

# Manufacturer's Instructions for Lifeline® Power Cables



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

### Technical Information Sheet #301H

BreathSaver is registered trademark of FRE composites

**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 BreathSaver® XW Phenolic Conduit**

#### Applications

Lifeline® Power Cables have been qualified and listed to the demanding requirements of UL 2196, Tests for Fire Resistive Cables, and are UL Listed Type RHW-2.

Lifeline® Power Cables meet various industry code requirements (NFPA 70, NFPA 72, NFPA 101, NFPA 130, and NFPA 502) for fire resistance according to UL Standard 2196 when selected and installed per applicable codes including federal, state, local and municipal rules, laws and regulations as well as Electrical Circuit Integrity System 25C (FHIT 25C). Note that Authorities Having Jurisdiction (AHJ) should be consulted for approval prior to cable purchase and installation.

#### Requirements

##### 1) Codes / Laws / Regulations

Selection and installation compliance is dependent on the applicable issue of any codes or addendums which cover the use of Lifeline® RHW-2 Cables, Fire Resistive Cables.

##### 2) UL Electrical Circuit Integrity System #25C (FHIT 25C)

The most current listing details and supporting information applicable to Lifeline® Cables' fire resistive rating classification can be obtained from UL's UL Product IQ website by searching for keyword: "FHIT 25C".

##### 3) Manufacturer's Instructions – TIS #301H

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) Cable: Lifeline® RHW-2

Code compliant cable certified as two-hours fire resistive with 480 volts utilization per testing according to UL 2196 and listed in FHIT 25C. Appropriate cable selection is required for systems requiring a fire resistive rating.

##### 2) Fire Resistive Cable System

Code compliant conduit system which meets the following requirements:

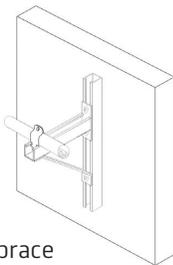
a. Horizontal installations must use either BreathSaver® XW Phenolic Conduit with optional ResolveOne NEMA 4X Enclosures as pull boxes with BreathSaver® XW Phenolic conduit assembly components, or Allied or Western EMT conduit with optional Wiegmann NEMA 3R enclosures as pull boxes with Raco steel compression assembly components. Vertical Installations must use BreathSaver® XW Phenolic Conduit with optional ResolveOne NEMA 4X Enclosures as pull boxes with BreathSaver® XW Phenolic assembly components. EMT and NEMA 3R components are not approved for 2-hour rated vertical installations. Maximum allowable vertical distance is 24 feet. For easier installation Polywater LZ pulling lubricant may be used. No substitute components are allowed and Lifeline cables shall be installed in dedicated raceway.

b. 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). 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 14-gauge for trade sizes 1/2 in. to 2 in., 12-gauge for trade size 2-1/2 in., and 11-gauge for trade sizes 3 in. and larger.

# Manufacturer's Instructions for Lifeline® Power Cables



**Note:** Installations where BreathSaver® XW Phenolic Conduits run parallel to and extend away from the support structure require additional support. In such an installation, the horizontal support members shall be reinforced with a knee brace or equivalent. The drawing to the right shows an example installation with knee brace installed. The knee brace shall be secured to vertical and horizontal structural members using 3/8in. or larger steel bolts. Recommended bracing material is steel at least 1/4 inch thick with cross sectional area 0.3 in.<sup>2</sup> or greater.



c. Maximum support spacing shall be

- EMT conduit shall be supported every five feet (60 inches)
- BreathSaver® XW Phenolic Conduit shall be supported in accordance with National Electric Code article 355.30 with exception that spacing for conduit sizes 2½ and larger shall not exceed 5ft.

d. When enclosures are used as pull boxes, two-piece steel clamps shall be used to secure conduit within one foot from enclosure. When BreathSaver® XW Phenolic Conduit is used conduit connectors shall also be secured using two-piece steel clamps.

### 3) Conduit Sizing

Minimum allowable conduit sizes for installation of Lifeline® RHW-2 cables classified in FHIT.25C are listed in Table 2, 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 3.

### 4) Pull Boxes

If pull boxes are used, enclosure size shall be at least 8 times the raceway trade size in accordance with National Electric Code article 314.28. Installations in EMT conduit shall use Wiegmann NEMA 3R 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 a RHC with hinged cover. Order model number 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.

