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Re: Benefits of a UL 183 Listed Wiring System

There are a number of benefits to installing a factory-built UL 183 Listed wiring system over a conventional "pipe-n-wire" system that is essentially fabricated and fitted on site, not the least of which is the UL 183 Listed system comes to the job site fully tested and safety certified by an OSHA sanctioned Nationally Recognized Test Laboratory, (NRTL), Underwriters Laboratories, (UL) for example. Further, UL 183 is the Standard for Safety published by Underwriters Laboratories used by all NRTLs for the safety certification of any Manufactured Wiring System, (MWS) that is installed in the United States.

A happy by product of installing a UL 183 Listed wiring system is that because all components and wiring methods have been thoroughly inspected and approved by the Listing NRTL field inspectors in their factory of manufacture, further inspection is not necessary when shipped to and installed on the job site. The same cannot be said for conventional wiring methods. To ensure safety and code compliance of conventional electrical installations, electrical inspections are required at various stages of the electrical distribution systems installation. Correcting issues uncovered during unsatisfactory inspections could very well add delays to a project.

Some of the testing performed on a UL 183 Listed system that are never done on a traditionally installed system are summarized below.

UL 183-27 Temperature Test: A 72-hour test where all circuits of the system are loaded to 100% of rated current. After 16 hours of 100% load the temperature of component parts, i.e. wires, are measured to ensure the temperature of the components remain at a safe level. Power is left on for another hour and then removed for 7 hours. The cycle repeated two more times.

UL 183-28 Aging/Creep Test: Before any of the following tests can be performed, all samples must first be conditioned in an air-circulating oven heated to 212º F (100 ºC) for 168 hours (7 days). This is done to simulate the effects of age on the test samples. The conditioned samples must not crack, warp, deform, or show any other signs of deterioration.

UL 183-30 Vibration Test: Sample cables are stretched and secured in the horizontal plane and twisted 180º in the direction that would promote the flexible conduit to loosen in its fitting or clamp. The cables are then vibrated at a frequency of 2,000 cycles per minute at a peak-to-peak amplitude of 1/32" (0.78mm) for a period of 24 hours. At the end of this test the samples must not be adversely affected such that they would present a risk of fire or electric shock.

These sample cables that have passed the Vibration Test are then subjected to the Push-Back Relief test.

UL 183-31 Push-Back Relief Test: With the whip head clamped in place a 6 pound-force (26.7N.) is applied to the flexible cable, pushing in the direction of the whip head. The direction of this force is manipulated, (pushed, pulled and twisted) to ensure that no pressure is transmitted to the connector terminals of the whip head.

After these samples have passed the Push-Back Relief Test they are then subjected to the Pull-Out test.

UL 183-32 Pull-Out Test: This is a two-part test. In the first test the whips are suspended vertically, secured by a clamp attached to the flexible conduit and a 150-pound weight is attached to the whip at position 3 feet from its lower connector for a period of 5 minutes. A second

set of whips is suspended vertically, but these are supported at the whip head/connector fitting. To these whips a 150-pound weight is attached to the whip head/connector fitting on its opposite end for a period of 5 minutes. In both test set-ups no displacement of parts, damage to the cable or flexible metal conduit is acceptable, nor can any stress be transmitted to the conductors of the test samples. This test ensures the connector of the MWS power cable will not separate from the cable's raceway, i.e. MC, AC or FMC.

Note: Prior to submitting our product to UL for listing, the 10-pin connector used on the CII manufactured wiring system, attached and locked to its mating connector, was tested and found to withstand a pulling force of 195 pounds before the self-locking latches disengaged, thereby breaking the contact-to-contact connections of the mated connector. This ensures against the inadvertent disconnection of a power cable from its mating box or enclosure.

UL 183-34 Overload Test: Rated voltage at 150% of rated current is applied to mating connectors of the system. Mating connectors make and break full contact for 250 cycles of operation at a rate no faster than 10 cycles per minute. The contacts are to mate for not more than 1 second during each cycle. The temperature test is to be conducted immediately after the first 50 cycles. No signs of undue wear or pitting may be present at the conclusion of testing.

UL 183-37 Conductor-Secureness Test: The connection of a conductor to a terminal of the device shall not break when subjected for 1 minute to a pull force of 30 pounds (133 N) applied between the terminal and the conductor.

UL 183-38 Grounding Impedance Test: The impedance of two electrically and mechanically interconnected wiring components, between the point of connection of the conductor cable and other metal parts (such as a module head or fitting), shall not be more than 0.1 ohm.

UL 138-39 Dielectric Voltage Withstand, (Hi-pot) Test: The insulation and spacings of a manufactured wiring system shall withstand for 1 minute without breakdown the test potential of 1240 volts AC, (1000 volts + 2 x supply voltage). 1240 volts is applied to all current carrying conductors of the system. Any voltage bleed to grounded bare-metal parts or any other conductor indicates a failure.

As you can see, to ensure the safety of life and property, UL 183 testing is quite comprehensive, and far and away exceeds that of any on site built and installed electrical system. At best, the electrical inspector on a conventional system will look for proper wire sizes, termination and splicing techniques, and ensure the correct conduit and electrical boxes are used and are properly installed per code requirements. But, be assured, there is nothing that even approaches the amount and the severity of testing that is performed on a UL 183 system to ensure system safety. Something to consider when weighing all the options available for your next electrical distribution system.

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