

# Electrical Preventive Maintenance (EPM) Program

---

Only qualified and properly trained persons may work on electric circuit parts or equipment. Such persons shall be capable of working safely and shall be familiar with the proper use of special precautionary techniques, PPE, insulating and shielding materials, and insulated tools. Electrical panels and equipment needs to be de-energized prior to being serviced following proper lockout/tag out procedures, whenever possible. If it is not possible to de-energize the electrical panel or equipment, proper safety procedures must be in place following NFPA 70E: Standard for Electrical Safety in the Workplace.

**ALWAYS READ AND FOLLOW INSTRUCTION MANUALS AND SAFETY WARNINGS.**

This program and checklist does not purport to set forth all hazards nor to indicate that other hazards do not exist. They are intended for the purpose of assisting you in loss control and safety procedures. These recommendations do not guarantee compliance with local, State or Federal regulations. Neither Hortica nor any of its employees shall be liable in any manner for any personal injury, bodily injury, property damage or loss of any kind arising from or connected with this program or checklist. No responsibility for implementation, management, or operation of loss control and safety procedures is assumed by Hortica.

## **Hazard Identification: Electrical Preventive Maintenance (EPM) Program**

Electrical related fires are a common occurrence. Property damage and/or physical injuries due to electrical fires can be devastating. Every year, electrical fires result in hundreds of deaths, thousands of injuries and hundreds of millions of dollars in property damage. While some fires are caused by faulty products, many more are caused by the misuse and poor maintenance of electrical equipment, incorrectly installed wiring, overloaded circuits and misapplied extension cords.

Electrical equipment deterioration is normal and equipment failure is inevitable. However, equipment failure can be delayed through appropriate electrical preventive maintenance. In addition to normal deterioration, other potential causes of equipment degradation can be detected and corrected through EPM. Among these are load changes or additions, circuit alterations, improperly set or improperly selected protective devices, and changing voltage conditions.



**An effective Electrical Preventive Maintenance Program should consist of the following essentials elements:**

- Management commitment
- Responsible and qualified personnel – employee training
- Regularly scheduled inspection
- Survey and analysis of electrical equipment and systems to determine maintenance requirements and priorities
- Programmed routine inspections and suitable test
- Accurate analysis of the inspection so proper corrective measures can be prescribed
- Performance of necessary work
- Concise but complete records
- Evaluation of repairs and failures to predict future problem areas
- Inventory of spare parts for critical components

**During the development of your plan, you should take these basic steps:**

- Compile a listing of all equipment and systems
- Determine which equipment and system are most critical
- Develop a system for monitoring
- Determine the internal and/or external personnel needed to implement and maintain the EPM Program
- Develop a Contingency Plan to deal with outages, equipment failures, etc.

An electrical distribution system is typically comprised of a network of circuits, including wiring, circuit breakers, fuses and possibly transformers. The electrical distribution equipment should be periodically thermally imaged as well as physically inspected. This inspection should include:

**Hazard Identification**

- Switchgear, switchboards, and panel boards
  - Circuit breakers
  - Fuses
  - Disconnect switches
  - Contactors and relays
  - Protective relays
  - Fans, motors and motor controls
  - Busway and bus duct circuit breakers
  - Transformers (if outdoor, it may be owned and the responsibility of the utility company)
-

## **Please keep an eye out for**

- Corroded wiring, deteriorated wiring and deteriorated sheathing
- Frequently blown or tripped fuses and circuits
- Hot spots

## **Other areas**

- Lighting
  - Unprotected light bulbs can be hit and broken, and may create sparks, potentially causing a fire.
  - Flickering or dimming lights may indicate a short in the wiring, dangerous arcing, or an over-extension of the electrical systems.
  - Multiple dimmed lights can also be a symptom of an overloaded circuit.
- Extension Cords
  - Check for missing prongs
  - Damaged cords
  - Overload
  - Spliced or unprotected
  - Running through walls and ceilings
  - Self-inspection program of extension cords
  - Replace, not repair, damaged cords
  - Minimize use through installation of permanent wiring
  - Use GFCI adapters in wet areas

## **Housekeeping**

Good housekeeping greatly reduces fire risks. When electrical distribution equipment is in a separate dedicated room, the room should be temperature-controlled, well ventilated, clean, and dry to prevent moisture and excessive room temperatures that can degrade electrical materials. Additionally, keeping the room properly sealed will keep it free of dirt, dust, rodents, and pesky bugs that can get into the cabinets and degrade the equipment and potentially start a fire.