### 4) Pull Boxes (Continued)

Installation in BreathSaver® XW Phenolic conduit shall use Resolve One Stainless Steel NEMA 4X enclosures. ResolveOne 4X JIC Style 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 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.

#### Examples:

An installation with 1-1/4 inch BreathSaver® XW Phenolic conduit requires an enclosure 10 inches across and ResolveOne AB-R101004JHFX3T304HT enclosure shall be used.

An install installation with 3 inch BreathSaver® XW Phenolic conduit requires an enclosure 24 inches across and ResolveOne AB-R242406NFX3T304HT enclosure shall be used.

Installations using NEMA 4X enclosures shall include an Eaton Crouse-Hinds breather/drain P/N DPE102953 installed on the bottom of pull box enclosure.

### 5) Connector Insulation Bushing

When NEMA 3R pull boxes are installed in applications using EMT conduit, the EMT connector shall have insulating bushing installed after cable has been pulled in. Insulation bushings are flexible silica insulation that is installed under cable and inside connector nipple. The bushing dimensions shall be 3 inches by at least half the connector nipple internal circumference. The installed cables shall be lifted and insulating bushing inserted 2½ inches into connector with ½ inch outside connector folded over connector threads. The bushing shall be secured in connector by circumferentially wrapping connector threads and exposed bushing with at least three layers of 3M 69 Glass Cloth tape. Insulating bushings are available from Prysmian, order part number CUSEMT-DDD, where DDD is conduit trade size

#### Examples:

An installation with 1-1/4 inch EMT requires one kit of CUSEMT-125

An installation with 3 inch EMT requires one kit of CUSEMT-300

### 6) Raceway Transitions

Raceway transitions between EMT and BreathSaver XW® Phenolic conduit shall use Stainless Steel NEMA 4X enclosures described above for use with BreathSaver XW® Phenolic conduit at point of raceway transition. The enclosure shall be at least 8 times trade size of largest raceway. Instructions above to secure raceways and install EMT connector insulation bushings shall be done as applicable to each raceway at transition.

# Lifeline® Power Cables: RHW-2 Fire Resistive Cables in EMT Conduit and BreathSaver® XW Phenolic Conduit

UL 2196 Certified Fire Resistive Cable for Survivability in a Fire



## 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, for two-hours.
- Electrical Circuit Integrity System (FHIT) No. 25C of the UL Fire Resistance Directory for horizontal installations in EMT conduit or BreathSaver® XW Phenolic conduit and vertical installations in BreathSaver® XW Phenolic conduit
- Sunlight Resistant
- FT4 Rated
- ST1
- IEEE 1202
- NFPA 70, NFPA 72, NFPA 101, NFPA 130 and NFPA 502

## DESIGN PARAMETERS

**CONDUCTORS:** Bare stranded copper, 8 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 GROUP MA P/N [#####] [X]AWG ([Y]mm<sup>2</sup>)  
LIFELINE® (UL) RHW-2 600V FT4 ST1 VW1 (UL) 2196 FHIT25C 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 mm<sup>2</sup>



**RoHS  
COMPLIANT**

# Lifeline® Power Cables: RHW-2 Fire Resistive Cables in EMT Conduit and BreathSaver® XW Phenolic Conduit

UL 2196 Certified Fire Resistive Cable for Survivability in a Fire



Table 1 - 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 <sup>1</sup> 75°C Amps	Ampacity <sup>1</sup> 90°C Amps
G30064	8	7	0.060 (1.5)	0.31 (7.8)	84 (125)	50	55
G30065	6	7	0.075 (1.9)	0.37 (9.5)	129 (192)	65	75
G30066	4	7	0.075 (1.9)	0.42 (10.7)	185 (275)	85	95
G30067	3	7	0.075 (1.9)	0.45 (11.4)	224 (333)	100	115
G30068	2	7	0.075 (1.9)	0.48 (12.2)	269 (400)	115	130
G30069	1	19	0.100 (2.5)	0.57 (14.5)	364 (542)	130	145
G30070	1/0	19	0.100 (2.5)	0.61 (15.5)	441 (656)	150	170
G30071	2/0	19	0.100 (2.5)	0.65 (16.6)	535 (796)	175	195
G30072	3/0	19	0.100 (2.5)	0.70 (17.9)	656 (976)	200	225
G30073	4/0	19	0.100 (2.5)	0.76 (19.2)	803 (1195)	230	260
G30074	250	37	0.130 (3.3)	0.86 (21.9)	987 (1469)	255	290
G31501	300	37	0.130 (3.3)	0.92 (23.4)	1160 (1726)	285	320
G30075	350	37	0.130 (3.3)	0.97 (24.7)	1306 (1943)	310	350
G31496	400	37	0.130 (3.3)	1.02 (25.9)	1500 (2232)	335	380
G30076	500	37	0.130 (3.3)	1.10 (27.9)	1820 (2708)	380	430
G30077	600	61	0.145 (3.7)	1.21 (30.6)	2199 (3272)	420	475
G30078	750	61	0.145 (3.7)	1.31 (33.3)	2699 (4016)	475	535

