Industrial Electrical Safety Inspections

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Keeping People Safe from Electrical Hazards for Over 50 Years

Introduction

- OSHA concluded that:
  - Effective management of worker safety and health protection is a decisive factor in:
    - Reducing the extent and the severity of work-related injuries and illnesses
- Effective management addresses:
  - All work-related hazards, including:
    - Potential hazards which could result from a change in worksite conditions or practices
    - Addresses hazards whether or not they are regulated by government standards

Introduction

- OSHA reached this conclusion in the course of:
  - It’s evaluation of worksites in it’s enforcement program
  - State-operated consultation program
  - Voluntary Protection Programs (VPP)

Introduction

- These evaluations have:
  - Revealed a basic relationship between effective management of worker safety and health protection
  - A low incidence and severity of employee injuries
  - The elimination or adequate control of employee exposure to toxic substances and other unhealthful conditions

Introduction

- OSHA's experience in the VPP has also determined:
  - Effective management of safety and health protection:
    - Improves employee moral and productivity
    - Significantly reducing workers' compensation costs
    - Other less obvious costs of work-related injuries and illnesses

Electrical Inspection Program

- OSHA Act of 1970, Section 5(a)(1)
  - "General Duty Clause"
    - Requires the employer to provide a safe and healthful workplace for every working man and woman.
- To assist in accomplishing this, the
  - Employer should implement self-assessment or inspection programs
  - Ensure that the electrical systems and equipment are properly designed and installed
  - Operated and maintained in a safe and reliable condition.

Electrical Inspection Program

- Electrical safety inspections should be conducted to verify full compliance with:
  - OSHA 29 CFR 1910 electrical regulations
  - Industry consensus standards such as:
    - NFPA 70, *National Electrical Code*
    - NFPA 70E, *Standard for Electrical Safety in the Workplace*
    - NFPA 70B, *Recommended Practice for Electrical Equipment Maintenance*
    - *National Electrical Safety Code*

Electrical Inspection Program

- Compliance with these regulations and standards will:
  - Ensure that employees are maintaining electrical systems and equipment in proper and safe working condition
  - Each employee's utilization of:
    - Safe work practices
    - Appropriate electrical protective equipment
  - Assist supervisors and managers in meeting electrical safety goals

Electrical Inspection Program

- Electrical Safety Auditing Section 110.1(I)
  1) Electrical Safety Program
     - Verify principles and procedures
     - Program is in compliance with the standard
     - Not to exceed three (3) years
  2) Field Work
     - Verify requirements are being followed, if not followed
       - Revise training program
       - Revise procedures
       - Audit not to exceed one (1) year
  3) Documentation
     - Audit shall be audited

Electrical Inspection Program

- Inspection and audit programs should
  - Be carried out by an electrically knowledgeable, qualified person
    - Identify deficiencies in electrical equipment or systems
    - Correct or properly document any deficiencies found
- To ensure that the inspection program is on target
  - Have electrically qualified company safety personnel conduct the inspections

Electrical Inspection Program

- Hire a contracted third party safety inspector
  - Using a person from outside the facility will often lead to discovery of items and deficiencies that may be overlooked by self-inspecting
- Written electrical safety inspection program should be reviewed on a periodic basis
- Conducted by qualified persons
- Ensure that the check-lists are current and are being utilized

Electrical Inspection Program

- Inspections should include:
  - Review of the entire electrical safe work program
    - Energized work
    - Deenergized work
  - Written work practices
  - Personal protective equipment (PPE)
  - Inspection of electrical equipment and systems for compliance
  - “Work in progress” to:
    - Ensure that each worker understands and is implementing the safe work practices and procedures

Electrical Inspection Program

- Inspections should include (cont):
  - A root cause analysis of the deficiencies identified
  - To prevent reoccurrence:
    - Changes or corrections in processes, practices, and procedures should be analyzed
    - Items identified in the inspection or lessons learned should be communicated to others

Management Role

- Management ultimately bears the burden for:
  - Administering the electrical safety inspection programs
- Management involvement in the development and implementation of the electrical safety inspection program is vital to its success.
- Several areas must be considered when developing the inspection program:
  - Hazard assessments (1910.132(d)(1) requirement)
  - Inspections
  - Safety and health training
  - Evaluation of the existing safety and health management system

