

Standard Operating Guideline –Electric Switchgear

Standard Operating Guideline (SOG)

Title: **ELECTRICAL SYSTEM MAINTENANCE - SWITCHGEAR**

District Name: _____

Date Prepared: _____ Date Revised: _____

OBJECTIVE:

To ensure adequate safety to persons engaged in maintenance and operation of electrical switchgear.

RATIONALE / PURPOSE:

An effective Switch Maintenance Program is essential to:

- Ensure electrical distribution system reliability
- Develop predictive maintenance programs
- Determine capital improvement budgeting
- Develop loss trend analysis
- Ensure system isolation capability

METHODS / PROCEDURES:

The following methods and procedures are recommendations that illustrate methods used by the electrical industry for switchgear equipment.

Plan for the Maintenance on Switchgear Equipment

The following steps will help you formulate a comprehensive maintenance action plan and in turn an effective Switchgear Maintenance Program.

Prior to the outage:

- Review your equipment history. What failures have occurred? Are you aware of any repair or refurbishment needs?
- Review the drawings and other documentation. Are the relevant drawings current? Do you have the correct instruction manuals?
- Perform visual inspections, thermal scanning, partial discharge testing, and other testing before the outage so you can take corrective action when it happens.
- Identify and order all materials required for the outage. Take lead times into account.

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- Develop a specific work plan and schedule. Communicate this information to all involved personnel and update.
- Conduct the tailgate safety meeting to be sure each person understands any dangers, special circumstances, and related work assignments.

During the outage:

- Shutdown the switchgear and apply protective grounds. Follow lockout/tagout procedures. Barricade and put up warning signs as appropriate.
- Check and correct any drawing inconsistencies or connection questions.
- Perform inspections and cleanings.
- Disconnect as necessary for tests.
- Make any planned repairs, changes, or upgrades.
- Perform measurements and tests.
- Based on test results, make additional repairs.

Concluding the outage:

- Re-connect and torque connections.
- Account for all tools and personnel.
- Make a visual check of all work.
- Remove grounds and then test to ensure you have no unintentional grounds.
- Energize switchgear and verify normal operation.
- Remove barricades and signs, and follow appropriate procedures to clear the lockout/tagout condition.

After the outage:

- Interview crews about problems they may have encountered. Ask them for recommendations for improving response efforts during the next outage, or preventing problems that occurred in this one.
- Prepare a report of maintenance outage and test results. Include trending and analysis of results and recommendations for future maintenance as appropriate.

SAFETY CONSIDERATIONS:

The effective maintenance and operation of electrical facilities can help to prevent damage to property, environment, injury to the public, and employees by:

- Precluding electrical equipment and distribution system damage
 - Inspection and testing frequency

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- Visual observations
- Mechanical and Electrical Testing
- Facilitating Operations and Maintenance personnel safety
 - Identify safe work practices
 - Identify hazards
 - Electric shock and burns
 - Electrical shock hazard from ungrounded or poorly grounded enclosures.
 - Arc-flash
 - Burns to skin and eyes from electrical arcing and molten metal
 - Personal Protective Equipment requirements
 - Lockout/Tagout
 - Crowded working conditions within enclosures, resulting in personnel-safety hazards
 - Safety signs and/or warning lights

COST BENEFIT:

- Reduce system failure
- Avoid costly repair and replacement
- Create a manageable capital improvement budget
- Enhance system reliability

INSPECTION FORMS / CHECKLISTS / DOCUMENTATION/ASSETS:

- Switchgear Check List
- Low Voltage < 600 Volt and Switchgear

REFERENCES:

Electrical work shall comply with the latest revisions to the following codes and standards:

- A. National Electrical Code (NEC) - National Fire Protection Association (NFPA) No. 70
- B. National Electrical Safety Code (NESC) - ANSI C2
- C. Cal OSHA 8CCR – 2299-2599 (Low Voltage) and 2700-2889 High Voltage
Title 8, Division 1, Chapter 4, Subchapter 5 (Electrical Safety Order)
Group 1 Low Voltage, Group 2 High Voltage safety Order
- D. Occupational Safety and Health Act (OSHA)
Title 29 CFR 1910 Subpart S - Electrical
Title 29 CFR 1926 Subpart K, Subpart V - Electrical
- E. Relevant DOE Orders - Chapter 16, Paragraph M

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- F. NFPA 70E- Standard for Electrical Safety Requirements for Employee Workplaces
- G. International Electrical Testing Association (NETA) Section 7
- H. Electric Hazards-Electric safety principles energize and de-energize

TESTIMONIALS:

The following benefits were experienced when a detailed Switchgear Maintenance Program had been established: