Manufacturer's Instructions for Lifeline® Power Cables

Lifeline® RHW-2 Two-Hour Fire Resistive Cables in EMT Conduit and RTRC XW Phenolic Conduit

Technical Information Sheet #301K

This Technical Information Sheet (TIS) covers Lifeline® RHW-2 Cables: UL Certified and Listed Two Hour Fire Resistive Cable for use in EMT Conduit and RTRC XW Phenolic Conduit

APPLICATIONS

Lifeline® Power Cables have been qualified and listed to the demanding requirements of UL 2196, Fire Test for Circuit Integrity of Fire-Resistive Power, Instrumentation, Control and Data Cables, and are UL Listed as Type RHW-2.

Lifeline® Power Cables meet industry code requirements NFPA 70, NFPA 72, NFPA 101, NFPA 130, and NFPA 502 for installation of fire resistive cable systems when installed according to Electrical Circuit Integrity System No. 25E and applicable federal, state, local, and municipal rules, laws, and regulations. Note that Authorities Having Jurisdiction (AHJ) should be consulted for approval prior to cable purchase and installation.

Lifeline® Power Cables and components are tested and certified as a two-hour fire resistive system at 480 volts utilization in accordance with UL 2196 and listed in FHIT 25E.

REQUIREMENTS

1) **Installation Requirements**
   Selection and installation compliance is dependent on the codes or addenda in effect within the local jurisdiction which cover the use of Lifeline® RHW-2 Cables, Fire Resistive Cables.

2) **UL Electrical Circuit Integrity System No. 25E**
   The most current listing of detailed and supporting information applicable to Lifeline® Cables' fire resistive rating classification can be obtained from the UL Product IQ website by searching for keyword: "FHIT 25E".

3) **Manufacturer's Instructions – TIS #301K**

   All Lifeline® Cable products are covered by specific datasheets and supporting Technical Information Sheets that provide the user with information to properly select and install Lifeline® Cables in a reliable and trouble-free manner. Do not hesitate to contact your Lifeline® Cable representative should you have any questions

INSTALLATION PARAMETERS

1) **a. Raceways and Couplings.** Installations must use either BreathSaver® RTRC XW Phenolic Conduit with BreathSaver ® RTRC XW Phenolic conduit assembly components, or Allied EMT conduit with Raco steel conduit connectors and couplers. When using EMT conduit 2 inches and smaller, set screw type connectors and couplers shall be used. All larger EMT conduit sizes can use either set screw type or compression type.

   b. Boxes. When pull boxes are required, enclosure size shall be in accordance with National Electric Code article 314.28.

   Installations in EMT conduit shall use Wiegmann NEMA 3R steel enclosures. For enclosures 12 inches or less across, Wiegmann series RSC with lift-off screw cover or RHC with hinged cover may be used and enclosures 16 inches or greater across shall use Wiegmann series RHC with hinged cover. Wiegman order model number is comprised of series number prefix followed by two digit height, width, and depth dimensions.

   Examples:

   An installation with 1-1/4 inch EMT requires an enclosure 10 inches across and Wiegmann RSC101004 enclosure shall be used.

   An installation with 3 inch EMT requires an enclosure 24 inches across and Wiegmann RHC242408 enclosure shall be used.

   Installations in RTRC XW Phenolic conduit shall use ResolveOne NEMA 4X or Selco NEMA 4X stainless steel enclosures. ResolveOne 4X JHFX series enclosures shall be used for sizes 12 inches or less across and 4X NEMA Style NFX series shall be used for enclosures 16 inches or greater across. Order model number is comprised of AB-R prefix followed by two-digit height, width, and depth dimensions JHFX or NFX style series, 3 or 4 to describe finish polish, T304 for grade of stainless steel, and HT suffix denoting high temperature gasket. Selco NEMA 4X Fire Rated Enclosures shall be used for all sizes. Order model number is comprised of NE4X prefix followed by two-digit height, width, and depth dimensions, and F suffix denoting fire rated.

   Examples:

   An installation with 1-1/4 inch RTRC XW Phenolic conduit requires an enclosure 10 inches across and ResolveOne AB-R101004JHFX3T304HT or Selco NE4X-101004-F enclosure shall be used.

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c. Vertical Conductor Support. Maximum allowable distance between conductor supports in vertical raceways is 59 feet for sizes up to and including 350MCM. For sizes 400MCM and 500MCM, the maximum allowable distance between conductor supports in vertical raceways is 50 feet and for sizes 600MCM and 750MCM is 40 feet.

