

To The Point

Electrical Maintenance Program (EMP)

Lack of consistent electrical equipment inspection and maintenance can result in severe safety risks, decreased efficiency, and higher maintenance expenses. According to the Institute of Electrical and Electronics Engineers (IEEE), the failure rate of electrical equipment increases by 300% without an Electrical Maintenance Plan (EMP).¹

Potential Dangers of Electrical Systems

Electrical systems present some of a facility's most critical property damage and business interruption exposures. Electrical deficiencies caused by loose connections, load imbalances, or overloaded circuits can lead to arcing and fires. The new National Fire Protection Association (NFPA) 70B standard² primary goal is to provide practical measures that effectively safeguard individuals, property, and processes against the inherent risks of an electrical distribution system's failure, breakdown, or malfunction. It is a valuable framework for establishing and maintaining the proper condition of electrical equipment and systems for safety and reliability.

Per this standard, an industrial plant had damage amounting to \$100,000, which was attributed to the failure of the main switchgear. Fouling by dirt, gummy deposits, and iron filings caused the failure. New electrical equipment deteriorates over time once energized. If left unaddressed, deterioration caused by normal operations can lead to malfunction or complete electrical failure. Accelerating factors such as hostile environments, overload, or demanding duty cycles can accelerate the rate of deterioration. A well-designed EMP efficiently identifies and acknowledges these factors while offering measures to mitigate equipment failure.

EMP Components

The following elements are key requirements of an effective EMP:

- Comprehensive assessment of maintenance needs.
- Identification of responsible personnel to implement the program.
- Survey and analysis of equipment and systems to establish maintenance priorities.
- Development and documentation of maintenance procedures.
- Plan for regular inspections, servicing, and suitable testing.

- Records retention policy.
- Process for taking corrective measures based on collected data.
- Designing equipment for maintenance while minimizing outage or disruption to facility operations.
- Periodic review and revision of the program to ensure continuous improvement.

Determining Maintenance Intervals and Frequency

Maintenance should adhere to the manufacturer's specifications. If they are unavailable or not provided, maintenance is performed as outlined in NFPA 70B and specified in the EMP. Once the initial inspection, maintenance, and testing frequency is established based on those intervals and the EMP equipment condition assessment, the frequency is followed for at least two cycles.

The frequency and intervals for inspections, maintenance, and testing can be adjusted according to the equipment condition assessment in the EMP and the results obtained from cycle inspections. When failures occur, the cause of failure is used to determine if the maintenance interval needs to be reduced and the frequency increased. When two maintenance cycles have been completed without issue, the frequency and interval can be extended. Any deviations and the justification to extend are documented in the EMP.

The equipment's Overall Maintenance Condition assessment is based on physical, criticality, and operating environment conditions. The assessed overall condition is then used to determine the maintenance interval. The condition assessments and maintenance intervals are adapted from NFPA 70B standard requirements. Refer to the standard for comprehensive requirements, informational notes, and sample forms.

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Benefits

A well-administered Electrical Maintenance Program (EMP) offers a range of significant advantages:

- Reduces accidents and saves lives by implementing proactive safety measures.
- Enhances safety and reliability of electrical systems by conducting regular inspections and maintenance.
- Identifies and addresses potential issues in advance, preventing them from escalating into major problems.
- Manages maintenance costs effectively while maximizing production efficiency.
- Minimizes costly breakdowns and unplanned equipment outages through regular preventive maintenance and prompt troubleshooting.

Routine preventive maintenance is essential to an electrical equipment safety and reliability program. An effective EMP reduces the risk and cost of failures significantly.

Resources

[Electrical Fire Prevention](#)

[Infrared Thermography](#)

References

1. Institute of Electrical and Electronics Engineers (IEEE), www.ieee.org/
2. NFPA 70B: Standard for Electrical Equipment Maintenance, www.nfpa.org/codes-and-standards/nfpa-70b-standard-development/70b

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