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Construction Management—Temporary Electrical Wiring

Temporary electrical wiring at construction sites should comply with the requirements of OSHA, NEC, and local codes. This report summarizes the general requirements for temporary electrical wiring used at construction sites.

Temporary electrical wiring on equipment and at construction sites should comply with the appropriate requirements of the latest edition of the National Electrical Code (NEC). Experts in electrical safety have traditionally looked to the NEC for the practical safeguarding of persons from electrical hazards. The Occupational Safety and Health Administration (OSHA) has recognized the important role of the NEC in defining basic requirements for safety in electrical installations by referencing the entire NEC in Subpart K of 29 Code of Federal Regulations Part 1926 (29CFR1926). [3]

OSHA's general requirement states that the employer should ensure that electrical equipment is free from recognized hazards that are likely to cause death or serious physical harm to workers. As with all OSHA standards, and with specific electrical standards, the determination of the safety of equipment and its correct installation and use should be made by a competent person, knowledgeable in all elements of electrical work.

This report is not a comprehensive compilation of all the OSHA, NEC, NFPA or local government requirements. In case of conflict or uncertainty, the Department of Labor should be consulted for an opinion.

Temporary Electrical Wiring

Wiring networks for temporary electrical power and lighting are subject to less stringent requirements than would be required for a permanent installation. Except as specifically noted as follows, all other requirements for permanent wiring should apply to temporary wiring installations.

Uses Permitted, 600 Volts, Nominal, or Less—Temporary electrical power and lighting installations using 600 volts, nominal, or less are permitted during periods of construction, remodeling, maintenance, repair, or demolition of buildings, structures, or equipment, as well as for similar activities. Usage is also permitted for experimental or developmental work.

Uses Permitted, Over 600 Volts, Nominal—Temporary wiring using over 600 volts, nominal, is permitted during periods of construction, tests, experiments, or emergencies. Guarding by fencing, barriers, or other effective means should be provided to prevent access of other than authorized and qualified personnel.

Temporary wiring should be removed immediately upon completion of construction or upon fulfillment of the purpose for which the temporary wiring was installed.

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General Requirements For Temporary Electrical Wiring

Incoming Service

Temporary Service Pole—The size of wood service poles should be determined by the servicing power company. The height of these poles should be stable and sufficient to maintain required overhead clearance.

Service Switch—An approved main disconnecting means for service equipment should be provided and properly marked, identifying each set of service entrance conductors. It should have overcurrent protection as part of its assembly. Disconnecting means shall also be provided to disconnect all conductors in a building. The main disconnect must be accessible only to qualified personnel. Each service disconnecting means must simultaneously disconnect all ungrounded conductors. Wherever exposed to the weather, service equipment should be weather-resistant and listed for outdoor use.

Overcurrent Protection—Temporary electrical service equipment should provide overcurrent protection for wiring that it supplies.

- Conductors—Conductors and equipment should be protected from overcurrent. These conductors should have sufficient ampacity to carry the load. All branch circuits for temporary lighting and outlet receptacles should be protected by proper overcurrent devices sized in accordance with the wiring of the system.
- Overcurrent devices—Overcurrent devices should be readily accessible.
- Circuits—Circuits supplying electric motors should be protected in accordance with NEC requirements.

Ground-Fault Wiring Protection—An employer should use either ground-fault circuit interrupters (GFCI) or assured equipment grounding conductor program (AEGCP) to protect workers on construction sites.

Ground-Fault Circuit Interrupters—All 120-volt, single, phase, 15- and 20-ampere receptacle outlets on construction sites, which are not a part of the permanent wiring of the building or structure and which are in use by workers, should have approved ground-fault circuit interrupters for personnel protection. Receptacles on the ends of extension cords are not part of the permanent wiring and should therefore be protected by GFCIs whether or not the extension cord is plugged into permanent wiring (see Construction Management Report CM-70-00, *Ground Fault for Electrical Tools*, for additional information).

Distribution

Temporary Outside Wiring—Wiring installed outside of buildings and structures must be insulated when it is within 10 feet (3.05m) of any building or structure.

Conductors on Poles—Conductors supported on poles should provide a minimum horizontal climbing space as follows:

- Power conductors below communication conductors—30 inches (762mm).
- Power conductors alone or above communication conductors: 300 volts or less—24 inches (610mm); more than 300 volts—30 inches (762mm).

Clearance from Ground—Conductors should conform to the following minimum clearances:

- 10 feet (3.05m) above finished grade and sidewalks, or from any platform or projection from which they might be reached.

- 12 feet (3.66m) over areas subject to vehicular traffic other than truck traffic.
- 15 feet (4.57m) over areas other than those specified in (d) that are subject to truck traffic.
- 18 feet (5.49m) over public streets, alleys, roads or driveways.

Clearance Over Roofs—Conductors above roofs accessible to workers should have a clearance from the highest point of the roof surface of not less than 8 ft. (2.44m) (vertical or diagonal) for insulated conductors, and not less than 15 ft. (4.57m) for bare conductors, except that:

- Where the roof is also accessible to vehicular traffic, the vertical clearance should not be less than 18 feet (5.49m), or
- Where the roof is not normally accessible to workers, fully insulated conductors should have a vertical or diagonal clearance of not less than 3 ft (914mm), or
- Where the voltage between conductors is 300 volts or less and the roof has a slope of not less than 4 inches (102mm) in 12 inches (305mm), the clearance from roofs should be at least 3 feet (914mm), or
- Where the voltage between conductors is 300 volts or less, the conductors do not pass over more than 4 feet (1.22m) of the overhang portion of the roof, and the conductors are terminated at a through-the-roof raceway or support, the clearance from roofs should be at least 18 inches (457mm).

Underground Conductors—Cables used underground must be of a type approved for such use. They must have insulation suitable for the location and applied voltage and must be protected from damage by being installed in duct, rigid conduit (either metallic or non-metallic), or metal raceways.

No bare conductors or earth returns should be used for wiring on any temporary underground services.

Wiring in Buildings

Branch Circuits—Branch circuits must originate in a power outlet or panelboard. Conductors should be run as multi-conductor cord or cable assemblies or open conductors. All conductors should be protected by overcurrent devices at their rated ampacity.

Receptacles—Receptacles should be of the grounding type with an effective ground continuity maintained at all times. Unless installed in a complete metallic raceway, each branch circuit should contain a separate equipment grounding conductor, and all receptacles should be electrically connected to the grounding conductor. Receptacles for uses other than temporary lighting should not be installed on branch circuits that supply temporary lighting.

Portable Electric Lighting—Portable electric lighting used in wet or other conductive locations (for example, in drums, tanks, and vessels) should be operated at 12 volts or less. However, 120-volt lights may be used if protected by a ground-fault circuit interrupter.

Earth Returns—Earth returns are not permitted in temporary wiring.

Bare Conductors—Bare conductors are not permitted in temporary wiring.

Abandoned or Unused Wiring—Abandoned or unused conductors should be disconnected and removed from raceways and equipment, or should be insulated at the terminal ends, enclosed and treated the same as ungrounded conductors throughout the installation.

Flexible Cords

Flexible cords and cables should be suitable for their conditions and locations. They should be used only for pendants, wiring of fixtures, connection of portable lamps or appliances, elevator cables, wiring of cranes or hoists, connection of stationary equipment to facilitate their frequent interchange, prevention of the transmission of noise or vibration, or on appliances where the fastening means and mechanical connections are designed to permit removal for maintenance and repair.

Where different voltages or types of current are supplied by flexible cords, the receptacles should be of such design that they are not interchangeable.

Flexible cords should not be used as a substitute for the fixed wiring of a structure, run through holes in walls, ceilings, floors, doorways, windows or similar openings, or concealed behind walls, ceilings, or floors.

Flexible cords should be used only in continuous lengths without a splice or tap. They should be connected to devices and fittings so that strain relief is provided which will prevent any pull from being directly transmitted to joints or terminal screws. Hard service flexible cords No. 12 or larger may be repaired if spliced so that the splice retains the insulation, outer sheath properties, and the original usage characteristics of the cord. Worn or frayed cables should not be used.

Flexible cords and cables should be protected by bushings or fittings where passing through holes in covers, outlet boxes, or similar enclosures.

Attachment plugs for use in work areas should be made for rough handling and be provided with cord grips to prevent strain on terminal connections.

A conductor of a flexible cord or cable that is used as a grounded conductor or an equipment grounding conductor should be distinguishable from other conductors (e.g., green or green with yellow stripes).

Portable Handlamps—Portable handlamps should be of molded composition or other type suitable to the required purpose. Handlamps should be equipped with a handle and a substantial guard, over the bulb, attached to the lampholder or the handle. Brass shell, paper-lined lampholders are not acceptable.

Lighting

Temporary lights should be equipped with guards to prevent accidental contact or breakage. Guards are not required when the reflector is such that the bulb is deeply recessed.

Temporary lighting fixtures, which operate at temperatures capable of igniting ordinary combustibles, such as the quartz type, should be securely fastened to avoid the possibility of their coming in contact with materials.

Temporary lights should be equipped with heavy-duty electric cords with all connections and insulation maintained in a safe condition. Temporary lights should not be suspended by their electric cords unless the cords and lights are designed to be suspended. Splices should have insulation equal to that of the original cable. The cords or cables should not be hung from nails, or suspended by staples or wire. Temporary lights installed in a wet or damp location should be of the type designed for that type of condition.

References

1. Consumer Product Safety Commission. CPSC *Guide to Wiring Hazards*. Washington, DC: The Commission, 1990.
2. National Fire Protection Association. *National Electrical Code*. NFPA-70 (1999), 70B (1998), and 70E (1999). Quincy, MA: NFPA, 1998-1999.
3. Occupational Safety and Health Standards. *Construction Industry*. OSHA 29 CFR 1926/1910, Subpart K. Electrical (1926.400 – 1926.449). Washington, DC: OSHA, 1999.

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The Hanover Insurance Group®

The Hanover Insurance Company
440 Lincoln Street, Worcester, MA 01653

hanover.com
The Agency Place (TAP)—https://tap.hanover.com

171-1200 (6/15) LC 2015-153