require permits
Occupancy	Safe for routine work	Not designed for continuous occupancy
Examples	Utility vaults, tunnels	Sewers, tanks, silos

WHEN IN DOUBT

- Treat all spaces as confined until a proper hazard assessment is conducted.
- If a space requires a permit, ensure all safety measures are in place before entering.
- Always prioritize personal safety and report unsafe conditions immediately.

Reclassification is only valid as long as the space remains hazard-free. If conditions change or new hazards are introduced, the space must be re-evaluated. Ensure all personnel involved are trained and informed about reclassification.

HIERARCHY 3 OF 6 · YOUR WORK METHODS

JOB SITE AWARENESS

PURPOSE

To ensure employees understand and follow safety protocols related to hazards at the worksite, focusing on body placement, equipment use, traffic control, and specialized operations such as hauling poles and using digger derricks.

OBJECTIVE

Equip workers with the knowledge and skills to identify risks, safely handle equipment, and maintain compliance with safety standards.

Understanding Job Site Awareness

1 What is job site awareness?

- Awareness of risks such as energized lines, vehicle movement, traffic, and stored energy.
- Specialized operations like hauling poles and digger derrick use require additional precautions.

2 Key elements

- Safe body and equipment placement.
- Traffic control and high-visibility practices.
- Proper handling of materials such as poles and equipment like digger derricks.
- Awareness of underground utilities.

Body & Equipment Placement, MAD, Aerial Devices

1 Minimum Approach Distances (MAD)

Follow OSHA/MIOSHA-defined MAD near energized lines. Use insulated tools and live-line equipment when required.

Full minimum approach distances – both voltage ranges – are given overleaf as Figure 3-1. The same chart appears in the PPE section as Figure 6-2.

2 Vehicle and Equipment Positioning

- Place vehicles and equipment to maintain clearances from live lines.
- **Do not** place equipment directly under the conductors or pole structures when possible.

AC Live-Line Work Minimum Approach Distance

Nominal Voltage Phase-To-Phase	Distance to Employee	
	Phase-To-Ground Exposure	Phase-To-Phase Exposure
0 to 50 V	N/A	N/A
51 to 300 V	Avoid contact	Avoid contact
301 to 750 V	1 ft., 1 in.	1 ft., 1 in.
751 to 5,000 V	2 ft., 1 in.	2 ft., 1 in.
5,100 to 15,000 V	2 ft., 2 in.	2 ft., 3 in.
15,100 to 36,000 V	2 ft., 7 in.	3 ft., 0 in.
36,100 to 46,000 V	2 ft., 10 in.	3 ft., 3 in.
46,100 to 72,500 V	3 ft., 4 in.	4 ft., 0 in.

Nominal Voltage Phase-To-Phase	Distance to Employee from Energized Part		
	Without Tools Phase-To- Ground Exposure	With Tools Phase-To-Ground Exposure	Without Tools Phase-To-Phase Exposure
72,600 to 121,000 V	3 ft., 6 in.	3 ft., 9 in.	4 ft., 8 in.
121,100 to 145,000 V	4 ft., 0 in.	4 ft., 4 in.	5 ft., 5 in.
145,100 to 169,000 V	4 ft., 6 in.	4 ft., 10 in.	6 ft., 5 in.
169,100 to 242,000 V	6 ft., 2 in.	6 ft., 8 in.	10 ft., 2 in.
242,100 to 362,000 V	10 ft., 6 in.	11 ft., 3 in.	18 ft., 2 in.
362,100 to 420,000 V	13 ft., 2 in.	14 ft., 0 in.	22 ft., 5 in.
420,100 to 550,000 V	15 ft., 9 in.	16 ft., 8 in.	27 ft., 1 in.
550,100 to 800,000 V	21 ft., 6 in.	22 ft., 7 in.	37 ft., 5 in.

Consult OSHA regulations and NESC standards for specific calculations and other information on Minimum Approach Distances.

Figure 3-1 – AC live-line work minimum approach distance

The same chart appears in the PPE section as Figure 6-2, p70

Insulated aerial lift (bucket truck)

- Only authorized, trained personnel should operate aerial lifts.
- Ensure insulated aerial lifts are positioned away from energized lines.
- Deploy outriggers and stabilizers on a firm surface; outrigger pads must be used if a solid surface is not at the work site.
- Never operate aerial lifts in winds greater than 30 MPH or unstable conditions.
- A designated observer must be present when operating near energized lines.
- Inspect the bucket before first use of the day; personnel always wear fall protection.

Digger derrick use

- Digger derricks must maintain required clearances (MAD) from energized lines. Insulated cover-up on the conductors must be used, or conductors properly grounded.

MAD CHART · FIGURE 3-1, P33

- Do not raise derricks or booms unless supervised by a designated observer.
- Never stand under suspended loads or within the bight of a winch line.
- Use tag lines to control loads during lifting to prevent swinging or contact with other equipment.
- Operator must stay focused with the controls while a load is suspended.

HIGH-WIND POLICY

Stop aerial or derrick operations in sustained winds above 30 mph, per OSHA and manufacturer's specifications. If public life needs to be protected and winds exceed 30 MPH, the only work that can be performed for public protection purposes is out of a bucket, with a live line tool, and a designated observer in place.

Worksite Inspection & Designated Observers

1 Who is a designated observer?

A trained individual responsible for monitoring hazardous tasks, including those near energized lines and during pole handling above 600 volts. This person should be designated during the job briefing portion of your work planning.

2 Responsibilities

- Ensure safe clearances and monitor body / equipment positioning.
- Communicate with operators during movement or lifting tasks — unless a person closer to the equipment landing zone is present.

3 Worksite inspection

- Assess for hazards related to pole handling and equipment operations.
- Verify the presence of traffic controls and barriers.

4 Stop work authority

All workers are empowered to halt operations if hazards arise.

5 Response plans

Ensure emergency access to the site and implement response procedures for equipment failure or accidents.

6 Continuous monitoring

- Overseers and observers ensure compliance with safety measures during pole hauling and lifting operations.
- Adjust safety measures for changing conditions, such as increased traffic or a change in weather.

7 Reporting hazards

Workers must immediately report unsafe conditions to a supervisor, foreman, or crew leader.

1 Establishing a Temporary Traffic Control Zone

- Use cones, barricades, and signs to mark work areas and direct traffic.
- Flaggers or spotters shall be assigned as needed.
- Traffic should self-direct when possible.

2 High-Visibility Clothing

- Ensure vests are clean and undamaged for maximum visibility. Must be visible and distinguishable from 1000 feet.
- High-visibility clothing is required in low light or low visibility work conditions — night, fog, snow.
- If focused on anything other than traffic, a Class 3 vest is recommended. See Figures 3-2 and 3-3.

HI-VIS CLASSES · FIGURE 6-9, P82



Figure 3-2 – Class 2 vest

Lower speed roadways, barrier present



Figure 3-3 – Class 3 vest

High-speed roads, no barrier, low light

3 Warning Signs and Traffic Cones

- Place "Utility Work Ahead" signs near areas where poles or equipment are being used.
- A minimum cone height of 28" with a dual reflective stripe shall be used to meet MUTCD guidelines.



Figure 3-4 – Utility Work Ahead sign

Cone taper leading into the work zone

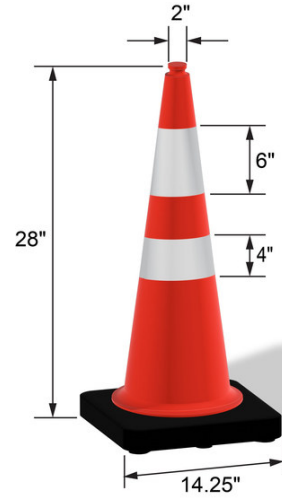


Figure 3-5 – Traffic cone specification

28" height, 6" and 4" reflective stripes



Figure 3-6 – Utility trucks and cones

Multi-vehicle setup

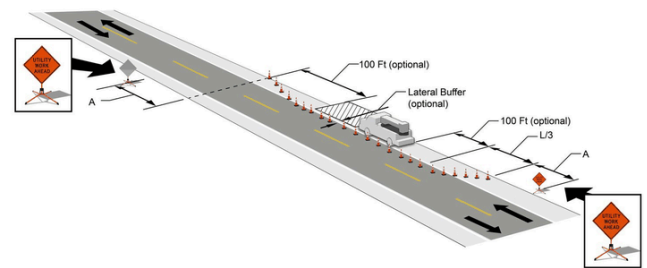


Figure 3-7 – Work zone layout

Lateral buffer and taper spacing

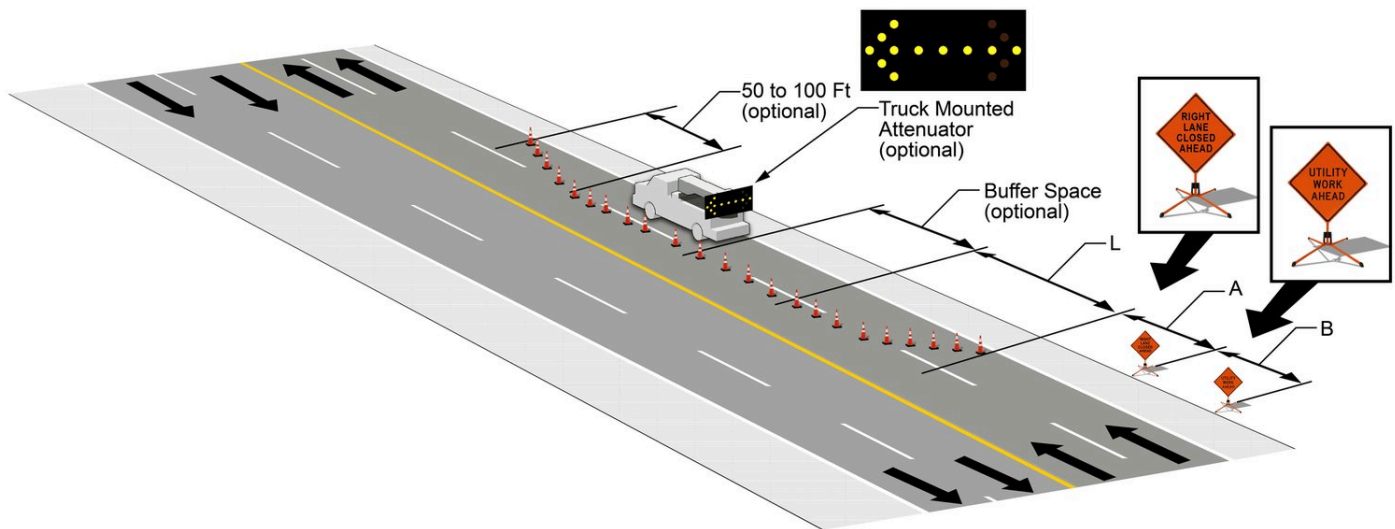


Figure 3-8 – Work zone layout, lane closure

Truck-mounted attenuator and buffer space

4 **Flagger-Controlled Lane Closures**

- Flaggers or spotters shall be assigned as needed to control traffic through the work zone.
- Employees performing flagging duties must wear a **Class 3** vest. HIGH-VISIBILITY · HIERARCHY 6
- Set sign spacing and taper length from the applicable table for the posted speed before opening the zone.

