

Electrical Preventive Maintenance Checklist

Commercial and Industrial Systems

Electrical system breakdowns and resulting fires are a leading loss driver across all types of occupancies. In addition, electrical failures may cause production and business shutdowns, resulting in lost revenue and sales. All electrical equipment has an expected service life, which can be negatively affected by environmental conditions, misuse and, most importantly, lack of maintenance. Studies have estimated that nearly 70 percent of electrical system failures could have been prevented by an electrical preventative maintenance program.

The following checklist helps define those areas that require scheduled preventative maintenance. Suggested timeframes for inspections are listed; however, testing and inspection frequency must be modified based on environmental conditions. For example, if switchgear is in manufacturing areas that are prone to high dust concentrations, the testing/inspection intervals should be increased accordingly with the environmental conditions.

For any inspection/testing program to be effective and safely performed, trained and experienced personnel must be employed. Many of the visual inspection tasks can be performed by in-house employees that have received special training. However, the mechanical and electrical tests require a highly trained electrician with experience in medium/high voltage, multi-phase systems. Additionally, they should be NICET certified or comply with the latest version of NETA standard for certification of electrical testing technicians (ETTs), ANSI/NETA ETT-2010, "Standard for Certification of Electrical Testing Technicians." Arc Flash training in compliance with NFPA 70e would also be required for individuals administering this program.

Consistent with established protocols, there are various levels of testing and inspection.

- Visual inspections determine if equipment is operating in a cool, clean, dry and tight condition with no abnormal heat, smells, noises or vibrations.
- Electrical testing is performed by trained personnel using electronic and computer controlled testing equipment. Examples include insulation resistance test, contact resistance, dielectric strength, earth continuity test and current leakage test.
- Mechanical inspection utilizes mechanical means such as re-torquing major connection points, exercising circuit breakers, performing a functional check of charging mechanisms and lubrication of circuit breakers per manufacturers' recommendations.
- Dissolved gas analysis of critical oil filled transformers helps detect conditions occurring within the transformer such as incipient faults, overheating and internal arcing. An oil sample is collected and sent to a qualified laboratory facility for analysis. This testing also measures the level of dissolved metals, oxidation and moisture content of the transformer oil.
- Infrared testing requires trained and certified personnel to perform thermographic surveys of electrical distribution equipment to detect defective components and other conditions that could result in electrical breakdown and fire. The testing reveals hot spots in the equipment that indicate excessive heat generated from problem areas.

**Retesting intervals may be more frequent depending on test results and recommendations from the technician.*

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Equipment to be tested/inspected	Visual (months)	Mechanical and Visual (months)	Electrical, Mechanical and Visual (months)
Switchgear and switchgear assemblies	12	12	24
Transformers			
Small dry type	2	12	36
Large dry type	1	12	24
Liquid-filled	1	12	24
Oil sampling	-	-	12
Cables			
Low voltage	2	12	36
High/medium voltage	2	12	24
Switches			
Low voltage air	2	12	36
Medium voltage metal enclosed	-	12	24
Medium/high voltage open	1	12	24
Medium voltage oil	1	12	24
Medium voltage vacuum	1	12	24
Medium voltage SFs	1	12	24
Cutouts	12	24	24
Circuit breakers			
Low voltage - molded case	1	12	36
Medium voltage air	1	12	36
Medium voltage oil	1	12	36
Sampling	-	-	12
High voltage oil	1	12	12
Sampling	-	-	12
Medium voltage vacuum	1	12	24
Extra high voltage SFs	1	12	12
Motors			
AC motors	1	12	24
DC motors	1	12	24
AC generators	1	12	24
DC generators	1	12	24
Motor controls			
Low voltage motor starters	2	12	24
Medium voltage motor starters	2	12	24
Low voltage motor control centers	2	12	24
Medium voltage motor control centers	2	12	24
Speed drive control systems	1	12	24
Surge arresters			
Low voltage devices	2	12	24
Medium/high voltage devices	2	12	24
Emergency power systems			
Emergency generator	1	2	12
Full load/functional testing	-	-	2
Uninterruptable power systems	1	12	12
Full load/functional testing	-	-	2
Automatic transfer switches	1	12	36
Full load/functional testing	-	-	24
Metal enclosed busways	2	12	24
Infrared surveys	-	-	12
Grounding systems	2	12	24
Ground fault protection systems	2	12	12
Direct current systems			
Batteries	1	12	24
Battery chargers	1	12	24
Exteriors	1	12	36