



## **2 Hour Fire Resistive Circuit Integrity Cable with Hose Stream**

***Installation Guide for 18, 16, 14 & 12 AWG  
2 Hour Rated Fire Resistive Applications***



**UL 105°C Type FPLR-CI-LS, CMR-CI-LS,  
CL3R-CI-LS or FPLR-LS, CMR-LS, CL3R-LS  
CSA FAS105**

**For use in Electrical Circuit Integrity  
System FHIT .40A & FHIT7 .40A  
R27557, (72v)**



Thank you for purchasing 2 hour fire-rated cable from RATH®. We are the largest Emergency Communication Manufacturer in North America and have been in business for over 35 years.

We take great pride in our products, service, and support. Our Emergency Products are of the highest quality. Our experienced customer support teams are available to remotely assist with site preparation, installation, and maintenance. It is our sincere hope that your experience with us has and will continue to surpass your expectations.

Thank you for your business,

*The RATH® Team*

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## **SCOPE**

2 Hour Fire Resistive Circuit Integrity Cable is a unique cable which offers superior fire endurance capabilities along with the well-established benefits and features associated with NEC Type FPLR-CI-LS, CMR-CI-LS, CL3R-CI-LS, and CEC CSA Type FAS 105 cable designs. This cable is specifically designed to meet the circuit integrity requirements in NFPA 72 National Fire Alarm and Signaling Code, CSA C22.2 No. 208-14 Fire Alarm and Signal Cable as well as other low voltage critical circuits in NFPA 70 National Electrical Code.

## **INTRODUCTION**

The following instructions are for the 2 Hour Fire Resistive Circuit Integrity Cables for UL 2196 and ULC-S139 Electrical Circuit Integrity System No. FHIT .40A and FHIT7 .40A with Hose Stream Test. The National Electrical Code, Canadian Electrical Code, and all applicable rules and regulations, including federal, state, or provincial, local, and municipal or territorial laws should be followed.

## **ELECTRICAL CIRCUIT INTEGRITY SYSTEM FHIT .40A and FHIT7 .40A**

Electrical Circuit Integrity Systems consist of components and materials that are intended to provide protection for specific fire alarm and control wiring systems with respect to the circuit integrity upon exterior fire exposure. The specifications for Electrical Circuit Integrity System No. FHIT .40A and FHIT7 .40A and its assembly are all important details in the development of the ratings.

Ratings apply only to the entire integrity system assembly, constructed using the combination of components specified in the system. Individual components and materials are designated for use in a specific system 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.

The Electrical Circuit Integrity System No. FHIT .40A and FHIT7 .40A 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 integrity system. This is to ensure that the complete electrical integrity system will survive during the fire and hose stream exposure.

The Electrical Circuit Integrity System No. FHIT .40A and FHIT7 .40A is evaluated by the fire exposure and water hose stream test as described in the Standards ANSI/UL 2196 and CAN/ULC-S139. The system contains the construction details of the tested configuration. The conductor size, cable type, and voltage rating, etc. are construction details that are also provided. Cables are listed to NEC and CEC Types and constructed to:

- UL – Type FPLR-CI-LS, FPLR-LS to UL 1424, CL3R-CI-LS, CL3R-LS to UL 13 and CMR-CI-LS, CMR-LS to UL 444/CSA 22.2 No. 214
- CSA – FAS105 to C22.2 No. 208

The Electrical Circuit Integrity System No. FHIT .40A and FHIT7 .40A is tested as a complete system and includes the types of raceway, raceway support, couplings, pulling lubricants, and cable or raceway supports needed to hold the cable in place during the fire and hose stream. The hardware, clamps, struts, etc., unless otherwise noted, are to be made of steel so that the components do not melt in fire.

Systems that require a raceway are to be evaluated for use with the type and size of raceway and couplings with the maximum numbers of cables per diameter raceway trade size. Only the type of raceway and number of cables installed in the raceway per the UL/ULC certification shall be acceptable. The raceway must be connected together using the coupling type listed in the system, such as steel compression or set screw. No other coupling shall be used unless noted in the specific system.

The supports are an important part of the Electrical Circuit Integrity System No. FHIT .40A and FHIT7 .40A, with Hose Stream Test. The maximum distance between the supports is listed in the system and should not be exceeded. 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 unless otherwise noted in a specific system.

The cable was tested in both horizontal with offset configurations and vertical configurations and the support mechanisms are detailed in the system.

Compatibility of support materials used in Electrical Circuit Integrity System No. FHIT .40A and FHIT7 .40A is also a concern. Bare copper should not be in contact with hot dip galvanized cable tray or supports.