Figure 6P-10. Lane Closure on a Two-Lane Road Using Flaggers (TA-10)

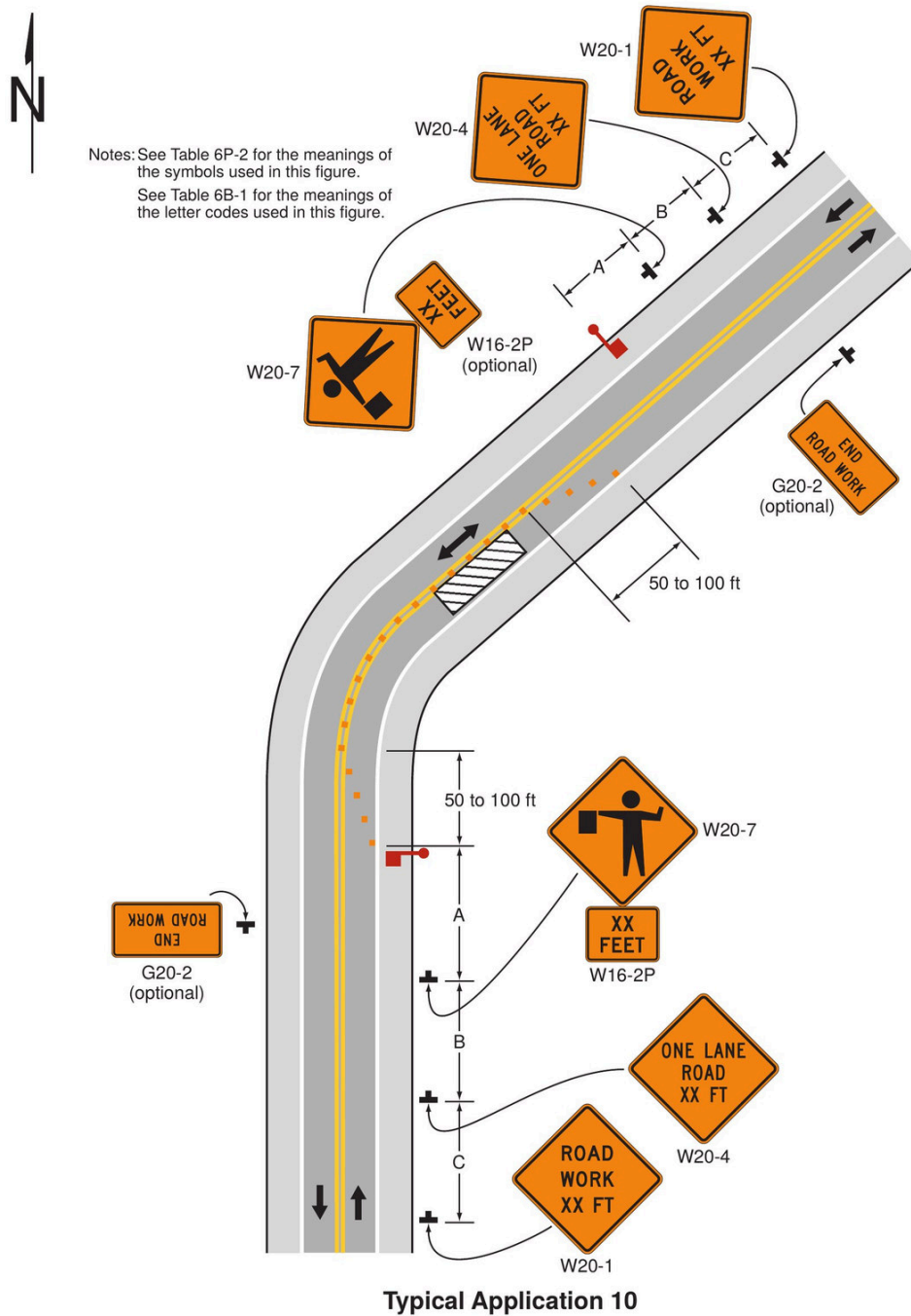


Figure 3-9 – Lane closure on a two-lane road using flaggers

MUTCD 11th Edition, Figure 6P-10 (Typical Application 10). See MUTCD Table 6P-2 for sign spacing A, B, C.

Figure 6P-11. Lane Closure on a Two-Lane Road with Low Traffic Volumes (TA-11)

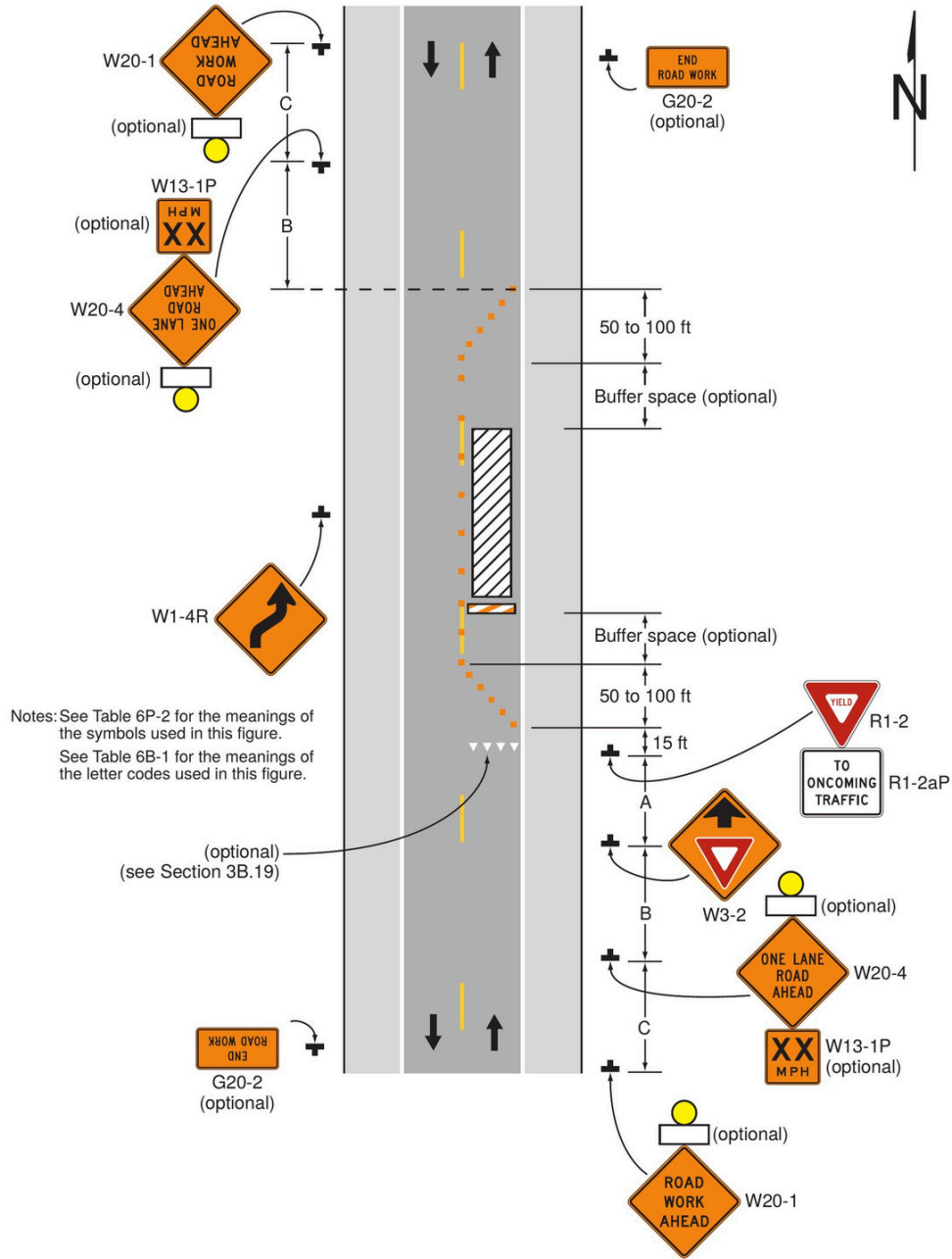


Figure 3-10 – Lane closure on a two-lane road with low traffic volumes

MUTCD 11th Edition, Figure 6P-11 (Typical Application 11). Yield control instead of flaggers — use only where gaps are sufficient and both approaches have clear sight distance.

Hauling and Handling Poles

1 Hauling poles

- **Trailer (over 50 ft):** Secure every 10 feet.
- **Digger derrick rack:** Max 50-foot or manufacturer spec.
- No riding on pole dollies / trailers. Load binders operated from ground.
- Attach flags and red 360° strobes at all times.
- Use escort / chase vehicles in high traffic. See FMCSA Cargo Handbook.

2 Pole handling at worksites

- Workers near energized lines must wear rubber gloves.
- Use pole guards or cover-up when safe clearance cannot be maintained.

3 Temporary pole storage

- Store where poles will not interfere with traffic.
- Use traffic control cones overnight near streets.
- Block poles securely to prevent rolling.
- Do not stand on a pole pile during hoisting operations.

4 Setting & removing poles

- Only trained, qualified employees may operate hoisting equipment.
- Inspect lifting gear and ensure load rating tags are present before use.
- Guard open holes while work is active on site.
- Cover unfilled holes securely at end of day — T-post / ground rods and snow fence preferred.
- Keep non-essential personnel completely outside the work area.

NEAR ENERGIZED LINES — ABOVE 600 VOLTS

- De-energize or cover conductors with protective devices if safe clearance is impossible.
- Use pole guards and ensure conductors are spread to prevent contact.
- Wear rubber gloves when handling the butt of the pole — this applies even when using cant hooks, peaveys, or slings.

1 Proper ladder placement

Ladders that do not support themselves must be placed at a safe angle — 4:1 ratio. For every 4 feet of height, place the base 1 foot from the wall.

2 Climbing safety

- Always face the ladder when climbing.
- Do not carry objects that could cause loss of balance while climbing.
- Maintain 3 points of contact at all times, per OSHA.
- If both hands are needed to complete the work, belt off to the ladder or another securement point to create the third point of body contact.

3 Stable surfaces

- Place ladders on stable, level surfaces. Secure or stabilize if surfaces are uneven.
- 16-to-20-foot extension ladders shall be provided with leg levelers.
- For a 16-foot combination ladder, storage and use needs to be considered for each department's needs and safe usage.

4 Ladder extension

For ladders used for dismounting onto another surface, ensure the side rails extend at least 3 feet above the surface, per OSHA.