Management Role

- OSHA's assistance to employers and employees in developing effective safety and health management systems include:
  - *Safety and Health Program Management Guidelines* (*Federal Register* 54(16): 3904-3916, January 26, 1989).
  - Can be applied to all places of employment covered by OSHA.
  - These guidelines identify four general elements:
    - Management leadership and employee involvement
    - Worksite analysis
    - Hazard prevention and control
    - Safety training

Inspection Guidelines

- Employers should perform a self-assessment or inspection to determine:
  - Adequacy of their written electrical safety program and procedures including:
    - Electrical protective equipment
    - Ensure that they are being implemented
    - Inspection of the facility electrical systems and equipment to:
      - Ensure compliance with the installation and maintenance regulations and standards

Inspection Guidelines

- Numerous subjects and items should be addressed in an electrical safety inspection.
  - The list below identifies several, but not all, typical deficiencies:
    - Operating one-line diagrams
    - Electrical Hazard Analysis (shock & arc flash)
    - Trained and qualified operators and maintenance technicians
    - De-energized work procedures
    - Electrical safety program
    - Energized safe work procedures & work permit
    - Shock and arc flash PPE
    - Grounding and bonding

Inspection Guidelines

- Typical deficiencies (cont):
  - Corrosion
  - Maintenance practices
  - Exposed live parts – covers left off or doors left open
  - Unused openings not effectively closed
  - Working space around electrical equipment, 600-volts or less
  - Working space around electrical equipment, over 600-volts
  - Identification of disconnecting means
  - Improper or unapproved extension cords
  - Damaged extension cords
  - Damaged cord- and plug-connected equipment
  - Availability and condition of electrical PPE

Inspection Guidelines (OSHA)

- Do you specify compliance with OSHA for all contract electrical work?
- Are all employees required to report as soon as practicable any obvious hazard to life or property observed in connection with electrical equipment or lines?
- Are employees instructed to make preliminary inspections and/or appropriate tests to determine what conditions exist before starting work on electrical equipment or lines?
- When electrical equipment or lines are to be serviced, maintained or adjusted, are necessary switches opened, locked-out and tagged whenever possible?

Inspection Guidelines

- Are portable electrical tools and equipment grounded or of the double insulated type?
- Are electrical appliances such as vacuum cleaners, polishers, and vending machines grounded?
- Do extension cords being used have a grounding conductor?
- Are multiple plug adaptors prohibited?
- Are ground-fault circuit interrupters installed on each temporary 15, 20, or 30 ampere, 125 volt AC circuit at locations where construction, demolition, modifications, alterations or excavations are being performed?

Inspection Guidelines

- Are all temporary circuits protected by suitable disconnecting switches or plug connectors at the junction with permanent wiring?
- Do you have electrical installations in hazardous dust or vapor areas?
  - If so, do they meet the National Electrical Code (NEC) for hazardous locations?
- Is exposed wiring and cords with frayed or deteriorated insulation repaired or replaced promptly?
- Are flexible cords and cables free of splices or taps?
- Are clamps or other securing means provided on flexible cords or cables at plugs, receptacles, tools, equipment, etc., and is the cord jacket securely held in place?

Inspection Guidelines

- Are all cord, cable and raceway connections intact and secure?
- In wet or damp locations, are electrical tools and equipment appropriate for the use or location or otherwise protected?
- Is the location of electrical power lines and cables (overhead, underground, under floor, other side of walls) determined before digging, drilling or similar work is begun?
- Are metal measuring tapes, ropes, handlines or similar devices with metallic thread woven into the fabric prohibited where they could come in contact with energized parts of equipment or circuit conductors?

Inspection Guidelines

- Is the use of metal ladders prohibited in areas where the ladder or the person using the ladder could come in contact with energized parts of equipment, fixtures or circuit conductors?
- Are all disconnecting switches and circuit breakers labelled to indicate their use or equipment served?
- Are disconnecting means always opened before fuses are replaced?
- Do all interior wiring systems include provisions for grounding metal parts of electrical raceways, equipment and enclosures?
- Are all electrical raceways and enclosures securely fastened in place?

Inspection Guidelines

- Are all energized parts of electrical circuits and equipment guarded against accidental contact by approved cabinets or enclosures?
- Is sufficient access and working space provided and maintained about all electrical equipment to permit ready and safe operations and maintenance?
- Are all unused openings (including conduit knockouts) in electrical enclosures and fittings closed with appropriate covers, plugs or plates?
- Are electrical enclosures such as switches, receptacles, and junction boxes, provided with tight fitting covers or plates?