In no case shall the values in NEC Table 300.19(A) be exceeded.

d. Pulling Lubricant. When a reduction in pulling friction is needed, Polywater LZ pulling lubricant must be used. No substitute lubricants are allowed. Lifeline® cables shall be installed in dedicated raceway.

e. Mounting. Conduit assemblies shall be secured to a fire rated structure comprised of steel or other fire rated components proven to meet the required fire resistance ratings (i.e. two hours) with concrete or masonry walls. Conduit shall be secured to structure using steel two-piece single-bolt pipe clamps. Clamps shall be 1-1/4 in. wide with minimum thickness of 14-gauge.

f. Support. EMT conduit shall be supported a maximum of every five feet (60 inches) both horizontally and vertically for all conduit sizes. RTRC XW Phenolic conduit shall be horizontally supported a maximum of every five feet (60 inches) for conduit sizes one inch to three and a half inches, and a maximum of every four feet (48 inches) for four-inch conduit, and vertically supported a maximum of every five feet (60 inches) for all conduit sizes. When enclosures are used as pull boxes, two-piece steel clamps shall be used to secure conduit within one foot from enclosure. When RTRC XW Phenolic conduit is used, conduit connectors shall also be secured using two-piece steel clamps.

2) Conduit Sizing

Minimum allowable conduit sizes for installation of Lifeline® RHW-2 cables classified in FHIT.25E are listed in Table 3a and 3b, where the conduit sizes listed shall be used lieu of maximum conduit cross-sectional area requirements of National Electrical Code. Conduit bends shall be equal or greater than minimum conduit bend radius listed in Table 4.

3) Connector Insulating Bushing

When NEMA 3R pull boxes are used, insulating bushings shall be installed inside EMT connectors of all horizontal installations and inside vertical connectors with 250MCM and larger conductors. Insulating bushings consist of flexible silica fabric secured with high temperature glass cloth tape and shall be installed after cable has been pulled into conduit.

Flexible silica fabric of bushing shall be 3 inches long by width listed in Table 1. Prysmian bushing kits include silica fabric and tape required to install bushing. For vertical installation in 4 inch EMT the silica fabric is provided at width needed and does not need to be cut, for all other installations silica fabric needs to be cut to width shown in table 1. Gloves are recommended when cutting or handling silica fabric and a sharp pair of scissors or fabric cutter are required to cut silica fabric. To cut silica fabric lay it flat on clean surface, measure and mark width required in table 1 and cut between next two yarns. No more than one yarn should be allowed to fray at cut.

The installed cables shall be lifted and moved away from nipple internal surface and insulating bushing shall be inserted 2 inches into connector nipple with excess folded over connector nipple threads. Bushings shall be secured in connector nipple by circumferentially wrapping exposed bushing and connector threads with at least three tight layers 3M 69 Glass Cloth tape for horizontal installations and at least five tight layers of 3M 69 Glass Cloth tape for vertical installations. Insulating bushings are available from Prysmian. Order with part number LLIB-400V.

Table 1 – Bushing Width

Trade Size	Horizontal	Vertical
½	1"	N/A
¾	1-3/8"	N/A
1	1-5/8"	N/A
1 ¼	2-¼"	N/A
1 ½	2-½"	N/A
2	3-¼"	6-½"
2 ½	4-3/8"	8-5/8"
3	5-3/8"	10-¼"
3 ½	6"	12"
4	6-7/8"	13-5/8"

4) Raceway Transitions

Raceway transitions between EMT and RTRC XW Phenolic Conduit shall use Stainless Steel NEMA 4X enclosures at the point of transition as described above for use with RTRC XW Phenolic Conduit. The enclosure shall be at least 8 times the trade size of the largest raceway. Raceways shall be secured as described above and EMT connector insulating bushings shall be installed as applicable to each raceway at transition.

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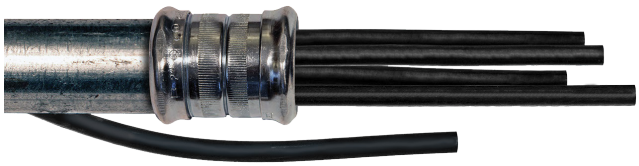

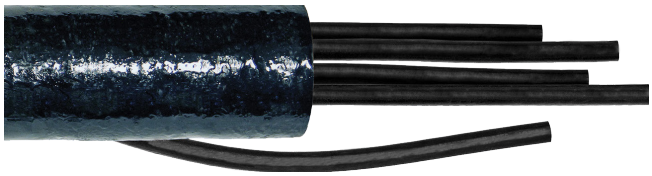

SPECIFICATIONS & RATINGS

- Listed to UL 44, Thermoset Insulated Wires and Cables, as the following type:
- RHW-2, 600 Volt, Rated 90°C Dry/90°C Wet
- Classified to UL 2196, Standard for Tests for Fire Resistive Cables. FRR two-hour 480V utilization
- Electrical Circuit Integrity System (FHIT) No. 25E of the UL Fire Resistance Directory.
- FT4-ST1 12AWG and larger
- VW1 all sizes
- NFPA 70, NFPA 72, NFPA 101, NFPA 130 and NFPA 502

