

Working with Electrical Wiring and Adhesives in Cold Conditions: A Guide for OHS Managers



Cold weather creates significant challenges for workers handling electrical wiring and adhesives across North American construction, utilities, and industrial worksites. Low temperatures can change the physical properties of materials, reduce flexibility, weaken adhesion, and increase the risk of equipment failure or injury. For Occupational Health and Safety (OHS) managers, understanding how cold affects these products—and how to help workers safely use them—is essential for preventing incidents and maintaining project quality.

How Cold Weather Impacts Electrical Wiring and Adhesives

When temperatures drop, electrical components and chemical products behave differently. Wiring insulation may stiffen or crack, and adhesives that normally bond quickly can become brittle or fail to cure. These conditions not only threaten worker safety but can also compromise long-term system reliability.

Cold weather can cause:

- **Reduced insulation elasticity**, increasing the risk of cracking or splitting during installation.
- **Decreased adhesion strength** and longer curing times, particularly for solvent- or water-based adhesives.
- **Condensation-related hazards** when materials are brought from warm to cold environments.
- **Heightened risk of electrical shock** due to glove stiffness, reduced dexterity, and brittle tools.
- **Improper bonding or sealing**, which may lead to future structural or electrical failures.

Given these hazards, OHS managers must ensure that workers are properly trained, equipped, and supervised during winter projects or in cold storage environments.

Common Types of Electrical Wiring Found on Worksites

Different wiring types have different tolerances for temperature, moisture, and mechanical stress. OHS managers should ensure workers understand these distinctions:

1. **Non-Metallic (NM) Cable (e.g., Romex)**

Used in residential construction but becomes stiff and brittle in extreme cold. Not suited for outdoor or exposed installs during winter.

2. **Underground Feeder (UF) Cable**

Moisture-resistant and designed for direct burial. Can handle cold better than NM cable but still requires prewarming to prevent cracking.

3. **Metal-Clad (MC) Cable**

Encased in metal armor; often used in commercial settings. Cold temperatures can stiffen the jacket and make bending difficult.

4. Thermoplastic High Heat-Resistant Nylon-Coated Wire (THHN/THWN)

Common in conduit systems. Performs well in cold when properly rated, but workers must avoid forcing bends.

5. Low-Voltage and Communication Wiring

Often thinner and more fragile. Insulation can fracture easily in sub-zero temperatures.

Common Adhesives Used on Worksites

Adhesives respond differently in cold climates, and understanding cure requirements is crucial:

Epoxy Adhesives

Strong and durable but require minimum temperature thresholds to cure properly. Many types fail below 5–10°C (41–50°F).

Polyurethane Adhesives

More flexible in cold environments and can handle some moisture. Cure slower in low temperatures.

Cyanoacrylate (Super Glue) Adhesives

Fast-setting, but cold temperatures significantly slow bonding time.

Silicone Sealants

Flexible and cold-resistant but may harden if stored improperly.

Construction Adhesives (Solvent- or Water-Based)

Water-based types can freeze; solvent-based may become thick and difficult to apply.

Hot Melt Adhesives

Completely unsuitable for cold environments unless used indoors or with heating tools.

Safe Work Practices for Handling Wiring and Adhesives in Cold Weather

Prewarm Materials Whenever Possible

Electrical wiring and adhesives perform best when stored above freezing. Use heated storage boxes, indoor staging areas, or warming blankets to maintain proper temperatures.

Follow Manufacturer Temperature Ratings

Every cable and adhesive type has minimum installation temperatures. OHS managers should ensure all crews review and comply with data sheets.

Provide Proper Training for Cold-Weather Installations

Training should include:

- Recognizing temperature-related material changes.
- Safe bending and cutting techniques for stiffened wiring.
- Correct adhesive application based on ambient temperature.
- Identifying when a material is unsafe to use.

Use the Right PPE

PPE is especially important in cold conditions where dexterity and protection must be balanced:

- **Cold-rated insulated gloves** with good grip.
- **Eye protection** to prevent injury from brittle, snapping wires.
- **Cut-resistant liners** for added protection.
- **Thermal protective clothing** for prolonged outdoor tasks.

- **Chemical-resistant gloves** when working with adhesives.

Implement Engineering Controls

- Use portable heaters to maintain workable temperatures in enclosed spaces.
- Shield work areas from wind chill to avoid rapid material cooling.
- Provide dry, insulated storage for adhesives and electrical components.

Increase Inspection Frequency

Workers should check wiring for:

- Cracks
- Brittleness
- Flattening or cold deformation

And inspect adhesives for:

- Separation or crystallization
- Thickening
- Frozen tubes or cartridges

Any compromised material should be removed from service.

Encourage Slow, Controlled Work

Rushing increases breakage and misapplication. Supervisors should plan schedules that account for cold-weather limitations.

Cold weather presents unique challenges for workers handling electrical wiring and adhesives. By ensuring proper training, following manufacturer specifications, and implementing thoughtful storage and PPE strategies, OHS managers can reduce risk and improve installation quality throughout the winter season. With proactive planning and informed material handling, even the harshest conditions can be managed safely.

and effectively.