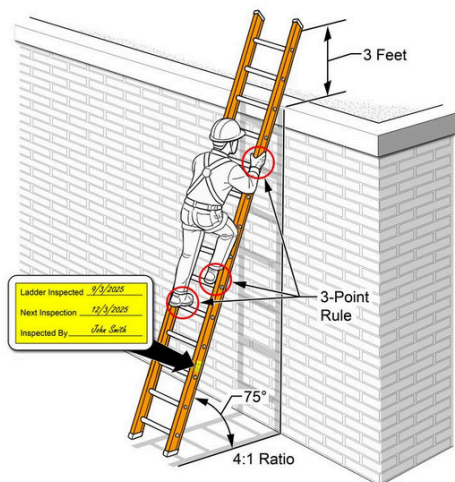


Figure 3-11 – Proper ladder position and inspection

4:1 ratio, 75°, 3-point rule

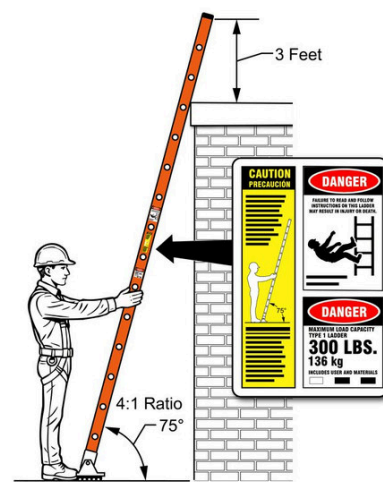


Figure 3-12 – Ladder position and inspection, continued

Inspection tag and duty rating label

General Safety Requirements for Enclosed Spaces

DEFINITION OF ENCLOSED SPACES

- Applies to electric power transmission and distribution departments.
- Designed for periodic human occupancy and work with restricted entry / exit — for an OSHA 1910.296 qualified employee.
- Usually safe but can become hazardous under unusual conditions — **then the space transfers to a confined space and needs to be reevaluated.**
- Includes spaces like manholes, vaults, pits, tunnels.

1 Training

- Only employees trained in hazards, entry, and rescue may enter.
- Attendants must be trained and stationed for monitoring.
- Two-way radio communication must be maintained.

2 Pre-entry assessment

- Check for temperature, pressure, or hazardous conditions before removing covers.
- Guard openings with railings, temporary covers, or barriers once covers are removed.

3 Atmospheric testing

- Test for oxygen, flammable gases, and toxic vapors at all levels — approx. 2 minutes per level.
- Use calibrated instruments. Unit must be calibrated monthly, show current date/time, and be calibrated before crew use.
- Continuous testing must happen at the same elevation as the employees' working level.

4 Ventilation

- Use forced ventilation to maintain safe oxygen levels.
- Ventilate for a minimum of 15 minutes before testing.
- Continuously ventilate when possible during work.
- Do not place monitor directly under forced air pipe.
- If not continuous, take a 20-minute fresh air break every 60 minutes.

5 Hazardous atmospheres

- Do not enter if the atmosphere cannot be cleared and remains unsafe.
- Maintain continuous testing and forced ventilation to mitigate hazards.

6 Emergency preparedness

- A CPR and first-aid trained person must be immediately available.
- Station a trained attendant outside to monitor and communicate.
- Attendant must not enter during emergencies; summon rescue.

7 Work restrictions

- No hot work in spaces with flammable gases until cleared.
- No compressed gas bottles inside — extend hoses inside instead.
- Secure cylinders if they must enter; safety attendant required.

8 Access and entry

- Maintain safe access at all times.
- Route cords / hoses through non-access openings.
- Visually inspect all cables before starting work.

9 Energy sources & draining

- For inactive cables, LOTO mechanical / electrical sources (Hot Line Tag).
- Use remote cutters from surface when cutting cables in enclosed spaces.
- Drain, vent, and clean the space if required.

10 Exhaust systems

- Use exhaust systems for ventilation when provided.
- Test systems annually for proper functioning.

11 Conducting work

- Two qualified employees in workspace when space allows.
- Attendants can only enter for short duration — max 10 minutes — after safety inspection.

REGULATORY COMPLIANCE

All cylinder safety guidelines and enclosed space entry criteria must comply strictly with OSHA 1926.350(a) (9) and local site hazard protocols.

Substation Rules and Procedures

1 Access control

- Only authorized personnel may enter.
- Notify supervisor when unlocking gates.
- Keep entrances closed and secured unless supervised.

2 Warnings & signs

- Permanent clear signage on outer perimeter: "Danger – High Voltage".
- Edge signage reads: "Warning – High Voltage".

3 New employees

- Escort employees unfamiliar with hazards until trained.
- Escort all contractors unfamiliar with substation hazards.

4 Vehicles

- No parking inside substations unless for work.
- Avoid driving over wire troughs.
- Check equipment clearance before entry.
- Designated observer **must** be used when raising booms.

5 Equipment handling

- Store materials away from energized lines and buses.
- Do not carry long materials — e.g. steel — that could contact energized equipment.

6 Gate security

- Keep gates closed while working to prevent unauthorized access.
- Lock all gates, doors, and control houses when leaving.

7 PPE and tools

- Wear appropriate PPE for the arc fault current possible.
- Rubber gloves **shall** be worn while operating any manual switch mechanism.
- Inspect tools and ensure grounding continuity during fence expansions or vehicle operations.

I Substation Pre-Entry Procedures

1 Visual inspection

- Walk perimeter to check for standing water, erosion, exposed grounding conductors, cut fence fabric, or arcing sounds.
- Look for visible damage to grounding grids, fences, or protective systems.

2 Environmental assessment

Monitor weather conditions — rain, snow, or lightning — that may compromise ground safety.

J Excavation Safety Standards

OSHA general safety mandates

- **Inspections:** A competent person must inspect excavations daily and as conditions change.
- **Cave-in protection:** Protective systems must be used for trenches **5 feet or deeper**, unless entirely in stable rock.
- **Hazard prevention:** Address falling loads, access/egress, water accumulation, and hazardous atmospheres.
- **Access & egress:** Ladders, steps, or ramps are required for trenches **4 feet or deeper**, within 25 feet of travel.
- **Spoil piles:** Keep soil spoils, equipment, and traffic back at least **2 feet** from trench edges.
- **Utility clearance:** Ensure marking before digging — "811" / MISS DIG compliance.
- **Public protection:** Focus heavily on worker and pedestrian safety, especially near high-traffic areas.

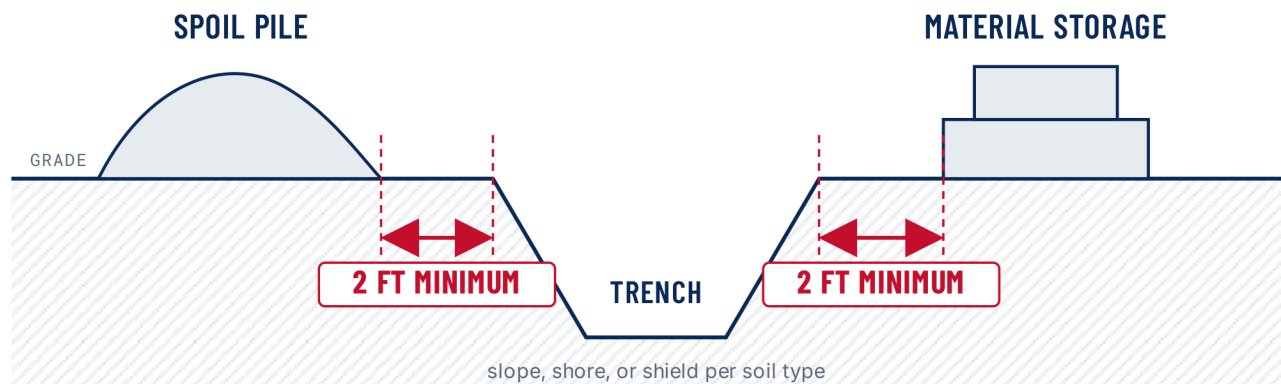


Figure 3-13 – Excavation setback at the trench edge

Spoil piles, stored material, equipment, and traffic must be kept back at least 2 feet from the edge. Per OSHA 29 CFR 1926 Subpart P.

MIOSHA Part 9. Excavations, Trenching, and Shoring

Table 1: Max Angle of Repose for Excavation Sides in Excess of 5' Depth

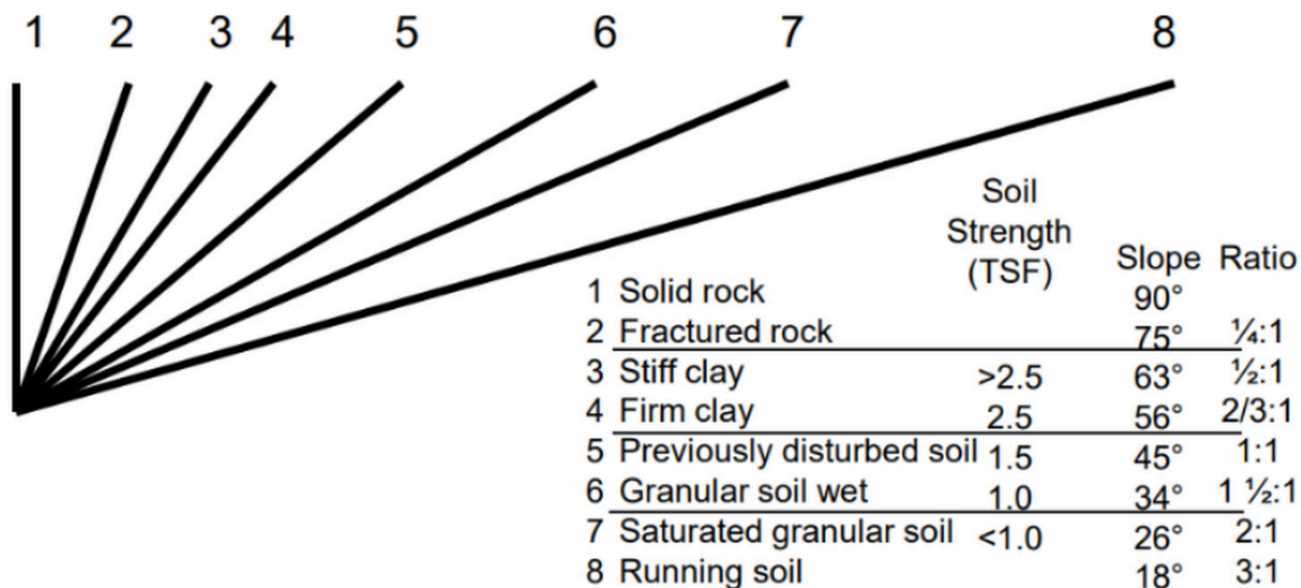


Figure 3-14 – Maximum angle of repose for excavation sides

MIOSHA Part 9, Table 1 — sides in excess of 5 ft depth. See Soil structure & classification, p49.

Protective systems – the core four

1 Shoring

- Uses physical supports — hydraulic, pneumatic, or timber — to prevent soil movement and cave-ins.
- Used for near-vertical walls or unstable soil.
- Ideal for deep excavations where sloping is impractical.
- Must be designed / approved by a qualified expert.

2 Shielding

- Trench boxes or shields protect workers from soil pressure, but do not prevent soil movement.
- Best for straight, deep utility trenches.
- Allows quicker setup and removal than shoring.
- Workers must remain inside the shield at all times.