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

**Note: Authorities Having Jurisdiction (AHJ) should be consulted in all cases as to the specific requirements covering the installation and use of these classified systems.**

The following instructions are for the 2 Hour Electrical Circuit Integrity System No. FHIT .40A and FHIT7 .40A. These requirements must be followed to maintain the 2 hour rating in a fire-rated area. It is assumed that the cable has been properly sized and the installation properly designed.

### **DESIGN/SYSTEM/CONSTRUCTION/ASSEMBLY USAGE DISCLAIMER**

- Authorities Having Jurisdiction (AHJ) should be consulted prior to construction and in all cases as to the particular requirements covering the installation and use of UL certified products, equipment, system, devices, and materials.
- Fire resistance assemblies and products are developed by the design submitter and have been investigated by UL for compliance with applicable requirements. The published information cannot always address every construction nuance encountered in the field.
- Only products which bear UL/CSA marks are considered certified.

### **INSTALLATION DETAILS**

For cables installed outside of Canada, in non-fire-rated areas, install per the NEC. For cables installed in fire-rated areas, see limits for UL System 40A.

#### **1. WALL OR FLOOR ASSEMBLY\*:**

Minimum 2 hour rated concrete or masonry wall or concrete floor. Opening in wall or floor through which raceway passes is to be sized to closely follow the contour of the raceway. Through opening in a wall or floor shall be fire stopped using an approved firestop system. See Through Penetration Firestop Systems (XHEZ) for presently certified firestop systems.

#### **2. RACEWAY\*- HORIZONTAL AND VERTICAL INSTALLATION:**

**Type EMT-** Allied Tube & Conduit Corp & Columbia-MBF – E-Z Pull™ Brand or Wheatland/Western Tube Co

**Type IMC-** Allied Tube & Conduit Corp or Wheatland/Western Tube Co (Type IMC is not for use in Canada)

#### **VERTICAL & HORIZONTAL – SHIELDED 2 CONDUCTOR CONSTRUCTIONS**

<b>Raceway/Conduit Size</b>	<b>Max # of 14 AWG (solid) in Conduit</b>	<b>Max # of 16 AWG (solid) in Conduit</b>	<b>Max # of 18 AWG (solid) in Conduit</b>
<b>1/2" **</b>	<b>N/A</b>	<b>N/A</b>	<b>1</b>
<b>3/4"</b>	<b>N/A</b>	<b>N/A</b>	<b>2</b>
<b>1"</b>	<b>3</b>	<b>3</b>	<b>4</b>
<b>1-1/4"</b>	<b>5</b>	<b>6</b>	<b>7</b>
<b>1-1/2"</b>	<b>6</b>	<b>8</b>	<b>7</b>
<b>2"</b>	<b>10</b>	<b>10</b>	<b>7</b>

## VERTICAL & HORIZONTAL – NON SHIELDED 2 CONDUCTOR CONSTRUCTIONS

Raceway/ Conduit Size	Max # of 12 AWG (stranded/ solid) in Conduit	Max # of 14 AWG (stranded) in Conduit	Max # of 14 AWG (solid) in Conduit	Max # of 16 AWG (stranded) in Conduit	Max # of 16 AWG (solid) in Conduit	Max # of 18 AWG (solid) in Conduit
1/2" **	1	1	1	1	1	1
3/4"	1	1	1	1	2	2
1"	2	2	3	3	3	4
1-1/4"	4	4	5	5	6	7
1-1/2"	6	6	7	7	8	7
2"	9	10	10	10	10	7

\*\* EMT only, not IMC

**Note:** 2 conductor cables, shielded and unshielded, may be installed within the same raceway when not exceeding the maximum number of cables associated with any of the cable sizes installed within the common raceway, i.e. 12 AWG and 18 AWG cables installed in the same 2 inch raceway are limited to a maximum of 7 cables.

## VERTICAL & HORIZONTAL – SHIELDED MULTI-CONDUCTOR CONSTRUCTIONS

Raceway/Conduit Size- EMT & IMC	Max # of 66120 in Conduit	Max # of 66124 in Conduit	Max # of 66126 in Conduit
3/4"	1	1	1

### 2A. Raceway coupling\* - (not shown)

**EMT-** Thomas & Betts Corp. – Steel (all components) EMT Compression Couplings. Trade size to correspond with the raceway size.

**RACO-** Steel (all components) EMT Compression (1/2-2 inch) or set screw (3/4-2 inch) couplings. Trade size to correspond with the raceway size.

**IMC-** (Type IMC is not for use in Canada) Allied or Wheatland/Western Steel Threaded Couplings. Trade size to correspond with the raceway size.