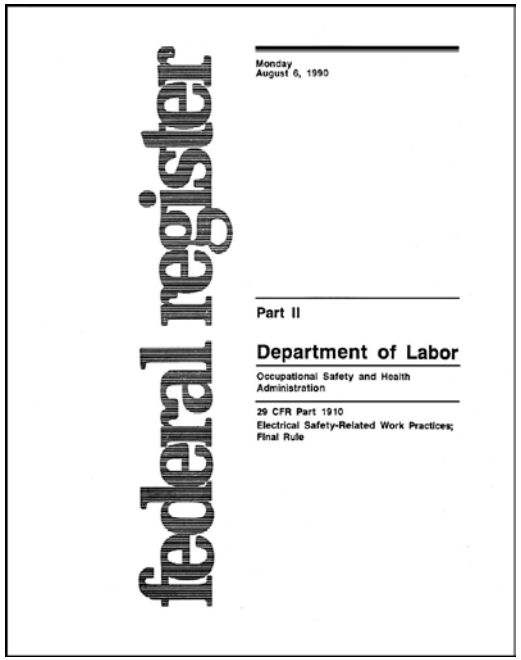
Inspection Guidelines

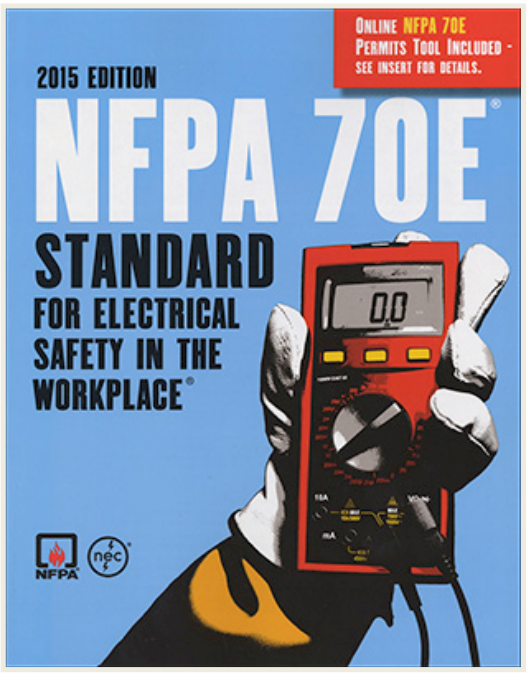
- Are disconnecting switches for electrical motors in excess of two horsepower, capable of opening the circuit when the motor is in a stalled condition, without exploding? (Switches must be horsepower rated equal to or in excess of the motor hp rating.)
- Is low voltage protection provided in the control device of motors driving machines or equipment which could cause probable injury from inadvertent starting?
- Is each motor disconnecting switch or circuit breaker located within sight of the motor control device?

Inspection Guidelines

- Is each motor located within sight of its controller or the controller disconnecting means capable of being locked in the open position or is a separate disconnecting means installed in the circuit within sight of the motor?
- Is the controller for each motor in excess of two horsepower, rated in horsepower equal to or in excess of the rating of the motor it serves?
- Are employees who regularly work on or around energized electrical equipment or lines instructed in the cardiopulmonary resuscitation (CPR) methods?
- Are employees prohibited from working alone on energized lines or equipment over 600 volts?

Use Regulations & Standards as Tools for Electrical Safety





Summary

- Electrical safety inspections are necessary in order to verify compliance with regulations and standards.
- Compliance with the OSHA regulations and NFPA standards will provide a means to reduce accidents, injuries, and fatalities in all segments of industry.
- Ensure that employees are properly trained and qualified

Summary

- Important safety tips to remember
  - Identify the electric shock and arc flash hazards
  - Use the right tools for the job
  - Isolate equipment from energy sources
  - Test every circuit and every conductor every time
  - Work electrical only when de-energized
  - Turn off, try, test, lockout/tagout, and ground
  - Treat de-energized electrical equipment and conductors as energized until properly lockout/tagout, tested, and ground procedures are implemented
  - Wear protective clothing and equipment and use insulated tools for electrical hazards

??? Questions ???

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