3 Sloping

- Cutting back trench walls at an angle inclined away from the excavation to prevent collapse.
- Most effective in open areas with plenty of space.
- Works best with stable soils like Type A or B.
- OSHA-compliant angle depends on specific soil type.

4 Benching

- Creating a series of horizontal steps along trench walls to significantly reduce collapse risks.
- Only suitable for cohesive soils — e.g. claybased.
- **Prohibited for Type C soils.**
- Requires precise engineering design to maintain stability.

NOTE ON BENCHING

Requirements depend on soil type, trench depth, and overall stability. OSHA provides specific rules for cohesive soils only — Type A or B.

Soil structure & classification

Type A – most stable

Clay, silty clay, clay loam, sandy clay. Highly cohesive.

Type B – medium stability

Silt, silty loam, sandy loam, angular gravel (crushed rock).

Type C – least stable

Granular soils, sand, gravel, loamy sand, submerged soil.

Stable rock

Natural solid mineral. Excavated vertically; remains intact.

Maximum allowable slope by soil type

Soil type	Max. slope (H:V)	Slope angle	Profile
Stable rock	—	90°	Vertical cut
Type A	3/4 : 1	53°	Steep slope
Type B	1 : 1	45°	Medium slope
Type C	1-1/2 : 1	34°	Gentle slope

DOWN GRADE SOIL TYPE IF NON-VIRGIN SOIL

Previously disturbed soil must be downgraded. Vibration from nearby traffic reduces Type A soil to Type B.

Type A benching

Characteristics: Clay, silty clay, hardpan. Not fissured. Never previously disturbed. No moisture seepage.

- Maximum vertical rise: 4 feet before benching
- Bench width: at least 3 feet
- Multiple benches allowed depending on depth
- Max overall height before new bench: every 4 feet

Type B benching

Characteristics: Silt, sandy loam, medium clay, unstable rock. Previously disturbed soils (unless Type C), or fissured / vibrating Type A.

- Follow general approach as Type A
- Slightly wider benches may be required based on conditions
- Maximum vertical rise without benching is still 4 feet

Type C – benching ban

Characteristics: Gravel, loamy sand, soft clay. Submerged soil, dense heavy unstable rock, or soil with freely seeping water.

Benching is prohibited in Type C soil. Type C lacks cohesion and cannot hold its shape. Stepped trench walls in loose, granular, or saturated soils are highly unstable and prone to sudden collapse. Sloping must be used instead — follow the 1-1/2 : 1 H:V standard (34°).

Excavation with equipment

- A designated observer **must** be used when operating a Vac Truck within 10 feet of energized overhead or underground lines.
- When excavating with the VAC truck, a second qualified employee **must** be present — hazards include open holes, equipment operation, and injury from high pressure hoses and lines. Whenever possible a second operator is desired.
- When any excavation is happening by a qualified employee and machine — Vac truck, mini, digger truck, any machine excavation — within the MAD distance, a designated observer **must** be used.

MAD CHART · FIGURE 3-1, P32

- The designated observer's role is to watch clearances of adjacent overhead and underground lines. This person is not to be involved in the direct work task.

Air Quality Guide for Particle Pollution

Harmful particle pollution is one of the nation's most common air pollutants. Use the chart below to help reduce exposure. Check your local forecast at airnow.gov.

Air Quality Index	Who needs to be concerned?	What should I do?
Good (0–50)	—	It's a great day to be active outside.
Moderate (51–100)	Some people who may be unusually sensitive to particle pollution.	Unusually sensitive people: Consider making outdoor activities shorter and less intense. Watch for coughing or shortness of breath — signs to take it easier. Everyone else: It's a good day to be active outside.
Unhealthy for Sensitive Groups (101–150)	People with heart or lung disease, older adults, children and teenagers, pregnant women, minority populations, and outdoor workers.	Sensitive groups: Make outdoor activities shorter and less intense. It's OK to be active outdoors, but take more breaks. Watch for coughing or shortness of breath. Follow your asthma action plan and keep quick relief medicine handy. Palpitations, shortness of breath, or unusual fatigue may indicate a serious problem — contact your health care provider.
Unhealthy (151–200)	Everyone	Sensitive groups: Avoid long or intense outdoor activities. Consider rescheduling or moving activities indoors. Everyone else: Reduce long or intense activities. Take more breaks during outdoor activities.
Very Unhealthy (201–300)	Everyone	Sensitive groups: Avoid all physical activity outdoors. Reschedule to a time when air quality is better or move activities indoors. Everyone else: Avoid long or intense activities. Consider rescheduling or moving activities indoors.
Hazardous (301–500)	Everyone	Everyone: Avoid all physical activity outdoors. Sensitive groups: Remain indoors and keep activity levels low.

If you don't have an air conditioner, staying inside with the windows closed may be dangerous in extremely hot weather. Go someplace with air conditioning or check with your local government about cooling centers.

L Heat Index

The heat index is a measure of how hot weather "feels" to the body, combining relative humidity and air temperature to produce an apparent temperature. Values assume shade — exposure to full sunshine can increase them by up to 15°F. Wind can be extremely hazardous as it adds heat to the body.

Classification	Heat index	Effect on high-risk groups
Extremely hot	130°F+	Heat / sunstroke highly likely with continued exposure.
Very hot	105–129°F	Sunstroke, heat cramps, or heat exhaustion likely ; heatstroke possible.
Hot	90–104°F	Sunstroke, heat cramps, or heat exhaustion possible.
Very warm	80–89°F	Fatigue possible with prolonged exposure or activity.

Full apparent-temperature grid by air temperature and relative humidity: weather.gov/jetstream/hi

Excessive heat – who is at risk

- Seniors
- Children
- Athletes
- Outdoor workers

Prevention

- Drink water
- No alcohol or caffeine
- Cool showering
- Wear lightweight clothing
- Do not leave people or pets in a car
- Limit afternoon outdoor time

4

HIERARCHY 4 OF 6 · YOUR WORK METHODS

COMMUNICATION OF HAZARDS

PURPOSE

To establish effective communication protocols and emphasize the importance of verbal and non-verbal warnings, job briefings, work methods, hazard alerts, and crew communication to enhance safety and operational efficiency.

OBJECTIVE

Equip workers with the knowledge and skills to use communication tools effectively, identify hazards, and maintain compliance with safety standards.

Job Briefings

1 Purpose of job briefings

- Required to ensure all workers understand the hazards, safety rules, and work methods for each task.
- Designed to communicate risks, safety measures, and emergency protocols before the start of work.
- Must clearly state scope of job and hazard mitigation thought process.

3 Dynamic nature of job briefings

- Additional briefings are mandatory if there are significant changes in work conditions — arrival of unbriefed personnel, changes in tasks or hazards.
- Must be documented and continuously updated throughout the job to reflect any new risks.

2 Mandatory Discussion Points

Hazards

Associated with the job, including proximity to energized lines and potential environmental risks.

Work procedures

Specific work methods, emphasizing safe handling of tools and equipment.

Special precautions

Required for the task, such as fall protection or use of insulated tools.

PPE requirements

Tailored specifically to the unique hazards of the task.

Emergency response

Protocols including clear steps to take in case of an accident or exposure.

Work Methods (Job Safety Analysis)

1 Standard operating procedures

- Workers must follow pre-determined, tested methods for safe work near energized systems.
- Live-line tools, proper barrier placement, and mandatory equipment testing are critical.

2 Warnings for non-compliance

- Failure to follow work methods is a significant safety violation and may lead to discipline.
- Safety must never be sacrificed for speed or convenience.

3 Tool and equipment use

- Regular visual and functional inspections are required for all tools.
- Do not modify tools or use makeshift devices.

Communication Between Crew Members

1 Audible and visual

Mandatory for jobs where visibility is limited or risks are high:

- Hand gestures and visual signals.
- Radio voice channels for active coordination.

2 Radio communication

Strictly mandatory in these scenarios:

- During wire pulls.
- If visual contact cannot be maintained.
- Inside manholes, enclosed spaces, or vaults.

3 Backup protocol

Hand signals must be agreed upon before starting the job if radio communication is not dependable or is interrupted.

Communication: Verbal & Non-Verbal

1 Verbal

- **Face-to-face:** Direct talks allow for instant feedback and clarification.
- **Job briefings:** Focused morning meetings to discuss safety and daily goals.
- **Two-way radios:** Key for long distance on noisy, expansive sites.
- **Emergency alerts:** Shouting warnings — "Heads up!" — to signal hazards.

2 Non-verbal

- **Hand signals:** Used to direct operators when talking is impractical.
- **Body language:** Stances or gestures that instantly convey urgency.
- **Visual aids:** Signs, posters, and markers indicating key safety rules.
- **Lights & alarms:** Beacons and sirens to flag active equipment or danger.

NON-VERBAL · HAND SIGNALS

Your utility may have preset signals established, but they must be used consistently across the entire department or team. Refer to Figure 4-1 as an option if established signals are needed.