DESIGN PARAMETERS

CONDUCTORS: Bare stranded copper, 14 AWG through 750kcmil

FIRE BARRIER: High Temperature Mica Tapes

INNER INSULATION: Ceramifiable silicone, Low Smoke Zero Halogen (LSZH)

OUTER INSULATION: Cross-linked polyolefin (XLPO), Low Smoke Zero Halogen

IDENTIFICATION:
ORIGIN USA PRYSMIAN MA P/N [######] [X]AWG ([Y] mm²)
LIFELINE (UL) RHW-2 600V FT4 ST1[1] VW1 (UL) 2196 FHIT25E FRR 2 HR 480V UTILIZATION ([mm]/[yr]) [2ft]

Notes: [#] is cable part number
[X] is cable size in AWG or kcmil
[Y] is cable size in mm²
[1] FT4 ST1 12AWG and larger

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Table 2 – Cable Description

LIFELINE® Part Number	Conductor Size AWG /MCM	Number of Strands	Insulation Thickness in (mm)	Overall Diameter in (mm)	Approximate Weight lbs/Mft (kg/km)	Ampacity* 75°C Amps	Ampacity* 90°C Amps
H30061	14	7	0.045 (1.1)	0.20 (5.0)	30 (45)	20**	25**
H30062	12	7	0.045 (1.1)	0.22 (5.5)	37 (55)	25**	30**
H30063	10	7	0.045 (1.1)	0.24 (6.1)	52 (77)	35**	40**
H30064	8	7	0.060 (1.5)	0.31 (7.7)	84 (125)	50	55
H30065	6	7	0.075 (1.9)	0.38 (9.5)	129 (192)	65	75
H30066	4	7	0.075 (1.9)	0.42 (10.7)	185 (275)	85	95
H30067	3	7	0.075 (1.9)	0.45 (11.4)	224 (333)	100	115
H30068	2	7	0.075 (1.9)	0.48 (12.2)	269 (400)	115	130
H30069	1	19	0.100 (2.5)	0.57 (14.5)	364 (542)	130	145
H30070	1/0	19	0.100 (2.5)	0.61 (15.5)	441 (656)	150	170
H30071	2/0	19	0.100 (2.5)	0.65 (16.6)	535 (796)	175	195
H30072	3/0	19	0.100 (2.5)	0.70 (17.9)	656 (976)	200	225
H30073	4/0	19	0.100 (2.5)	0.76 (19.3)	803 (1195)	230	260
H30074	250	37	0.130 (3.3)	0.87 (22.0)	987 (1469)	255	290
H31501	300	37	0.130 (3.3)	0.92 (23.3)	1160 (1726)	285	320
H30075	350	37	0.130 (3.3)	0.97 (24.6)	1306 (1943)	310	350
H31496	400	37	0.130 (3.3)	1.01 (25.7)	1500 (2232)	335	380
H30076	500	37	0.130 (3.3)	1.10 (27.8)	1820 (2708)	380	430
H30077	600	61	0.145 (3.7)	1.21 (30.6)	2199 (3272)	420	475
H30078	750	61	0.145 (3.7)	1.31 (33.1)	2699 (4016)	475	535

* Ampacities are based on Table 310.16 of the National Electrical Code (NFPA 70) for 3 current carrying conductors at 30°C ambient.

** Small overcurrent protection limitations per NEC Article 240.4(D): (4) 14AWG – 15 amps, (6) 12AWG – 20 amps, (30) 10AWG – 30 amps.

The above dimensions are approximate and subject to normal manufacturing tolerances. Information subject to change without notice.

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Table 3a – Minimum Allowable Conduit Size EMT Conduit

