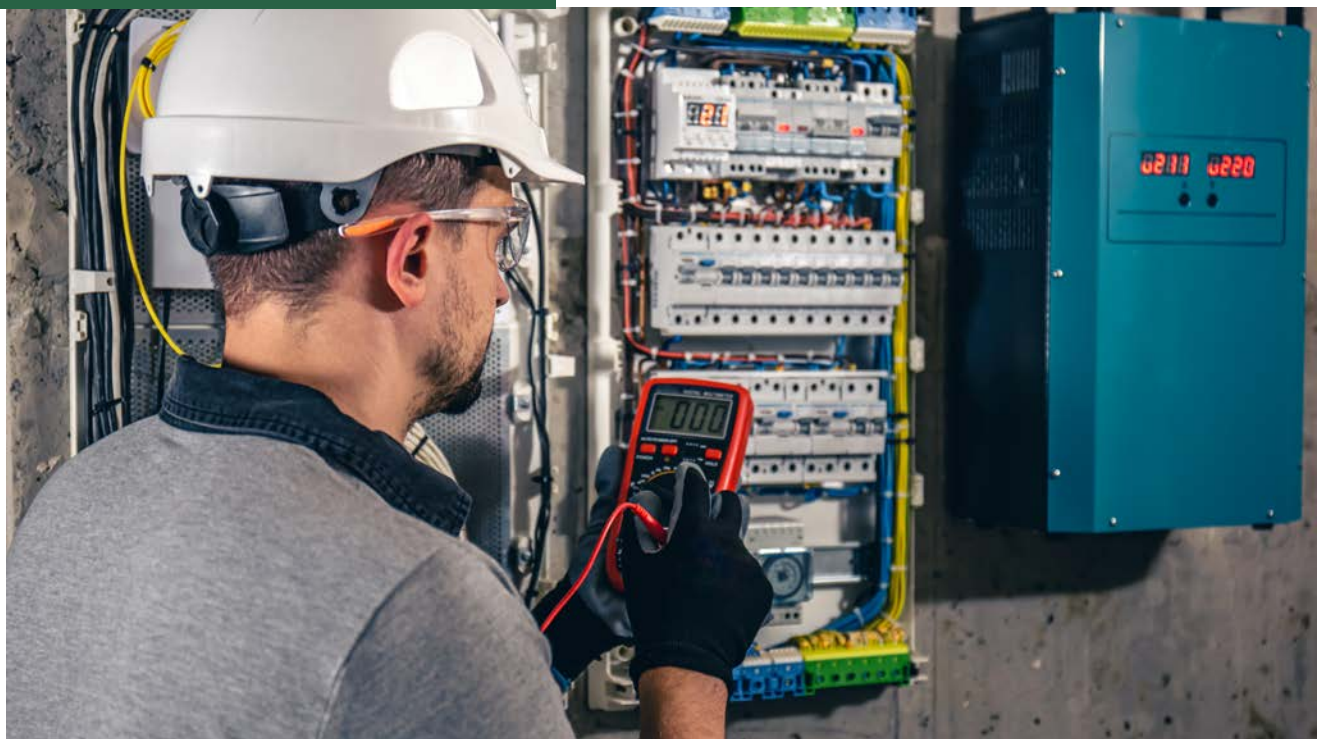

Electrical Preventative Maintenance

By Joe Calabria, Vice President, Engineering & Operations, Trace Consulting Group Ltd.

Building owners and property managers should be aware of the importance of preventative maintenance procedures for electrical distribution and emergency generators and the responsibility to protect their longevity, safety, and critical infrastructure to avoid unexpected equipment failure. Professional engineers can provide the recommended measures to ensure your electrical distribution and emergency systems are safe, along with experienced electrical contractors.

Joe Calabria

Regular testing and preventative maintenance on electrical distribution equipment will ensure that electrical distribution and associated life safety equipment continue to perform at optimum levels. This helps to protect the electrical safety of all building occupants during routine and emergency operations.

When a facility's main switchboard or power supply fails, having a functioning emergency generator can make all the difference between a safe or unsafe environment. A failure in a building's primary power source can create hazardous conditions if the building's backup generator system is not functioning.

The CSA C282 Standard

A CSA C282 standard describes how to design, install, operate and maintain emergency generators. Typically, this standard covers any power-generation systems used in buildings that provide an emergency power supply in case of power failure.

Electrical Maintenance Plan (EPM) is meant to prevent equipment failures which account for millions of dollars in damage and lost business every year. As electrical infrastructure ages, this problem will worsen unless preventative steps are taken through a routine EPM. A planned EPM program allows the equipment owner to schedule the system outage at a time of their choosing before significant problems occur. An EPM should be developed, implemented, and completed by properly trained and qualified individuals. Actual maintenance activities and frequencies should be based on the specific operations and conditions of the equipment. Any EPM program should be performed in accordance with accepted industry standards and safety practices.

The CSA-Z462 Standard

The workplace electrical safety standard, CSA-Z462, recommends that maintenance plans be created and documented for buildings, which will be verified by the Ministry of Labour and insurance companies as required. Electrical Safety Authority (ESA) has begun a program that will require that a maintenance plan be submitted that includes thermographic scanning and other intrusive testing procedures. Hydro utility companies like

Toronto Hydro require a maintenance plan to be submitted upon request before completing any electrical connections.

The following tests are examples that can help mitigate electrical risks: Power Distribution and circuit breaker tests (thermographic scanning); cable tests (megger); total harmonic distortion (Power quality metering); Power Studies (Short Circuit, Coordination and Arc Flash), updated single line As-builts, Transformer tests (Insulation Resistance and Winding resistance); Relay Tests (Protective Relay); Motor tests (Vibration Monitoring, Lubrication Analysis, Hi-Pot); Emergency Generator tests (Load Capacity, CSA-282); UPS Testing; Surge Arrestor Watts-Loss testing; Leakage Current Tests and Grounding electrode circuit resistance tests.

Qualified professionals can prepare an optimized electrical maintenance plan that is site-specific to the building based on site investigation findings and their recommendations. Such tests, as mentioned above, are to be carried out by an appropriate and qualified electrical contractor and reviewed by a qualified engineer for technical compliance. EPM programs should aim to take into account the minimal impact on building operations and downtime. Deficiencies are to be identified in the Electrical Maintenance Shutdown Program (EMSP) for the electrical contractor to rectify during the implementation phase of the EMSP.

When creating a maintenance plan, your qualified professional engineer will consider the following:

a. **Building Complexity**
   i. Services may include deployment of diagnostics testing (such as infrared & insulation resistance testing)
b. **Building Age**
   i. To accommodate many changes to the Ontario Electrical Safety Code over the years
c. **Equipment Manufacturers' Service Manuals**
   i. Gather records of previous maintenance to compare to each piece of equipment's service manual
d. **Applicable Standards**
   i. CSA Z463-18 "Maintenance of Electrical Systems"
   ii. ANSI/NETA MTS-2007
   iii. NFPA 80B

As enforced by ESA through Rule 12-300 of the Ontario Electrical Safety Code, "As a property Owner or Manager of a multi-unit residential building, you have a regulatory obligation, under the Ontario Electrical Safety Code, to conduct regular maintenance and repairs of all electrical distribution system to ensure they are in safe and proper working order." Several multi-unit residential building system failures in Ontario have led to tenant displacements and significant financial burdens for building owners. Taking a proactive approach to maintenance can lower the risk of a critical incident at substantially less cost to owners than after-the-fact repairs.

By getting the word out in our industry, we can ensure we all work together and keep our buildings electrically safe and properly maintained for years to come. ■

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