### 3. FIRE RESISTIVE CABLE:

The 2 hour fire rating applies to cable passing completely through a fire zone and terminating a minimum of 12 inches beyond the fire-rated wall or floor bounding the fire zone. These cables, as identified below, may be installed in the vertical or horizontal orientation.

Type FPLR-CI-LS, CMR-CI-LS, CL3R-CI-LS, and FAS 105 shielded and Type FPLR-CI-LS, CMR-CI-LS, CL3R-CI-LS, and FAS 105 non-shielded cables to be installed as described herein and in accordance with the manufacturer's installation instructions.

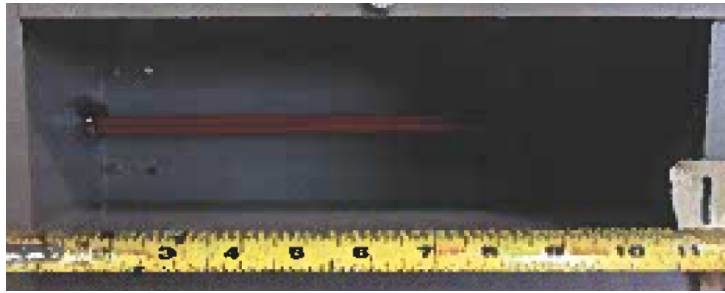
\*Listed and labeled to meet the requirements of the NEC/CEC.

**Horizontal Installation (Figure 1):** Horizontal runs may utilize an enclosure (pull box) within the system. The enclosures have minimum height and depth and maximum width as follows:

\* Listed and labeled to meet the requirements of the NEC/CEC

Figure 1

Raceway Size	Enclosure Size
1/2" - 1"	4" x 4" x 12"
1-1/4" - 1-1/2"	6" x 6" x 12"
2"	6" x 6" x 16"



**Vertical Installation (Figure 2):** Vertical runs require an enclosure (pull box) to be installed at the bottom of the raceway. The bottom raceway must exit through either the back or side wall of the enclosure. Vertical runs may utilize an enclosure (pull box) elsewhere within the system. The cable shall enter and exit through the top and bottom of the enclosure.

For 0.5, 0.75, and 1 inch raceway, the enclosure shall have a minimum dimension of 4 x 4 x 12 inches. For 1.25 and 1.5 inch raceway, the enclosure shall have a minimum dimension of 6 x 6 x 12 inches. For 2 inch raceway, the enclosure shall have a minimum dimension of 6 x 6 x 16 inches. The bottom raceway must exit through either the back or side wall of the enclosure not less than six times the diameter of the raceway (see Figure 3).

Figure 2



Figure 3



For Reference:

Raceway Size	Enclosure Size (Min)	Exit from Top (Min)
1/2" - 1"	4" x 4" x 12"	6"
1-1/4" - 1-1/2"	6" x 6" x 12"	9"
2"	6" x 6" x 16"	12"

**Note:** When installing 12 AWG, 14 AWG, and 16 AWG cables in vertical runs, the maximum distance of unsupported cable shall not exceed 45 feet between vertical cable supports. 18 AWG cable shall not exceed 30 feet between vertical cable supports.

**Vertical Cable Supports (Figure 4):** Vertical runs beyond the maximum distances described above require the cables to be supported using an AMTEC Stainless Steel wire mesh support grip within a vertical enclosure.

The grip must be suspended from a steel bolt or steel hook fastened to the back or side wall of the enclosure (see Figure 5). Ensure the head of the fastener does not block the opening of the raceway or interfere with the cables. For 0.5 – 1.5 inch raceway, the enclosure shall have a minimum dimension of 4 x 4 x 12 inches. For 2 inch raceway, the enclosure shall have a minimum dimension of 6 x 6 x 16 inches.

**Splices (for 2 conductor cables only, optional):** The cables may be installed with a pig tail crimp taped splice using components specified in manufacturer's instructions.

**Figure 4**



**Figure 5**



## **INSTALLATION PER NFPA ARTICLE 760:**

### **760.24(A) General**

Fire alarm circuits shall be installed in a neat workmanlike manner. Cables and conductors installed exposed on the surface of ceiling and sidewalls shall be supported by the building structure in such a manner that the cable will not be damaged by normal building use. Such cables shall be supported by straps, staples, cable ties, hangers, or similar fittings designed and installed so as not to damage the cable. The installation shall also comply with 300.4(D).

### **760.24(B) Circuit Integrity (CI) Cable**

Circuit Integrity (CI) cables shall be supported at a distance not exceeding 610mm (24in). Where located within 2.1m (7ft) of the floor, as covered in 760.53(A) (1) and 760.130(1), as applicable, the cable shall be fastened in an approved manner at intervals of not more than 450mm (18in.). Cable supports and fasteners shall be steel.