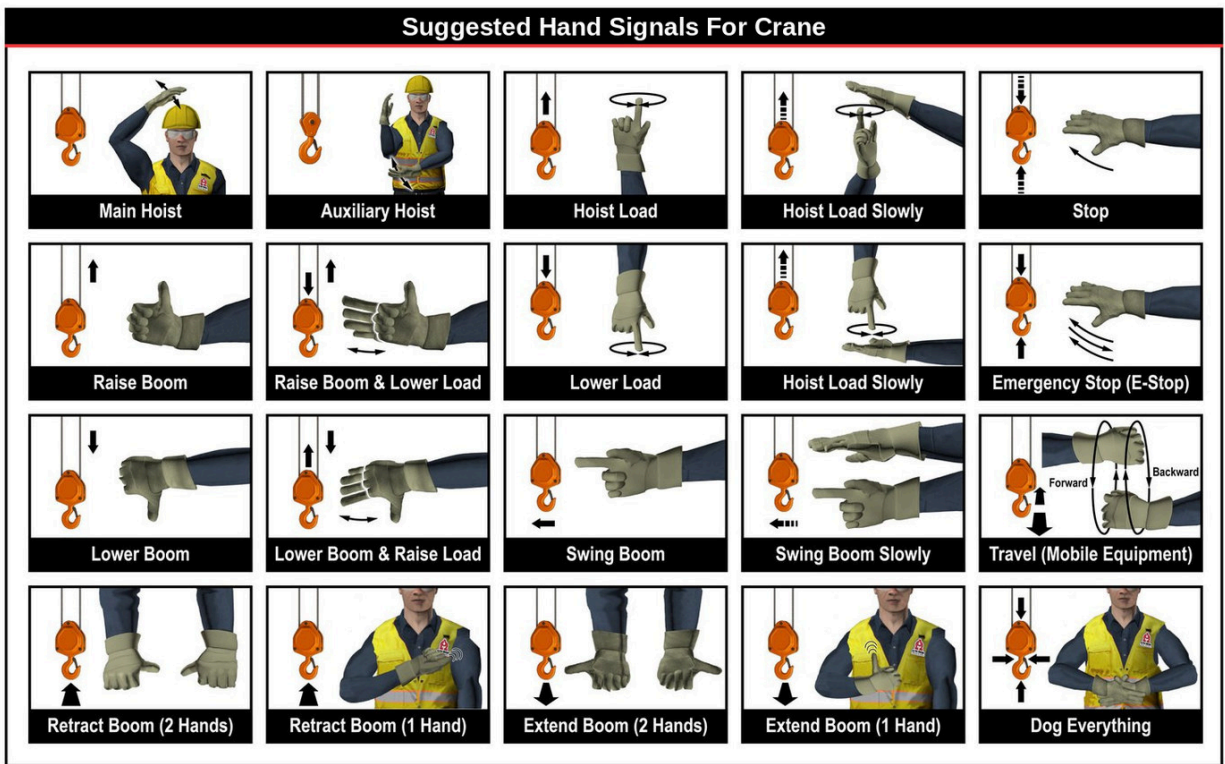


Figure 4-1 – Suggested Hand Signals: Crane

Hoist, boom, travel, and emergency stop

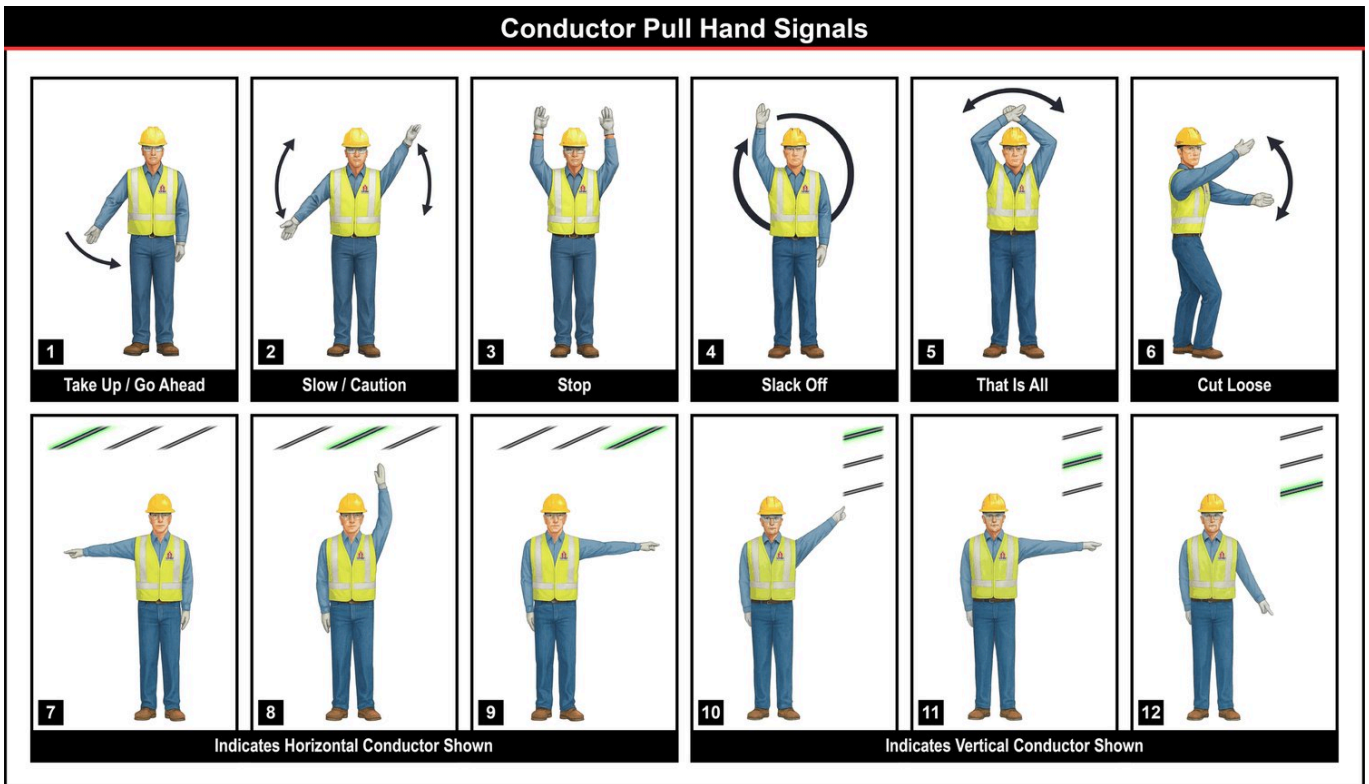


Figure 4-2 – Suggested Hand Signals: Conductor Pull

Take up, slow, stop, slack off, cut loose, and conductor orientation

Hazard Alerts & Worksite Signage

1 Work area alerts

Use caution tape to visually signal severity of hazards: **yellow tape** for general caution, **red tape** for ungrounded buried cables.

2 Tagging systems

"Do Not Operate" tags flag circuits under lockout/tagout, designed to prevent accidental machinery activation during maintenance. See Figures 1-4 and 1-5.

TAG EXAMPLES · FIGURES 1-4 & 1-5, P64

3 Warning tags

Danger and caution tags must be prominently placed near excavations, energized lines, or any area requiring specialized PPE. See Figures 1-4 and 1-5 for tag examples.

TAG EXAMPLES · FIGURES 1-4 & 1-5, P64

Hazard Reporting Procedures

1 Observation of hazard

If a condition causing injury, property damage, or service interruption is observed:

- Report immediately to the proper authority.
- Guard the area if necessary to protect others.

2 Receiving reports of hazards

When receiving a hazard report:

- Record informant's name, exact location, and nature of the issue.
- Refer this information promptly to the person responsible.

OSHA GUIDELINES

- Report hazards promptly — identification and mitigation are what keep the crew safe.
- **OSHA 29 CFR 1910.269** mandates employer response to identified hazards, proper documentation and corrective actions, and temporary controls like barricades and signage.

KEY ACTIONS FOR EMPLOYEES

- Be proactive in identifying hazards during routine work.
- Use hazard warning tags or barriers to alert others if guarding is required.
- Report emergencies following the organization's chain of command and protocols.

FIELD CONTROL

PURPOSE

To provide utility personnel with the tools and knowledge required to implement effective field control practices — ensuring safe, efficient, and reliable operations while maintaining accountability across all field activities.

OBJECTIVE

Equip participants with the knowledge and skills necessary to prioritize safety, enhance efficiency, promote accountability, and maintain the reliability of utility systems through effective field control practices.

Field control is the structured and disciplined management of field operations — overseeing personnel, work processes, and safety protocols to maintain, repair, and construct critical infrastructure like power lines, water pipes, and gas lines.

Key Components of Field Control

1 Communication

- **Clear instructions:** Ensure all team members understand tasks and responsibilities through precise communication.
- **Real-time updates:** Maintain open channels — radios, mobile — to address ongoing issues promptly.
- **Pre-job briefings:** Thorough discussions about objectives, hazards, and mitigation before starting.
- **Documentation:** Accurate records of work plans, changes, and outcomes for full accountability.

2 Proper tagging

- **Lockout/Tagout:** Standardized tags and locks to isolate equipment and prevent accidental energization. See Figures 1-4 and 1-5.
- **Tagging:** Clearly mark out of service, damaged, broken, or abnormal hazards requiring caution.
- **Identification of hazards:** Properly mark energized systems and high-voltage equipment.
- **Tagging protocols:** Follow established procedures to track equipment status and ensure proper sequencing.

3 Working energized

- **Minimizing risks:** Limit energized work to situations where de-energizing is not feasible.
- **Use of PPE:** Arc-rated clothing, rubber gloves, and face shields designed for energized work.
- **Qualified personnel:** Only trained, authorized workers perform tasks on energized equipment.
- **Tools and equipment:** Insulated and appropriately rated tools to handle components safely.

4 Following proper procedures

- **SOPs:** Adhere strictly to established protocols for all operations, from maintenance to emergency response.
- **Compliance:** Align practices with OSHA, NESC, or utility guidelines.
- **Risk assessments:** Conduct Job Briefings or hazard assessments before beginning work.
- **Audit and training:** Regularly review procedures and train staff to ensure understanding and compliance.

B

General Work Procedures

1 Voltage Work (>15 kV)

Employees must use approved supplementary insulation — e.g. aerial lift devices — and remain isolated from all differences in potential, including adjacent phases and grounds, including wood poles.

2 Required Presence of Two Employees

At least two qualified employees required for

- Work involving exposure to parts energized at more than 600 volts.
- Installation, repair, or removal of energized or de-energized lines and equipment — transformers, capacitors, regulators.
- Use of mechanical equipment near energized parts above 600 volts.

Exceptions for single-employee operations

- Routine circuit switching when safe.
- Work using live-line tools if the employee avoids contact with energized parts.
- Emergency repairs to safeguard the public.

C

Transformer Work

1 General guidelines

- Treat primary leads as energized until both primary and secondary leads are disconnected, or the secondary circuit is grounded.
- Assume transformer cases are energized at full primary voltage unless grounded.
- Do not stand on or contact transformer cases near energized circuits.

2 Grounding and procedures

Follow your utility's procedures for grounding substation transformers.

Applying Hot-Line Tag (HLT) or Non-Reclose

01 Pre-work planning

Confirm work area and relay locations — substation and downstream. Communicate the HLT plan with system control (when applicable), management, and field crew.

02 Enable hot line tag setting

If available, monitor via SCADA or at the local control panel, or manually at the relay panel. Verify change in status lights: reclosing disabled, instantaneous trip enabled, or alarm active. Install personal protective tag on relay control point with operator info and time/date.

03 Communicate across teams

Notify system control (if applicable) or management. Notify all members on work site location.

04 During the job

Maintain radio contact and clear work status if configuration changes. Keep HLT active until all personnel are clear.

05 Post-work removal

Communicate that HLT is being removed. Remove HLT after all work is complete and normal operations can resume. Document removal time.

IMPORTANT SAFETY NOTES

- Do **not** remove Hot Line Tag without confirming the field crew is clear.
- Never assume a circuit is safe to work on just because HLT is active.
- HLT is a supplemental control — proper PPE, clearance, and/or grounding procedures still apply.

TRAINING TIP

Include Hot Line Tag procedures in your tailboard briefings when energized work is performed near or on live lines.

Tagging Procedures

01 Clearance tags (Red)

System control (if applicable) — T&D Supervisor or Superintendent directed.

- Install tags at all opening points on overhead and underground systems. As directed by System Control (if applicable), the tag will have only the T&D Supervisor or Superintendent name as the authority.
- Ensure tags are properly filled out and located at the control point / switch operation point, to clearly identify the equipment or circuits being worked on.

02 Crew-specific tags (Red/White)

- Red/white tags are only to be used for "local" control.
- For use by a Crew Leader to designate a crew working under his or her directive, and equipment or lines being considered in an "abnormal" operating state.
- Each independent Crew Leader must use his or her own tag when working on lines, equipment, or circuits.
- Multiple crews will not work under one common tag unless the T&D Supervisor/Superintendent directs one lead and all crew members are working under the same common job briefing form.



