
Electrical Circuit Protective Systems (FHIT)

GUIDE INFORMATION FOR FIRE RESISTANCE RATINGS

GENERAL

This category covers electrical circuit protective systems consisting of components and materials intended for installation as protection for specific electrical wiring systems, with respect to the disruption of electrical circuit integrity upon external fire exposure.

Ratings apply only to the entire protective system assembly, constructed using the combination of components specified in the system. Individual components and materials are designated for use in a specific system(s) for which corresponding ratings have been developed, and are not intended to be interchanged between systems. Ratings are not assigned to individual system components or materials. As an example, caulk or putty used from one system cannot be interchanged with the caulk or putty specified in another system.

The Electrical Circuit Protective Systems must be fastened to a concrete or masonry wall or a concrete floor-ceiling assembly. The fire rating of wall or floor-ceiling assembly must be equal to or greater than the rating of the electrical circuit protective system. This is to ensure that the complete electrical circuit protective system will survive during the fire and hose stream exposure.

Systems incorporating cable protected with electrical circuit protective materials are evaluated to Subject 1724, "Outline of Investigation for Fire Tests for Electrical Circuit Protective Systems." Systems constructed with fire resistive cable are evaluated to ANSI/UL 2196, "Tests of Fire Resistive Cables." Fire resistive cables with the "CI" marking are also evaluated to UL 2196. "CI" Cables are Listed under the product categories, Power Limited Fire Alarm Cable (HNIR) or Non-power Limited Fire Alarm Cable (HNHT).

SYSTEMS INCORPORATING CABLE PROTECTED WITH ELECTRICAL CIRCUIT PROTECTIVE MATERIALS

These protective systems are evaluated with respect to fire exposure and with respect to water hose stream performance. Performance criteria are based on temperatures within the enclosure and visual examination after the water hose stream.

Classification of these protective systems contemplates installation in interior environments with representative heating and air conditioning, unless stated otherwise in the individual Classifications.

Where indicated in the system, the ampacity reduction due to the electrical circuit protection system has been determined for normal ambient temperature operating conditions in accordance with IEEE 848-96, "Procedure for the Determination of Ampacity Derating of Fire Protected Cables." If not specified in the individual system, the effect of the electrical circuit protection system on the ampacity of the electrical conductors has not been investigated. The specifications for the protective system and its assembly are important details in the development of the ratings. Information concerning these details is described on the individual systems.

The products used in these systems are to be installed in accordance with the applicable accompanying instructions.

SYSTEMS CONSTRUCTED WITH FIRE RESISTIVE CABLE

These protective systems are evaluated with respect to fire exposure and water hose stream performance. The Standard ANSI/UL 2196 describes two fire exposure conditions. The normal temperature rise (to ANSI/UL 263) is intended to represent a fully developed interior building fire. The rapid temperature rise (to ANSI/UL 1709) is intended to represent a hydrocarbon pool fire. If not stated otherwise, it is assumed that the normal temperature rise exposure was used. There are two hose stream levels, normal and low

impact. The low impact fog nozzle hose stream is applied only to cable to be marked with the –CI suffix. The normal impact hose stream, applied with a standard-taper, smooth-bore playpipe is applied to all other types of cables. Performance criteria are based on functionality of the cable during the fire and after hose stream.

CI cables are tested on steel ring to simulate installation in free air. If "CI" cable is to be installed in raceway it shall be so tested. CI cable that has been tested in a raceway will be specified in the system listing.

Each design of fire resistive cable is tested per ANSI/UL 2196. One-conductor and multi-conductor constructions are tested separately, as well as shielded or unshielded, and stranded or solid conductors. The system contains the construction details of the tested configuration. The minimum conductor size, minimum number of conductors, UL Type, voltage rating, etc. are construction details that are also provided. Cables are UL Listed to a National Electrical Code Type and constructed to a UL standard for the cable (such as Type MC per UL 1569, Type RHH/RHW to UL 44, Type FPL per UL 1424, Type NPLF per UL 1425, Type MI per CSA 124 and Type TC per UL 1277).