<sup>1</sup> Ampacities are based on Table 310.16 of the National Electrical Code (NFPA 70) for 3 current carrying conductors at 30°C ambient.

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

# Lifeline® Power Cables: RHW-2 Fire Resistive Cables in EMT Conduit and BreathSaver® XW Phenolic Conduit

UL 2196 Certified Fire Resistive Cable for Survivability in a Fire



Table 2 - Minimum Allowable Conduit Size

Conductor Size	Minimum Allowable Conduit Size											
	Horizontal Installation in EMT Conduit - Number of Conductors				Horizontal Installation in XW BreathSaver Conduit - Number of Conductors				Vertical Installation in XW BreathSaver Conduit - Number of Conductors			
	1	2	3	4	1	2	3	4	1	2	3	4
8	1/2	1	1-1/4	1-1/4	3/4	3/4	1	1	3/4	1	1-1/4	1-1/4
6	3/4	1-1/4	1-1/4	1-1/2	3/4	1	1-1/4	1-1/4	1	1-1/2	2-1/2	2-1/2
4	1	1-1/4	1-1/2	2	3/4	1	1-1/4	1-1/2	1-1/4	2	2-1/2	3
3	1	1-1/4	1-1/2	2	3/4	1-1/4	1-1/4	1-1/2	1-1/4	2	2-1/2	3
2	1	1-1/4	1-1/2	2	3/4	1-1/4	1-1/2	1-1/2	1-1/4	2-1/2	3	3
1	1-1/4	2	2	2-1/2	1	1-1/2	2	2-1/2	1-1/2	2-1/2	3-1/2	3-1/2
1/0	1-1/4	2	2-1/2	2-1/2	1-1/4	1-1/2	2-1/2	2-1/2	2	3	3-1/2	3-1/2
2/0	1-1/2	2	2-1/2	3	1-1/4	2	2-1/2	3	2	3	3-1/2	4
3/0	1-1/2	2-1/2	2-1/2	3	1-1/4	1-1/2	2-1/2	2-1/2	2-1/2	3-1/2	4	4
4/0	2	2-1/2	3	3	1-1/4	2	2-1/2	3	2-1/2	3-1/2	4	5
250	2	2-1/2	3	3	1-1/4	2-1/2	3	3	2-1/2	3-1/2	4	5
300	2	2-1/2	3	3-1/2	1-1/2	2-1/2	3	3-1/2	2-1/2	3-1/2	5	5
350	2	2-1/2	3	3-1/2	1-1/2	2-1/2	3	3-1/2	3	3-1/2	5	5
400	2	3	4	4	1-1/2	2-1/2	3-1/2	4	3	4	5	6
500	2-1/2	3	3-1/2	4	2	3	3-1/2	4	2-1/2	3-1/2	5	6
600	2-1/2	3	4	--	2-1/2	3	4	5	3	4	5	5
750	2-1/2	3-1/2	--	--	2-1/2	3-1/2	4	5	3	4	5	6

For questions regarding installation and conduit size, including the use of ECG, contact the Lifeline team at Prysmian Cables & Systems USA, LLC (800) 333-4248 x2600.