It is also important to keep combustible material away from electrical distribution systems. Keep in mind that electricity can arc or jump through the air as a path to the ground and ignite combustible material in the vicinity.

Implementing an effective EPM Program will provide tangible and intangible benefits including improved safety, lower repair cost and less equipment downtime. Additionally, as part of an established written Electrical Safety Program, OSHA's Lockout/Tagout Standard Operating Procedures should be consistently followed by employees and contractors to help ensure personal safety.

---

# ELECTRICAL PREVENTIVE MAINTENANCE CHECKLIST

COMPONENT	ITEM #	JOB PERFORMED

Responsible for the Inspection: \_\_\_\_\_

Date of Inspection: \_\_\_\_/\_\_\_\_/\_\_\_\_

---

# ELECTRICAL PREVENTIVE MAINTENANCE CHECKLIST

Electrical equipment room #: \_\_\_\_\_

## Check

- |   |                          |   |
|---|--------------------------|---|
| 1 | <input type="checkbox"/> | Access door is marked and in working order              |
| 2 | <input type="checkbox"/> | Free of excessive dust, dirt and debris                 |
| 3 | <input type="checkbox"/> | No storage. Clearance of at least 36 inches from panels |
| 4 | <input type="checkbox"/> | Adequate lighting                                       |
| 5 | <input type="checkbox"/> | Free of water or potential sources of water             |
| 6 | <input type="checkbox"/> | Check for burning or "ozone" odors                      |
| 7 | <input type="checkbox"/> | Room is well ventilated                                 |

## Recommendations

- Vacuum the panels and room to remove dust, dirt and debris
  - Wipe down with lint free rags and solvents if needed, nonflammable solvents only
  - Check for signs of moisture or contamination
  - If present, check that windows are in working order
  - Verify that surface mounted wiring is labeled UF-B, UV resistant and is located in areas not subject to abrasion or physical damage
  - For conduit wiring, verify Schedule 40 PVC is used and wire is for wet locations i.e. THWN.
  - Verify that electrical raceways and cable trays are used exclusively for electrical conductors
-

# ELECTRICAL PREVENTIVE MAINTENANCE CHECKLIST

Electrical Panel #: \_\_\_\_\_

## Check

- |    |                          |  |
|----|--------------------------|--|
| 8  | <input type="checkbox"/> | Panel doors in working order   |
| 9  | <input type="checkbox"/> | Front panel is present and no open slots are present   |
| 10 | <input type="checkbox"/> | Free of excessive dust and dirt  |
| 11 | <input type="checkbox"/> | Seal and gaskets are installed   |
| 12 | <input type="checkbox"/> | All the wiring is reaching completely into the box and properly secured  |
| 13 | <input type="checkbox"/> | No punch-out missing   |
| 14 | <input type="checkbox"/> | All the breakers are labeled   |
| 15 | <input type="checkbox"/> | If present, check for heater elements  |
| 16 | <input type="checkbox"/> | If present, check for fans   |
| 17 | <input type="checkbox"/> | Check for arc flash protection warning signs   |
| 18 | <input type="checkbox"/> | Check for identification of disconnecting means and circuit directories for panelboards, switchboards, switchgears and similar equipment |

## Switchgears (Insulators, Supports and Connectors)

- |    |                          |   |
|----|--------------------------|---|
| 19 | <input type="checkbox"/> | Check for signs of cracking, broken pieces or any sign of physical damage |
| 20 | <input type="checkbox"/> | Free of dirt and debris   |
| 21 | <input type="checkbox"/> | Check for evidence of moisture  |
| 22 | <input type="checkbox"/> | Check for evidence of tracking, arcing or overheating                     |
| 23 | <input type="checkbox"/> | Check for bolts and connecting devices for signs of physical damage       |
| 24 | <input type="checkbox"/> | Ensure bolts have proper tightness  |
| 25 | <input type="checkbox"/> | If present, copper and aluminum conductors, check for galvanic action     |
| 26 | <input type="checkbox"/> | Check for insulation: deterioration, cracking, flaking or overheating     |
| 27 | <input type="checkbox"/> | Inspect for missing parts   |

