

Inspection, Testing and Maintenance

Transfer switch equipment generally requires limited maintenance, but some regular care and testing is required to be sure that the equipment will operate properly upon power failure; start the generator set, and transfer power reliably to the alternate power source. Emergency power systems testing is required on a regular basis, and the transfer switch is required to be tested at least once per month per NFPA 110.

Weekly Inspection

On a weekly basis an operator or maintenance technician should inspect the entire emergency power system, including the transfer switch. That inspection should verify that all of the indicating lamps are functional, the control switches are in the proper (automatic operation) position, and that there are no obvious indications of overheating or misoperation.

Monthly Testing

Once per month the emergency power system should be tested. The transfer switch, as a part of this system, should go through its exercise sequence to initiate the test. In a standard exercise sequence, the transfer switch should signal the generator set to start, monitor the generator set as it starts, and transfer load to the generator set. When the generator set test is completed, the transfer switch should transfer load back to the normal service, and shut down the generator set after a cool-down period. Test initiation can be done either by manual operation of a control switch on the transfer switch, or by an automatic time clock in the transfer switch or other building management system device.

This testing not only verifies that the generator set will start and carry load, but also verifies the ability of the transfer switch to detect a power failure, and mechanically connect to the alternate power source. Generator sets are required to be operated at 30% or more of rated load on a regular basis, in order to meet certain codes and standards.

Annual Maintenance and Testing

NFPA110 and NFPA 70B both require an annual inspection and maintenance of automatic transfer switches. These inspection and maintenance actions are intended to detect overheating contacts or connections which may result from overloads, wear in contact assemblies, or loose cable terminations. If these conditions remain uncorrected, the transfer switch can overheat and completely fail. This would result in total power loss to critical loads in a facility for extended periods of time because the transfer switch serves critical loads all the time. Because the transfer switch is always energized in the building's electrical system, replacement of the transfer switch is generally difficult if a catastrophic failure does occur.

Annual Maintenance

Keeping the switch clean will help to prevent dangerous or damaging ground fault conditions. The basic yearly work needed on the transfer switch starts with a thorough cleaning and inspection of the switch. Power to the transfer switch from both the utility source and the generator source is disconnected, and these sources are locked out and tagged for safety. The switch cabinet is then vacuumed and cleaned to remove all dirt and debris from the enclosure.

Exterior surfaces of the switch can be carefully cleaned as long as care is taken to prevent liquid from entering external switches or the interior of the cabinet.

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Annual Maintenance (cont'd)

The transfer switch is then inspected for carbon tracking, cracks, corrosion, or any other type of deterioration. Covers over the contact mechanisms should be removed and the contacts themselves should be inspected for abnormal wear or degradation. Transfer switches are operated under load many more times than other distribution circuit devices, and some contact wear is normal. So, it's necessary to monitor transfer switch condition and make corrections and repairs when necessary. Most transfer switches require no lubrication, but if it is required, lubricate according to the manufacturer's instructions.

After the transfer switch is cleaned and reassembled, all the power and control connections should be checked for deterioration and re-torqued according to manufacturer's specifications. In particular, check for wear on wiring which goes across doors, and any wiring which is connected to a moving part.

Annual Testing

On completion of the annual maintenance, a full power failure test is recommended. In the monthly testing of the system, a power failure is typically simulated by manipulation of the control circuits in the transfer switch. In the yearly test, we recommend that the power supply to the facility be physically opened, so that the generator set and power transfer system must function exactly as in a real power failure condition. This verifies that all the critical support equipment is connected to generator power, and that the generator can start and run critical loads.

Thermography

A regular thermographic or infrared examination of transfer switches can be valuable in monitoring transfer switch condition and loading. A thermal evaluation will detect overheating due to not only failure or deterioration of components, but also overloading or the effects of nonlinear loads in the distribution system.

In general, thermographic evaluation is most useful when historical data is available for use in comparing current test data to samples of previous performance. Comparison of current performance to other contacts of identical or similar design with similar load levels, or between contacts of a single device will often highlight contacts that need further inspection or even repair.

If no historical data is available, then test data can be evaluated based on maximum allowable temperatures allowed by UL standards. For transfer switches rated 400 amps and smaller, the contact and lug assembly should be no more than 50C over ambient with full load on the switch.

For transfer switches larger than 400 amps, the maximum temperature allowed is 60C over ambient. Connecting straps and bus bar may operate at temperatures up to 60C over ambient at full load.

Note that thermographic evaluation does not take the place of the required yearly inspection and maintenance, but can highlight problems between service intervals, or indicate the certain need for repairs such as contact replacement which are not commonly required. The advance notice of the need to repair these components can prevent wasted time and unnecessary down time in the system for unplanned or additional shutdown periods.