Table 3 - Minimum Allowable Conduit Bend Radius

Trade Size	EMT Conduit	XW Breathsaver
1/2	4"	N/A
3/4	4-1/2"	12"
1	5-3/4"	12"
1-1/4	7-1/4"	12"
1-1/2	8-1/4"	12"
2	9-1/2"	12"
2-1/2	10-1/2"	12"
3	13"	24"
3-1/2	15"	24"
4	16"	24"
5	N/A	48"
6	N/A	48"

# FHIT.25C - Electrical Circuit Integrity Systems

## Design/System/Construction/Assembly Usage Disclaimer

- Authorities Having Jurisdiction should be consulted in all cases as to the particular requirements covering the installation and use of UL Certified products, equipment, system, devices, and materials.
- Authorities Having Jurisdiction should be consulted before construction.
- 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.
- When field issues arise, it is recommended the first contact for assistance be the technical service staff provided by the product manufacturer noted for the design. Users of fire resistance assemblies are advised to consult the general Guide Information for each product category and each group of assemblies. The Guide Information includes specifics concerning alternate materials and alternate methods of construction.
- Only products which bear UL's Mark are considered Certified.

## Electrical Circuit Integrity Systems

FHIT - Electrical Circuit Integrity Systems

[See General Information for Electrical Circuit Integrity Systems](#)