Figure 1-4 – Individual lockout tag

Front and reverse



Figure 1-5 – Group lockout tag

Remove only by the crew leader

PPE / IPE

PURPOSE

To outline the safety and operational standards for the use of PPE and IPE, aligning with OSHA guidelines to ensure employee safety during field operations.

OBJECTIVE

Equip workers with the knowledge to properly utilize, inspect, and maintain PPE/IPE, minimizing exposure to electrical, physical, and environmental hazards.

PPE — worn to protect against physical, electrical, or environmental hazards: rubber gloves and sleeves, work gloves, hard hats, safety glasses, footwear. **IPE** — live-line tools, rubber hoses and covers, footwear.

Rubber Gloves – Use & Conditions

01 General Use Requirements

- Always use rubber gloves and sleeves together for protection.
- Ensure rubber gloves are the proper class and rating for the voltage being worked on, based on phase-to-phase or phase-to-ground voltage.

02 ASTM Labeling Chart

Class, label colour, proof-test voltage and maximum use voltage are given in full on Figure 6-1 — ASTM Labeling Chart, overleaf. Volts AC / DC as printed on the chart and rubber glove labels; insulating gloves and sleeves must carry a colour-coded label to meet ASTM.

Rubber Insulating Personal Protective Equipment					
Class Color	Proof Test Voltage AC / DC	Maximum Use Voltage AC / DC (when used with leather protectors)	Rubber Molded Products Label	Insulating Rubber Glove Label	Insulating Rubber Dipped Sleeve Label
00 Beige	2,500 / 10,000	500 / 750		10 MANUFACTURER or BRAND ANSI / ASTM CLASS 00 D120 TYPE 1 MAX USE VOLT 500V AC	
0 Red	5,000 / 20,000	1,000 / 1,500	MANUFACTURER "MAX USE VOLTAGE 1,000V AC" CLASS 0 TYPE 1	10 MANUFACTURER or BRAND ANSI / ASTM CLASS 0 D120 TYPE 1 MAX USE VOLT 1000V AC	MANUFACTURER or BRAND ANSI / ASTM CLASS 0 D1051 TYPE 1 MAX USE VOLT 1000V AC
1 White	10,000 / 40,000	7,500 / 11,250	MANUFACTURER "MAX USE VOLTAGE 7,500V AC" CLASS 1 TYPE 1	10 MANUFACTURER or BRAND ANSI / ASTM CLASS 1 D120 TYPE 1 MAX USE VOLT 7500V AC	MANUFACTURER or BRAND ANSI / ASTM CLASS 1 D1051 TYPE 1 MAX USE VOLT 7500V AC
2 Yellow	20,000 / 50,000	17,000 / 25,500	MANUFACTURER "MAX USE VOLTAGE 17,000V AC" CLASS 2 TYPE 1	10 MANUFACTURER or BRAND ANSI / ASTM CLASS 2 D120 TYPE 1 MAX USE VOLT 17000V AC	MANUFACTURER or BRAND ANSI / ASTM CLASS 2 D1051 TYPE 1 MAX USE VOLT 17000V AC
3 Green	30,000 / 60,000	26,500 / 39,750	MANUFACTURER "MAX USE VOLTAGE 26,500V AC" CLASS 3 TYPE 1	10 MANUFACTURER or BRAND ANSI / ASTM CLASS 3 D120 TYPE 1 MAX USE VOLT 26,500V AC	MANUFACTURER or BRAND ANSI / ASTM CLASS 3 D1051 TYPE 1 MAX USE VOLT 26,500V AC
4 Orange	40,000 / 70,000	36,000 / 54,000	MANUFACTURER "MAX USE VOLTAGE 36,000V AC" CLASS 4 TYPE 1	10 MANUFACTURER or BRAND ANSI / ASTM CLASS 4 D120 TYPE 1 MAX USE VOLT 36000V AC	MANUFACTURER or BRAND ANSI / ASTM CLASS 4 D1051 TYPE 1 MAX USE VOLT 36000V AC
ASTM Specification Reference					
D120 Rubber Insulating Gloves D178 Rubber Insulating Matting D1048 Rubber Insulating Blankets D1049 Rubber Insulating Covers D1050 Rubber Insulating Line Hose D1051 Rubber Insulating Sleeves		F478 In-Service Care of Line Hose & Covers F479 In-Service Care of Insulating Blankets F496 In-Service Care of Gloves & Sleeves F696 Leather Protectors for Insulating Gloves and Mittens F1236 Inspection Guide for Rubber Products F1742 PVC Insulating Sheeting F2320 Rubber Insulating Sheeting F2677 Electrically Insulating Aprons		Type I- Designates natural rubber (non-ozone resistant) Type II- Designates synthetic rubber material (ozone resistant)	

Figure 6-1 — ASTM Labeling Chart

Salisbury natural rubber and SALCOR® — molded product, glove, and dipped sleeve labels

03 When to Wear Rubber Gloves & Special Work Conditions

- Working on poles or structures with energized lines or equipment.
- Handling equipment that could become energized near active systems.
- Tasks within 10 feet of the Minimum Approach Distance (MAD) — see Figure 6-2, p70.

Stormy weather

Always wear rubber gloves near any conductor or equipment that may become energized.

Live-line tools

Wear rubber gloves on poles and in buckets. Omit with extendo stick only if tested, wiped, and hot-line inspected.

Energized conductors

Use rubber gloves for opening / closing switches, testing, or operating live tools.

System neutral

Treat neutral and connected conductors as primary current-carrying.

04 Momentary removal

- Remove only momentarily for retrieving items or when completely outside the MAD zone.
- Communicate clearly with coworkers; replace before re-entering work zone.

05 Storage & maintenance

- Visually inspect rubber gloves daily before use and after any incident.
- Conduct an air test before use to check for leaks or defects.
- Store in approved containers or canvas bags to prevent exposure.
- Always store cuff-side down for ventilation and damage reduction.

06 Testing & replacement

- Rubber gloves must be tested periodically in accordance with MIOSHA standards.
- Exchange rubber gloves immediately if damaged or compromised.
- Do not wear inside out — rubber gloves must be worn correctly to maintain insulation properties.

SAFETY MANDATE

Always inspect your rubber gloves before every shift. A micro-puncture can lead to fatal shock. When in doubt, tag it out.

AC Live-Line Work Minimum Approach Distance

Nominal Voltage Phase-To-Phase	Distance to Employee	
	Phase-To-Ground Exposure	Phase-To-Phase Exposure
0 to 50 V	N/A	N/A
51 to 300 V	Avoid contact	Avoid contact
301 to 750 V	1 ft., 1 in.	1 ft., 1 in.
751 to 5,000 V	2 ft., 1 in.	2 ft., 1 in.
5,100 to 15,000 V	2 ft., 2 in.	2 ft., 3 in.
15,100 to 36,000 V	2 ft., 7 in.	3 ft., 0 in.
36,100 to 46,000 V	2 ft., 10 in.	3 ft., 3 in.
46,100 to 72,500 V	3 ft., 4 in.	4 ft., 0 in.

Nominal Voltage Phase-To-Phase	Distance to Employee from Energized Part		
	Without Tools Phase-To- Ground Exposure	With Tools Phase-To-Ground Exposure	Without Tools Phase-To-Phase Exposure
72,600 to 121,000 V	3 ft., 6 in.	3 ft., 9 in.	4 ft., 8 in.
121,100 to 145,000 V	4 ft., 0 in.	4 ft., 4 in.	5 ft., 5 in.
145,100 to 169,000 V	4 ft., 6 in.	4 ft., 10 in.	6 ft., 5 in.
169,100 to 242,000 V	6 ft., 2 in.	6 ft., 8 in.	10 ft., 2 in.
242,100 to 362,000 V	10 ft., 6 in.	11 ft., 3 in.	18 ft., 2 in.
362,100 to 420,000 V	13 ft., 2 in.	14 ft., 0 in.	22 ft., 5 in.
420,100 to 550,000 V	15 ft., 9 in.	16 ft., 8 in.	27 ft., 1 in.
550,100 to 800,000 V	21 ft., 6 in.	22 ft., 7 in.	37 ft., 5 in.

Consult OSHA regulations and NESC standards for specific calculations and other information on Minimum Approach Distances.

Figure 6-2 – AC live-line work minimum approach distance

Consult OSHA regulations and NESC standards for specific calculations. Transcribed in Hierarchy 3, Section B.

Visual Test for Rubber Gloves

01 Inspect the cuff

Carefully examine the inside and outside of the cuff for any signs of tears, punctures, or cracking. Stretch the cuff to help reveal hidden defects.

02 Check between fingers

Inspect the areas between each finger, looking closely for cracks, punctures, or tears that might compromise the rubber glove's integrity.

03 Turn the rubber glove inside out

Fully turn the rubber glove inside out and repeat the inspection steps for the cuff and between the fingers to ensure no defects are missed.

04 Repeat for both rubber gloves

Perform this inspection on both rubber gloves, paying equal attention to detail for each.



Figure 6-3 – Checking between the fingers

Stretch to reveal hidden defects



Figure 6-4 – Checking between the fingers, close up

Work finger by finger

Air Test for Rubber Gloves

01 Roll the rubber glove cuff

Gently roll the cuff toward the fingers to create internal air pressure.

02 Trap air inside the rubber glove

Hold the rubber glove by the cuff and close the opening to trap the air inside.

03 Inspect for air escaping

Squeeze the rubber glove and check for air escaping through tears, punctures, or weak spots.

04 Repeat for both rubber gloves

Perform the air test on both rubber gloves to ensure they are free from defects.



Figure 6-5 — Inflated rubber glove, checking for escaping air

Roll the cuff to build internal pressure

CRITICAL ACTION

If air escapes, immediately mark the rubber glove as defective and report it for replacement or repair. A thorough inspection helps ensure the safety and reliability of rubber gloves before use — make it part of your daily safety checks.

Leather Protectors

Always wear leather protectors over rubber gloves to provide mechanical protection.

