



THE CODE AUTHORITY®

A NEWSLETTER FOR THE CODE COMMUNITY

SWITCHING things up with SMILCHING transfer switches

Underwriters Laboratories Inc. investigates and Lists automatic and non-automatic transfer switches for a variety of applications covered by the National Electrical Code® (NEC®). Several different factors need to be considered to verify that the transfer switch selected is suitable for a given application. These products are investigated in accordance with UL 1008, Standard for Safety for Transfer Switch Equipment. Some of the factors associated with the various Listed transfer switches are described below.

By Howard Hopper

Product categories

Transfer switches include a variety of different configurations, and are investigated and Listed for use in specific installations. The product categories under which these various transfer switches are Listed are described in the sidebar on page 7.

Enclosure and location considerations

Transfer switches and bypass switches that have been investigated without an enclosure have the UL Listing Mark applied to the switch panel. Listed transfer switches without enclosures are for use as part of other equipment, or where open-type devices are acceptable. It is up to the regulatory authority to determine the suitability of the mounting location for these transfer switches. Instructions provided with the Listed open transfer switch provide the minimum acceptable dimensions for enclosures into which the open transfer switch may be installed. When the Listing Mark is applied to the enclosure of an enclosed transfer switch or bypass switch, it indicates the Listing of the complete enclosed assembly.

Service equipment applications

Transfer switches rated 600 volts and less that have been investigated for their suitability for use as service equipment are marked, "SUITABLE FOR USE AS SERVICE EQUIPMENT." Automatic transfer switches are required to be designed so that the load cannot remain simultaneously disconnected from both the normal and alternative sources when either or both sources are available. However, transfer switches marked, "SUITABLE FOR USE AS SERVICE EQUIPMENT," are provided with accessible means to independently disconnect both the normal and alternate sources.

Automatic switching

Automatic transfer switches transfer a common load from a normal supply to an alternate supply in the event of failure of the normal supply, and automatically return the load to the normal supply when the normal supply is reestablished. Additional sensing devices that may initiate or delay transfer have been evaluated in accordance with the manufacturer's marked operating values. Automatic transfer switches may have a switching contact to initiate the starting of an engine generator set.

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Switching things up with transfer switches

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Overcurrent and inrush considerations

Transfer switches have been investigated for load switching and inrush capability, and for a number of cycles of operation based on their intended use. In the case of an automatic transfer switch, this use is expected to include scheduled test operations switching full load.

Transfer switches without integral overcurrent protective devices are suitable for continuous use at 100 percent of rated current. Transfer switches incorporating integral overcurrent devices are suitable for continuous use at 100 percent of rated current unless restricted to use at 80 percent of rated current as indicated by the marking, "CONTINUOUS LOAD CURRENT NOT TO EXCEED 80 PERCENT OF SWITCH RATING," on the switch.

Transfer switches without integral overcurrent protection are marked to indicate the maximum rating of overcurrent protection to be provided ahead of the transfer switch.

Electrical rating considerations

Transfer switches are rated in amps, and are generally considered to be suitable for total system transfer, which includes control of motors, electric-discharge lamps, electric-heating loads and tungsten-filament lamps within the amp rating marked on the nameplate.

Unless marked otherwise, transfer switches rated 100 amps or less are suitable for use on circuits having available fault currents not greater than 5,000 amps rms symmetrical. Transfer switches rated more than 100 amps are suitable for use on circuits having an available fault current of 10,000 amps rms symmetrical or 20 times the transfer switch rating, whichever is greater.

Transfer switches marked with a short-circuit rating without reference to an overcurrent device by manufacturer and catalog number

have been tested for a minimum of three electrical cycles, and are intended for use with a Listed molded-case circuit breaker without an adjustable short-time function.

Manual transfer switches

Transfer switches having manual operators accessible only by opening the enclosure are not intended to be manually operated under load. A separate means to disconnect the load needs to be provided in applications in which these switches are used. These devices are not suitable for service equipment use.

Ground fault protection

Some transfer switches may be provided with ground-fault protection for services or major feeders. The circuit(s) so protected are identified by a marking on the unit's wiring diagram.

Listed transfer switches are for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Such marking is independent of any marking on terminal connectors, and is indicated on a wiring diagram or other readily visible location.

Wiring considerations

Unless otherwise marked, transfer switches are rated 600 volts and less, and the wiring space and terminations are based on 60 C wire for switches rated 100 amps or less and 75 C for switches rated more than 100 amps.

Unless transfer switches rated over 600 volts are marked otherwise, the wiring space and terminations are based on the use of Type MV90 conductors. The ampacity of Type MV90 conductors is specified in Tables 310-75 and 310-76 of the NEC.

For more information on transfer switches, contact Paul Barnhart in Research Triangle Park, N.C., by phone at +1-919-549-1446; or by e-mail at Paul.D.Barnhart@us.ul.com.

TRANSFER SWITCH PRODUCT CATEGORIES

- **Automatic Transfer Switches for Use in Emergency Systems (WPWR).** This category covers automatic transfer switches intended for use in emergency systems in accordance with Articles 517 and 700 of the NEC. Transfer switches for emergency systems are also suitable for use in standby systems.
- **Automatic Transfer Switches for Use in Optional Standby Systems (WPXT).** This category covers automatic transfer switches intended only for use in optional standby systems in accordance with Article 702 of the NEC.
- **Nonautomatic Transfer Switches (WPYV).** This category covers nonautomatic transfer switches intended to transfer a common load from a normal supply to an alternate supply of an equipment system in accordance with Sections 517.34 and 517.43 of the NEC, or to an optional standby system in accordance with Article 702 of the NEC.
- **Automatic Transfer Switches Over 600 Volts (WPYC).** This category covers switches that are rated up to 1,200 amps, and up to 38 kV.
- **Transfer Switch Accessories (WPVQ).** This category covers bypass switches that permit testing and maintenance of emergency system components that could not be otherwise maintained without disruption of important functions. The bypass switching sequence is manually initiated. The transfer and bypass/isolation switch for use in emergency systems consists of a transfer switch suitable for emergency systems together with a bypass/isolation switch. When the transfer switch is isolated or disconnected, the bypass/isolation switch functions as an independent nonautomatic transfer switch, and allows the load to be connected to either power source.
- **Transfer Switches for Use in Fire Pump Motor Circuits (XNVE).** This category covers transfer switches that are intended for use in fire pump motor circuits covered by NFPA 20, Standard for the Installation of Stationary Pumps for Fire Protection, and Article 695 of the NEC.