### System No. 25C

February 22, 2023

**Fire-Resistive Rating (FRR) - 2 Hr. at 480 VAC line-to-line**

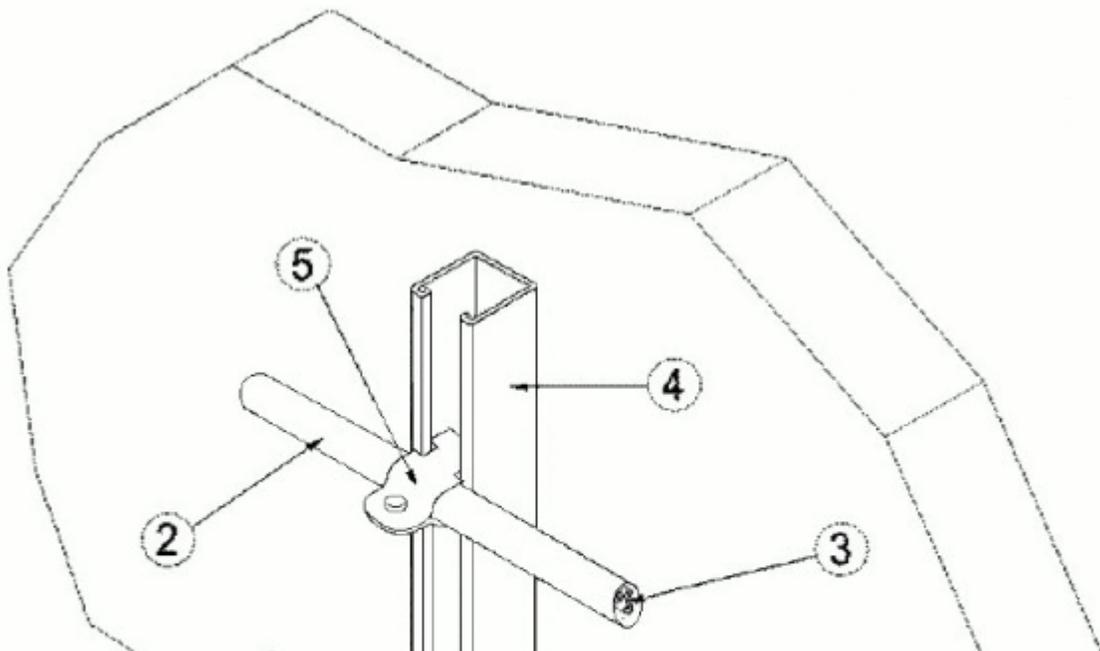


Fig. 1  
Two-piece Single-bolt Pipe Clamp

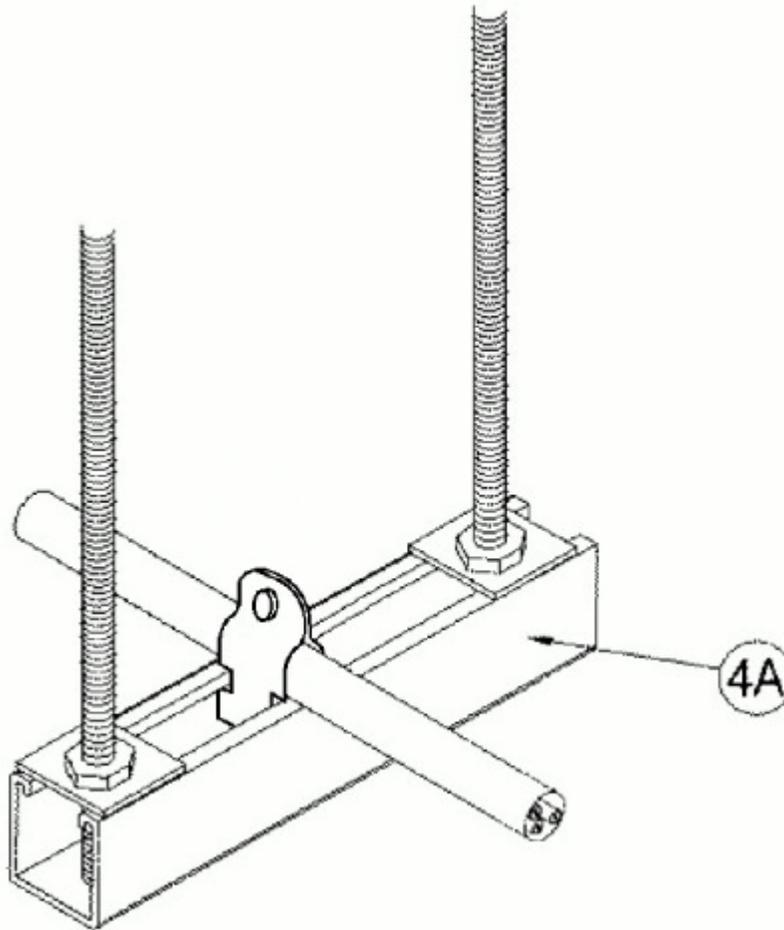


Fig. 2  
Steel Strut Trapeze

1. **Wall or Floor Assembly\*** — Minimum 2 hour fire 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 wall or floor to be firestopped using a compatible firestop system.

See **Through-penetration Firestop Systems** (XHEZ) category for presently Certified firestop systems.

2. **Raceway\*** — Reinforced Thermosetting Resin Conduit. Horizontal or Vertical installation; or EMT type steel conduit. Horizontal installation.

**FRE COMPOSITES INC** — BreathSaver Brand Type XW Conduit and Type XW elbows as follows:

**Minimum XW Raceway Trade Size, in.**

Cable Size, AWG/ kcmil	Horizontal Installation:				Vertical Installation:			
	No. of Cables				No. of Cables			
	1	2	3	4	1	2	3	4
8	3/4	3/4	1	1	3/4	1	1-1/4	1-1/4
6	3/4	1	1-1/4	1-1/4	1	1-1/2	2-1/2	2-1/2
4	3/4	1	1-1/4	1-1/2	1-1/4	2	2-1/2	3
3	3/4	1-1/4	1-1/4	1-1/2	1-1/4	2	2-1/2	3
2	3/4	1-1/4	1-1/2	1-1/2	1-1/4	2-1/2	3	3

1	1	1-1/2	2	2-1/2	1-1/2	2-1/2	3-1/2	3-1/2
1/0	1-1/4	1-1/2	2-1/2	2-1/2	2	3	3-1/2	3-1/2
2/0	1-1/4	2	2-1/2	3	2	3	3-1/2	4
3/0	1-1/4	1-1/2	2-1/2	2-1/2	2-1/2	3-1/2	4	4
4/0	1-1/4	2	2-1/2	3	2-1/2	3-1/2	4	5
250	1-1/4	2-1/2	3	3	2-1/2	3-1/2	4	5
300	1-1/2	2-1/2	3	3-1/2	2-1/2	3-1/2	5	5
350	1-1/2	2-1/2	3	3-1/2	3	3-1/2	5	5
400	1-1/2	2-1/2	3-1/2	4	3	4	5	6
500	2	3	3-1/2	4	2-1/2	3-1/2	5	6
600	2-1/2	3	4	5	3	4	5	5
750	2-1/2	3-1/2	4	5	3	4	5	6