Minimum leather-protector distance by rubber glove class

Class of rubber glove	Minimum distance, protector cuff to glove bead
0, 00	1/2"
1	1"
2	2"
3	3"
4	4"

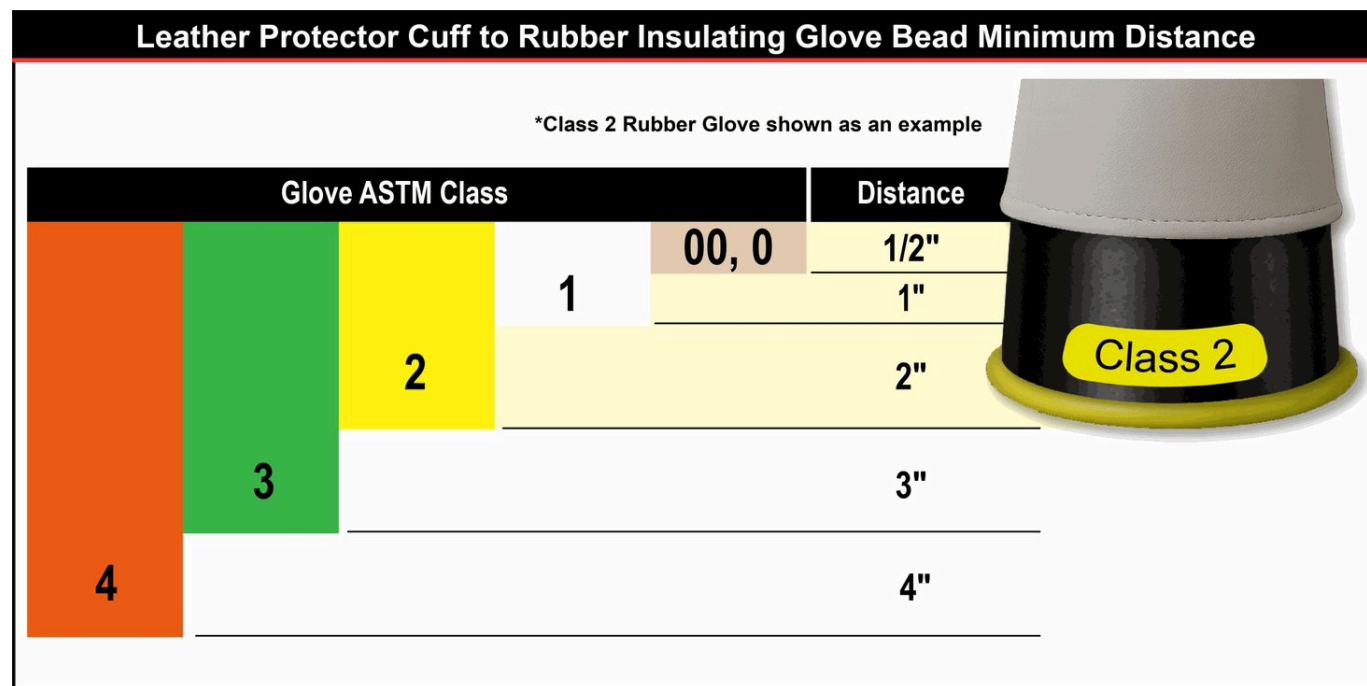


Figure 6-6 — Leather protector minimum distance

Class 2 rubber glove shown as an example — 2 inches

AVOID FOLDING RUBBER GLOVES

Never fold rubber gloves during storage or place objects on top of them. Always store them flat or in approved containers to prevent structural damage.

Usage Requirements

- Employees must wear approved protective equipment for the voltage when working on exposed, energized lines. Insulating sleeves must always be worn with rubber gloves directly on energized conductors over 480 V. Pole handling near energized conductors is covered in **HAULING & HANDLING POLES · HIERARCHY 3**

Additional Safety Notes

01 Equipment & tool usage

- Use insulated tools for opening switches, applying / removing grounds, or handling energized components.
- Never make physical contact with protective devices on energized conductors without rubber gloves.

02 Periodic testing

Ensure rubber gloves are tested at prescribed intervals for continued reliability and compliance with safety standards.

03 Compliance references

Refer to MIOSHA Part 33 (PPE) and MIOSHA Part 86 (Electric Power Generation, Transmission, and Distribution) for additional information on rubber glove use and care.

SUMMARY

Rubber gloves are a vital component of electrical safety. Proper use, regular inspection, and correct storage ensure their reliability and protection. Always adhere to safety protocols, and never compromise on rubber glove integrity. Safety starts with consistent vigilance.

Insulated Protective Equipment

01 General protection

Insulated protective equipment provides partial protection and must not be relied upon for complete safety.

02 Conductors

- Cover all energized / grounded conductors within reach with rubber protective equipment, except the conductor being worked on.
- Work from below energized lines whenever possible.

03 Application & removal

- **Applying:** Start with the nearest / lowest wires, including the system neutral, and protect yourself as you progress.
- **Removing:** Reverse the exact order of application.

04 Work area procedures

- Put on protective equipment before entering the work area / MAD and keep it on until 10 feet out of reach.
- MAD CHART · FIGURE 6-2, P70
- Use tarps, mats, or canvases to protect rubber blankets from damage and ground moisture.

05 Storage & maintenance

- Store equipment in special compartments to protect from tools, chemicals, and physical
- Inspect for damage daily, before each use and after any incident.
- Equipment must be periodically tested as per standards.

07 Exposure limits

Remove rubber equipment from energized lines within 8 hours to prevent corona / ozone damage. Cover-up materials left overnight must be thoroughly inspected and tested if damage is suspected.

08 Special considerations

- Treat bare communication conductors as equal to system voltage and protect accordingly.
- Rubber blankets, gloves, and sleeves must be seamless and free from physical irregularities.

Insulated protective equipment – test intervals

Type of equipment	When to test
Rubber line hose	Upon indication that insulating value is suspect, and after repair.
Rubber insulating cover	Upon indication that insulating value is suspect, and after repair.
Rubber blanket	Before 1st issue, each use, and every 12 months from the stamped test date; upon indication that insulating value is suspect, and after repair.
Rubber gloves	Before 1st issue, each use, and every 6 months from the issue date, or no more than 1 year from the stamped test date; upon indication that insulating value is suspect, and after repair.
Rubber sleeves	Before 1st issue, each use, and every 12 months from the issue date, or no more than 1 year from the stamped test date; upon indication that insulating value is suspect, and after repair.

Reference: 29 CFR 1910.137 (Electrical Protective Equipment).

Clothing and Arc Flash Protection

Proper clothing is critical for worker safety, particularly when exposed to arc flash or flash fire hazards. Requirements below align with NFPA 70E, NESC, and OSHA standards.

01 General clothing requirements

- Wear Arc-Rated (AR) / Flame-Resistant (FR) clothing when exposed to potential arc flash or energized equipment hazards.
- Long sleeves must be worn to reduce heat exposure on arms.
- Shirts must be tucked in and buttoned.
- Outermost clothing must be AR/FR-rated and cover the body completely.
- Each employee shall wear rubber gloves and other clothing suitable for the work performed.

02 Prohibited materials

- Avoid meltable fibers — polyester, nylon, spandex — in underlayers.
- Do not use DEET-containing insect repellents with AR clothing due to increased flammability.
- Electrical rubber glove protectors shall not be used as work gloves.

03 Protective layering

- Wear natural fiber or non-melting undergarments beneath AR clothing.
- Sleeves unrolled, cuffs buttoned, and collars secured to the second-highest button.

04 High-visibility requirements

Employees working near roadways or on construction sites must wear high-visibility clothing (Class 2 ANSI). If flagging duties are performed, a Class 3 vest must be worn.

Fire Resistant (FR) Work Wear

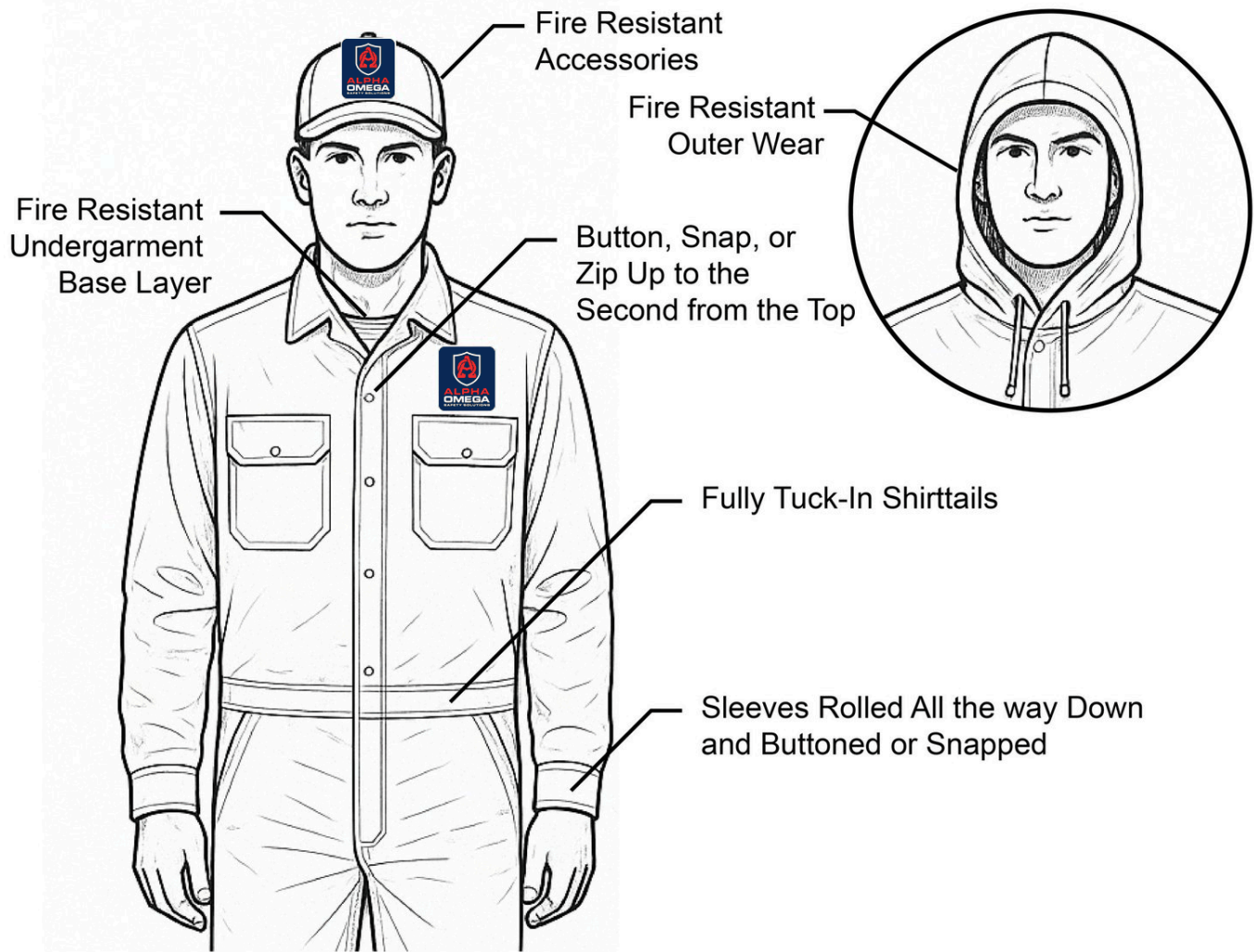


Figure 6-7 – Arc-rated / flame-resistant workwear

Tucked shirttails, sleeves down, buttoned to second from top

Arc-flash PPE categories

Category	Incident energy	Clothing system
0	0 cal/cm ²	No protection.
1	4 cal/cm ²	Arc-rated long sleeve shirt, arc-rated pants or overalls, arc-rated face shield with hard hat, safety glasses, hearing protection, leather and voltage-rated gloves (as needed), and leather work shoes.
2	8 cal/cm ²	Arc-rated long sleeve shirt, arc-rated pants or overalls, arc-rated face shield and balaclava or arc flash suit with hard hat, safety glasses, hearing protection, leather and voltage-rated gloves (as needed), and leather work shoes.
3	25 cal/cm ²	Arc-rated long sleeve jacket, arc-rated pants, arc-rated flash hood with hard hat, safety glasses, hearing protection, leather and voltage-rated gloves (as needed), and leather work shoes.
4	40 cal/cm ²	Arc-rated long sleeve jacket, arc-rated pants, arc-rated flash hood with hard hat, safety glasses, hearing protection, leather and voltage-rated gloves (as needed), and leather work shoes.