Conductor Size	Minimum Allowable Conduit Size EMT Conduit									
	Horizontal Installation					Vertical Installation				
	Number of Conductors					Number of Conductors				
	1	2	3	4	5	1	2	3	4	5
14	½	¾	¾	¾	1	½	½	¾	¾	1-¼
12	½	¾	1	1	1-¼	½	¾	¾	1	1-¼
10	½	¾	1	1-¼	1-¼	½	¾	1	1	1-½
8	½	1	1-¼	1-¼	1-¼	½	1	1-¼	1-¼	1-¼
6	¾	1-¼	1-¼	1-½	2	¾	1-¼	1-¼	1-½	2
4	1	1-¼	1-½	2	2	1	1-¼	1-½	2	2
3	1	1-¼	1-½	2	2	1	1-¼	1-½	2	2
2	1	1-½	2	2	2-½ ([1])	1	1-½	1-½	2	2
1	1-¼	2	2	2-½	2-½	1-¼	2	2	2-½	2-½
1/0	1-¼	2	2-½	2-½	3	1-¼	2	2-½	2-½	3
2/0	1-¼	2	2-½	2-½	3	1-¼	2	2-½	2-½	3
3/0	1-½	2	2-½	3	3	1-½	2-½	2-½	3	3-½
4/0	1-½	2-½	2-½	3	3-½	1-½	2-½	3	3	3-½
250	2	2-½	3	3	3-½	2	2-½	3	3	4 (3-½[2])
300	2	2-½	3	3-½	4	2	2-½	3	3-½	(4[3])
350	2	2-½	3	3-½	4	2	2-½	3	3-½	(4[3])
400	2	3	3-½	4	N/A	2	3	3-½	4	N/A
500	2-½	3	3-½	4	N/A	2-½	3	3-½	4	N/A
600	2-½	3-½	4	N/A	N/A	2-½	3-½	4	N/A	N/A
750	2-½	3-½	N/A	N/A	N/A	2-½	3-½	N/A	N/A	N/A

For questions regarding installation and conduit size, including the use of ECG, contact the Lifeline team at Prysmian Cables & Systems USA, LLC na.lifeline@prysmian.com

[1] 2 inch conduit may be used when ground conductor is 8AWG or smaller
[2] 3½ inch conduit may be used when ground conductor is 2AWG or smaller
[3] 4 inch conduit may be used when ground conductor is 1AWG or smaller

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Table 3b – Minimum Allowable Conduit Size RTRC XW Phenolic Conduit

Conductor Size	Minimum Allowable Conduit Size RTRC XW Phenolic Conduit									
	Horizontal Installation					Vertical Installation				
	Number of Conductors					Number of Conductors				
	1	2	3	4	5	1	2	3	4	5
14	1	1	1	1	1	1	1	1	1	1
12	1	1	1	1	1	1	1	1	1	1
10	1	1	1	1	1	1	1	1	1	1
8	1	1	1	1	1-¼	1	1	1	1	1-¼
6	1	1	1-¼	1-¼	1-½	1	1	1-¼	1-¼	1-½
4	1	1	1-¼	1-½	1-½	1	1	1-¼	1-½	1-½
3	1	1	1-¼	1-½	2	1	1	1-¼	1-½	2
2	1	1-¼	1-¼	1-½	2	1	1-¼	1-¼	1-½	2
1	1	1-¼	1-½	2	2-½	1	1-¼	2	2-½	2-½
1/0	1	1-¼	2	2-½	2-½	1	1-½	2	2-½	2-½
2/0	1	1-½	2	2-½	2-½	1	1-½	2-½	2-½	3 (2-½[4])
3/0	1-¼	1-½	2-½	2-½	3	1-¼	2	2-½	3	3
4/0	1-¼	2	2-½	3	3	1-¼	2	2-½	3	3-½
250	1-¼	2-½	3	3	4 (3-½[5])	1-¼	2-½	3	3	4 (3-½[5])
300	1-½	2-½	3	3-½	4	1-½	2-½	3	3-½	4
350	1-½	2-½	3	3-½	(46)	1-½	2-½	3	3-½	(4[6])
400	2	3	3-½	4	4	2	3	3-½	4	4
500	2	3	3-½	4	N/A	2	3	3-½	4	N/A
600	2-½	3-½	4	N/A	N/A	2-½	3-½	4	N/A	N/A
750	2-½	3-½	4	N/A	N/A	2-½	3-½	4	N/A	N/A

For questions regarding installation and conduit size, including the use of ECG, contact the Lifeline team at Prysmian Cables & Systems USA, LLC na.lifeline@prysmian.com

[4] 2-½ inch conduit may be used when ground conductor is 2AWG or smaller
[5] 3½ inch conduit may be used when ground conductor is 2AWG or smaller
[6] 4 inch conduit may be used when ground conductor is 3/0 or smaller

Table 4 – Minimum Allowable Conduit Bend Radius

Trade Size	EMT Conduit Bend Radius	RTRC XW Phenolic Conduit
½	4"	N/A
¾	4-½"	N/A
1	5-¾"	12"
1-¼	7-¼"	12"
1-½	8-¼"	12"
2	9-½"	12"
2-½	10-½"	12"
3	13"	36" Horizontal, 24" Vertical
3-½	15"	24"
4	16"	36"

Scan to Download Documentation

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