Cables are tested as a complete system. The system includes the cable or raceway support, couplings, boxes/conduit bodies, optional splices, vertical supports, grounds, pulling lubricants, cable tray, etc. Cable or raceway supports need to hold the cable in place during the fire and hose stream. The hardware, clamps, strut, etc. are generally stated to be made of steel.

Systems that require a raceway are to be tested with the minimum raceway diameter and the minimum raceway type with their respective coupling(s). Raceways having larger diameters are acceptable. Raceways with greater wall thickness are also acceptable. Intermediate Metal Conduit (IMC) or Rigid Metal Conduit (RMC) are acceptable for use in systems where Electrical Metallic Tubing (EMT) is specified. The raceway must be connected together using the coupling type listed in the system, such as steel setscrew type for EMT or threaded types of coupling for IMC and RMC. No other coupling shall be used unless noted in the specific system. As an example, a compression coupling shall not be used in place of steel setscrew coupling for EMT unless otherwise specified in the system.

If a box, conduit body, supports (such as a grip), splice or other components are tested, it will be noted in the system. Otherwise, hourly fire rating applies only to continuous lengths of cable and/or raceway with couplings passing completely through a fire zone and terminating a minimum of 12 inches beyond the fire rated wall or floor bounding the fire zone. For systems installed in a raceway, the National Electrical Code (NEC) requires not more than 360 degrees of bends without a pull point (such as conduit bodies or boxes). Therefore, for most practical installations, a conduit body or a box will be required. Items such as conduit bodies and boxes, if found acceptable, will be described in the system. Since boxes are tested with a single raceway, each individual raceway shall have an independent box used for pull points or splices. If a splice is tested, it will also be listed in the system. Boxes shall be sized per the method described in the NEC.

The supports are an important part of the systems and each individual system has specific support requirements. The maximum distance between the supports is listed in the individual systems and should not be exceeded even if an alternative raceway is used. As an example, if 5 feet spacing between supports is specified for EMT, this same support distance shall be used with any other raceway (IMC, RMC, etc), unless stated otherwise in the system or a lesser support spacing is specified in the NEC .

The type of support and the distance between the steel supports is unique to that specific system and is for all sizes/types of cable and/or conduits/raceways unless otherwise noted in a specific system. Support of tray should also be the same as the raceway spacing unless otherwise noted.

The support requirements are for both the horizontal and vertical configuration unless otherwise noted in a specific system. The supports for both the vertical or horizontal configuration are intended to be the support to the cable/conductor. Cables installed in a vertical raceway are not supported by the raceway. This is in contrast to a MI or MC cable, where a support on the outside of the cable also supports the conductors. The ability of cable to support the equivalent cable weight of the distance specified in Table 300.19 of the NEC (or a lesser distance), with out breaking the conductor, and compatibility/mechanical considerations of the

support mechanism may be evaluated in the test by simulating the weight of the vertical cable run. When so evaluated, the vertical distance tested and the support mechanism are detailed in the system.

Compatibility of materials used in fire rated systems is also a concern. Some materials can provide carbon residue that is conductive, or conductive gasses that can cause premature failure. A dedicated raceway is the required configuration unless otherwise noted in the system (such as the option of bare ground wires, or insulated ground wires). The bare or insulated ground wire may be of special manufacture to be compatible with system. The system will specify the manufacturer of an allowable ground wire. If not specified, the ground shall be the same as the fire rated wire listed in the system. Use of any other ground wire violates the system fire rating. As an example, THHN ground wire shall not be used with a fire rated system unless specified in the system. Also, a standard bare ground wire may lose strength in a fire, whereas a fire rated bare ground wire will not. If a pulling lubricant has been tested with the system, it will be so noted in the system.

These systems shall be installed in accordance with all provisions of the National Electric Code and as amended by the details of each individual system (such as type of supports and distance between supports).

ADDITIONAL INFORMATION

Authorities Having Jurisdiction should be consulted as to the specific requirements covering the installation and use of these classified systems. System components identified by an (*) in the description text are Classified under the Classification and Follow-Up Service of Underwriters Laboratories Inc. Such components and names of manufacturers who are authorized to apply the Classification Mark are identified under the specific product category.

For additional information, see Fire Resistance Ratings (BXRH)

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LOOK FOR THE UL MARK ON PRODUCT