Categories 3 and 4 call for the same clothing system but protect to different incident energies — Category 3 is rated 25 cal/cm², Category 4 is rated 40 cal/cm². Category 3 clothing does not satisfy a 40 cal/cm² exposure.

Table 410-1 – Clothing systems (cal/cm²) for 50 V to 600 V AC

Equipment type	50 V to 250 V	251 V to 600 V
Self-contained meters / cabinets	4	20
Pad-mounted transformers	4	4
CT meters and control wiring	4	4
CT compartment / customer switchgear	4	13
Metal-clad switchgear / MCCs	8	40
Pedestals / pull boxes / hand holes	4	8
Open air (includes lines)	4	4
Network protectors (transformer energized)	4	9
Network protectors (transformer de-energized)	4	8
Panel boards — 1 Φ (all) / 3 Φ ($\leq$ 100 A)	4	8
Panel boards — three phase (>100 A)	4	11
See NESC Rule 410A3.		

Incident energy ratings

- Wear AR clothing and equipment with an arc rating greater than or equal to estimated heat energy exposure.
- Protective headgear required for energy levels exceeding **2 cal/cm²**.
- Additional head and face protection required for higher exposures.

Arc Flash PPE Categories

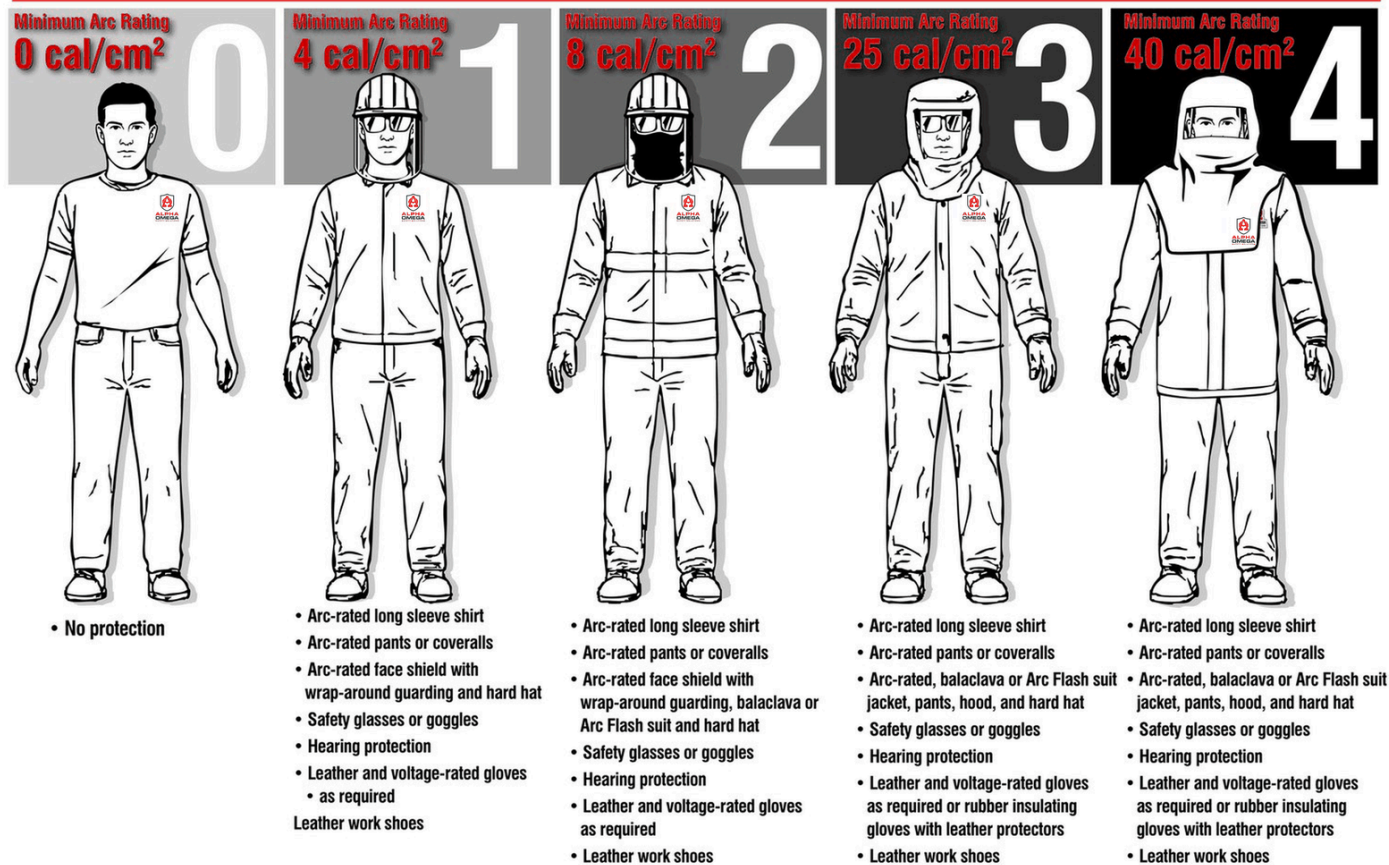


Figure 6-8 — Arc-flash rated PPE categories

Minimum arc rating 0, 4, 8, 25, and 40 cal/cm²

HAZARD

Be aware of heat stress when wearing Category 4 clothing.

Accessory restrictions

- Remove all exposed conductive items — rings, watches — before working on or near energized equipment.
- Ensure rubber gloves are suitable for the task.

ANSI 107-2015 – High Visibility Requirements

Non-Rated



WHERE USED:

- Work is done off roadway
- Work is done indoors or in controlled environments

IDENTIFIABLE FEATURES:

- No sleeves
- 1 inch reflective tape on one side giving 180° of visibility

ANSI Class II



WHERE USED:

Type R (Roadway)

- Work is done on lower speed roadways (25~50 mph)
- There is a physical barrier between worker and traffic
- Work during daylight hours

Type P (Public Safety):

- Has additional features to Type R
- Law Enforcement Personnel & Emergency and Incident Responders

IDENTIFIABLE FEATURES:

- No sleeves
- 2 inch reflective tape horizontally around torso and vertically over the shoulders giving 360° of visibility

ANSI Class III



WHERE USED:

Type R (Roadway)

- Work is done on high-speed roadways (50+ mph)
- There is no physical barrier between worker and traffic
- Work is in low light

Type P (Public Safety):

- Has additional features to Type R
- Law Enforcement Personnel & Emergency and Incident Responders

IDENTIFIABLE FEATURES:

- Short or long sleeves
- 2 inch reflective tape horizontally around torso and vertically over the shoulders giving 360° of visibility

Figure 6-9 – High-visibility requirements by class

Non-rated, ANSI Class II, ANSI Class III

* If worn within the energized zone, the garment must be FR/AR rated.

I Clothing Maintenance and Laundering

01 General care

Launder FR clothing at home or professionally:

- Avoid chlorine bleach, fabric softener, and starch.
- Use liquid detergent in hot water.
- Tumble dry on low.

02 Inspection & replacement

- Remove from service if soiled with flammable contaminants or damaged beyond repair.
- Retire if stains larger than a credit card persist or garments smell of hydrocarbons.

03 Persistent stains

- Apply liquid detergent directly to stains and soak before laundering.
- Retire from service if the stain is unsalvageable.

04 Proper storage

Store AR/FR garments in clean, dry areas away from heat, chemicals, and contaminants.

BEST PRACTICES FOR MAXIMUM PROTECTION

- **Dress as recommended:** Shirts tucked, collars buttoned, sleeves fully extended and secured.
- **Inspect regularly:** Check for tears, stains, or contamination before use.
- **Be proactive:** Retire garments that no longer meet safety standards.

J Special Considerations

01 Heat stress

Discuss heat-related illness prevention during job briefings when ambient temperatures exceed 78°F. Follow guidelines for hydration, breaks, and cooling. See the Heat Index (heat zones) chart, Section L, p52.

02 Inspection & readiness

- Ensure clothing complies with MIOSHA Part 33 and ANSI Z87.1.
- Replace non-metallic eyewear if damaged or unsuitable.

01 Inspections

- Inspect poles for cracks, rot, holes, or burn marks.
- Assess stability — perform hammer or screwdriver test.
- Avoid climbing poles deemed unsafe.

02 Fall protection

- Use fall arrest equipment whenever a fall over 4 feet is possible.
- Always use a secondary strap or arrest gear on elevated poles.

03 Climber use

- Wear climbers only when climbing; remove immediately after descending.
- Keep gaffs sharp and within safe limits per guidelines.

04 Positioning & use

- Do not place safety straps above the uppermost attachment or on unstable braces.
- Do not trust weight to guy wires, pins, or braces.
- Secure tools and tape only with nonconducting materials — e.g. leather.

05 Teamwork

On the same pole:

- Climb and descend one at a time.
- First worker must reach position before the next starts.
- With a climber aloft, a qualified spotter / rescuer must be on-site with gear ready.

06 Tool safety

- Store climbers with gaffs covered when not in use to prevent damage or injury.
- Secure hand lines in a safe location when working on poles or from a bucket.

07 General practices

- Do not wear climbers while driving, riding in vehicles, or performing ground work.
- Follow safe practices for handling poles under strain — ensure stability before attaching or removing wires.

Required PPE for climbing

- **Fall arrest:** Full-body harness, lanyard, lifeline, or rope grab.
- **Climbing gear:** Maintained climbers with sharp, shaped gaffs.
- **Head:** Hard hats to protect against falling objects.
- **Footwear:** Sturdy, slip-resistant boots designed for climbing.
- **Hands:** Insulated gloves when electrical hazards exist.
- **Eyes:** Safety glasses or goggles to shield from debris and arcs.

Underground

When unlocking and undoing a piece of underground equipment, rubber gloves shall be worn when opening the equipment and will stay on until the equipment is closed.

Overhead approach

Rubber gloves are not required from the cradle or the ground but shall be worn when entering within 10 ft of MAD, and until the worker moves out of that 10 ft area.

YOUR UTILITY IS OPERATING ON OPEN TO CLOSE

Follow the ground-to-ground, cradle-to-cradle, open-to-close glove rule, or wear rubber gloves whenever working within the MAD of overhead primary.

MAD CHART · FIGURE 6-2, P69

ALPHA OMEGA SAFETY SOLUTIONS

Field Guide · Utility & Crew Safety Reference · Hierarchy of Controls, Sections 1 – 6 · August 2026 Edition

Confirm all procedures against current OSHA / MIOSHA, NESC and NFPA 70E requirements and your own written safety program before use in the field. Where this guide references "your utility," substitute your organization's own written procedure.