## Recommendations

- If exposed to the environment, increase the frequency of maintenance
  - Clean all ceramic materials
  - Vacuum dirt and debris
  - Exercise circuit breakers annually
  - Bi-annual interior inspection/cleaning of distribution panels by licensed electrician
-

# ELECTRICAL PREVENTIVE MAINTENANCE CHECKLIST

Battery Station/Chargers # \_\_\_\_\_

## Batteries

- |    |                          |   |
|----|--------------------------|---|
| 28 | <input type="checkbox"/> | Battery surface clean of dust and dirt accumulation           |
| 29 | <input type="checkbox"/> | Check for all terminals and connections being tight and clean |
| 30 | <input type="checkbox"/> | Check for corrosion on battery terminals                      |
| 31 | <input type="checkbox"/> | Check for stranded cables, corroded or separated              |
| 32 | <input type="checkbox"/> | Check electrolyte levels and specific gravity.                |

## Charger

- |    |                          |  |
|----|--------------------------|--|
| 33 | <input type="checkbox"/> | Free of dirt and debris  |
| 34 | <input type="checkbox"/> | Check for terminal connections   |
| 35 | <input type="checkbox"/> | Check that all relays, lights, and other indicating devices are working properly |

## Recommendations

Batteries emit explosive gases while charging, allow no open flames or sparks  
Battery room should be ventilated using a "rated" fan  
No smoking should be permitted

Electric Motor # \_\_\_\_\_

## Electric Motors

- |    |                          |   |
|----|--------------------------|---|
| 36 | <input type="checkbox"/> | Check for damage caused by dirt, loose parts or foreign objects   |
| 37 | <input type="checkbox"/> | Check air inlets are not blocked  |
| 38 | <input type="checkbox"/> | Check for evidence of moisture and/or dirt build-up   |
| 39 | <input type="checkbox"/> | Check for unusual noises, leaking seals or high vibration   |
| 40 | <input type="checkbox"/> | If present, check oil level gages   |
| 41 | <input type="checkbox"/> | Check for degradation of foundation, bed plates, anchor bolts   |
| 42 | <input type="checkbox"/> | If present, check for oil ring turning  |
| 43 | <input type="checkbox"/> | Check for evidence of leaking oil and water from piping and connections   |
| 44 | <input type="checkbox"/> | Check for scheduled lubrication according to manufacturer's instructions  |
| 45 | <input type="checkbox"/> | For critical motors, check bearings daily using a stethoscope or infrared scanner (or camera, if appropriate)                           |
| 46 | <input type="checkbox"/> | Check bearing surface temperature with a thermometer, electronic temperature sensing devices, or stick-on temperature indicating labels |
| 47 | <input type="checkbox"/> | Check belt tension; belts should have about 1 in. of play; sheaves should be seated firmly with little or no play                       |
-



# ELECTRICAL PREVENTIVE MAINTENANCE CHECKLIST

## Additional Check

48	<input type="checkbox"/>	Verify that wiring methods are securely fastened in place, supported independently
49	<input type="checkbox"/>	Verify that boxes are installed at junction, splice, outlet, switch, and pull points
50	<input type="checkbox"/>	Identify wet and damp locations and the suitability of boxes and fittings
51	<input type="checkbox"/>	Verify that cabinets or cutout boxes are suitable and properly installed in any wet or damp locations
52	<input type="checkbox"/>	Verify that cables are secured to cabinets and cutout boxes or that the conditions for cables with nonmetallic sheaths are met
53	<input type="checkbox"/>	Verify that any switches in wet locations are properly installed in waterproof enclosures
54	<input type="checkbox"/>	Verify that the point of attachment for an overhead service drop is adequate and will provide minimum clearances
55	<input type="checkbox"/>	Verify that GFCI protection is provided for receptacles in bathrooms, near sinks, outdoors, on rooftops, indoor wet areas, outdoor areas and in garages
56	<input type="checkbox"/>	Check transformer installations for adequate ventilation and spacing from walls and obstructions
57	<input type="checkbox"/>	Periodic transformer oil testing

---