**[760.5]** Locate cables so they do not prevent the removal of ceiling panels for access to electrical equipment.

**[760.6]** Install equipment and cabling in a neat and workmanlike manner and support them. If you install cables on the exposed surface of ceilings and sidewalls, support them by the structural components of the building in a manner that prevents damage from normal use. You can secure the cables to structural components by straps, staples, hangers, or similar fittings designed and installed so as not to damage the cable.

If you install cables next to framing members, you must protect them against physical damage from penetration by screws or nails by 1-1/4 in. separation from the face of the framing member or by a suitable metal plate per 300.4(D).

## **APPENDIX**

### **2 HOUR FIRE-RATED CABLING SUPPORTS CRITICAL SYSTEMS SUCH AS:**

- Emergency Voice-Alarm Communication (EVAC) Smoke and Fire Alarm Systems
- Fireman's Telephone and Area of Refuge Communication Systems
- Emergency lighting

### **COMMON APPLICATIONS:**

- Manufacturing, commercial, and industrial locations
- Colleges, banks, hotels, airports, and stadiums
- Healthcare facilities
- Tunnels and subways for emergency communications

### **NOTES:**

- Refer to R27557 fire resistive cable (UL)
- Brand Type FPLR-CI-LS, CMR-CI-LS, and CL3R-CI-LS for use in System No. FHIT .40A and FHIT7 .40A when installed in accordance with the manufacturer's installation instructions
- For use as CI cable when installed per the NEC and local code
- Authorities Having Jurisdiction (AHJ) should be consulted before installation

### **DESCRIPTION:**

2 Conductor Shielded 2 Hour Fire-Rated UL FPLR-CI-LS, CMR-CI-LS, CL3R-CI-LS, C(UL) CMR-LS and CSA FAS 105, cable ANSI/UL 2196 for use in System FHIT .40A, CAN/ULC-S-139 with Hose Stream for use in System FHIT7 .40A, UL Fire Resistance Directory R27557. Certified for use as CI cable (for free air) when installed per the NEC and local code.

Cable is designed to support Life and Fire Safety. This cable offers "survivability" for 2 hours in harsh environments while being fully operational to allow for safe evacuation of building occupants. It has achieved FPLR-CI-LS, CMR-CI-LS, and CL3R-CI-LS rating and UL 2196 guidelines for 2 hour fire resistive cables for use in system FHIT .40A and FHIT7 .40A. In addition, the cable is certified for use in Canada as a c(UL)CMR-LS and CEC Type FAS 105.

### **CONSTRUCTION:**

**Conductors:** 18-14 AWG solid copper specially engineered to minimize embrittlement due to fire exposure

**Tape:** Flame retardant tape

**Insulation:** Low smoke, Zero Halogen Thermoset Fire-Roc™

**Assembly:** Color coded insulated conductors of red and black cabled together

**Shield:** Copper/polyester tape applied over core with a stranded bare copper drain wire

**Jacket:** Red, low smoke, zero halogen polyolefin sequentially marked every two feet



AWG	Stranding	Nominal Diameter in Inches	Nominal Con. DCR $\Omega$ /MFT @ 68F	Nominal Lay Length in Inches	Max Pull Tension Straight Runs in LBS/FT	Min Bend Radius in Inches	Ampacity @ 75° C	Nominal Cap pF/FT	Nominal Weight (lbs)/MFT
14	1	0.353"	2.573	5"	66	4	15.2	25	64
16	1	0.330"	4.091	4.5"	41	4	11	20	60
18	1	0.309"	6.505	4.25"	26	2	8.3	17	49

**COMPLIANCE:**

- NEC type FPLR-CI-LS, CMR-CI-LS, and CL3R-CI-LS for use in Electrical Circuit Integrity System FHIT 40A
- c(UL) CMR-LS
- CEC and CSA listed FAS 105 to C22.2 No. 208-14
- UL to ANSI/UL 2196 2 hour fire rating for use in FHIT system 40A (see UL Fire Resistance Directory R27557)
- CAN/ULC-S139 Certified with Hose Stream Test for use in FHIT7 system 40A
- UL1424 FPLR-CI-LS for Power-Limited Circuit Cables; 300V/105° C
- UL13 CL3R-CI-LS for Power-Limited Circuit Cables; 300V/105° C
- UL 444 CMR-CI-LS for Communication Cable; 300V/105° C
- Fire certified for power-limited system use at 72V phase-to-phase utilization voltage
- Sunlight resistant
- For use in wet locations
- NYC Electrical Advisory Board approval #54502
- California State Fire Marshal Approved