**ALLIED TUBE & CONDUIT CORPORATION** — Type EMT E-Z Pull Brand

**WESTERN TUBE & CONDUIT CORP** — Type EMT

**Minimum EMT Raceway Trade Size, in.**

**Horizontal Installation: No. of Cables**

<b>Cable Size, AWG/ kcmil</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
8	1/2	1	1-1/4	1-1/4
6	3/4	1-1/4	1-1/4	1-1/2
4	1	1-1/4	1-1/2	2
3	1	1-1/4	1-1/2	2
2	1	1-1/4	1-1/2	2
1	1-1/4	2	2	2-1/2
1/0	1-1/4	2	2-1/2	2-1/2
2/0	1-1/2	2	2-1/2	3
3/0	1-1/2	2-1/2	2-1/2	3
4/0	2	2-1/2	3	3
250	2	2-1/2	3	3
300	2	2-1/2	3	3-1/2
350	2	2-1/2	3	3-1/2
400	2	3	4	4

500	2-1/2	3	3-1/2	4
600	2-1/2	3	4	—
750	2-1/2	3-1/2	—	—

2A. **Raceway Coupling\*** — (Not Shown).

**FRE COMPOSITES INC** — BreathSaver Brand Type XW coupling. Trade size to correspond with the type XW raceway size

**RACO** — Steel (all components) EMT Compression Couplings. Trade size to correspond with the EMT raceway size.

3. **Fire Resistive Cables\*** — The hourly 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.

**PRYSMIAN CABLES AND SYSTEMS USA LLC** — Type RHW-2 Lifeline Brand of the following part numbers: G300 followed by 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78; or G31501 or G31496. To be installed as described herein and in accordance with the manufacturer's installation instructions SPL-FPT-0013 (TIS301H) dated Sep 2020, SPL-FPT-0012 dated March 2022.

4. **Supports** — (Figure 1) — Min 12 gauge, by 1-1/2 in. wide or 1-5/8 in wide, painted or unpainted, slotted steel channels with hemmed flange edges. Channel bottom with or without holes. Lengths of slotted steel channels 5 ft and less shall be secured to the wall or floor with a min of two 1/4 in. diameter (or larger) by 2-1/4 in. min long concrete screws, or 1/4 in. diameter (or larger) by 1-3/4 in. long min steel masonry anchors. One screw or anchor to be located at each end of the slotted steel channel. Lengths of slotted steel channel in excess of 5 ft require a min of three screws or anchors, one at each end of the channel and one centrally located within the length of the channel. The supports shall be spaced a maximum of 5 ft. OC. When installing cable(s) in vertical runs, the maximum distance of cable within raceway shall be 24 ft.

4A. **Trapeze-type Supports** — (Figure 2) — The raceways shall be installed on/from trapeze-type supports. The trapeze-type supports shall be secured from the surface of the floor. The supports shall be spaced a maximum of 5 ft. OC.

5. **Clamps** — Steel 1-1/4 in. wide two-piece single-bolt pipe clamps. Size to correspond with the outside diameter of the raceway and as follows: Trade size 3/4-2 in. conduit, min 14-gauge; Trade size 2-1/2 in. conduit, min 12-gauge; Trade size 3 in. and larger conduit, min 11-gauge.

6. **Pulling Lubricant** — (Not Shown) — When installing cables within a raceway, the cables shall be coated with pulling lubricant.  
**AMERICAN POLYWATER CORP** — Polywater LZ

7. **Pull Box** — (Optional Not Shown) — Cables installed in the horizontal or vertical orientation within type XW raceway, or in the horizontal orientation within EMT raceway, may utilize a Resolve One NEMA-4X stainless steel industrial control panel enclosure. Refer to the manufacturer's installation instructions, for additional details.

7A. **Box Connector** — (Not Shown) - For installation with item 7.

**FRE COMPOSITES INC** — BreathSaver Brand Type XW box connector. Trade size to correspond with the type XW raceway size.

8. **Pull Box** — (Optional Not Shown) — Cables installed in the horizontal orientation within EMT raceway may utilize a Wiegmann NEMA-3R steel cutout box enclosure. Refer to the manufacturer's installation instructions, for additional details.

8A. **Box Connector** — (Not Shown) - For installation with item 8.

**RACO** — Steel (all components) EMT Compression Box Connector. Trade size to correspond with the raceway size.

9. **Insulating Bushing** — For installation with item 8A. Prysmian P/N CUSEMT. Refer to the manufacturer's installation instructions, for additional details.

\*Bearing the UL Classification Mark

Last Updated on 2023-02-22

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# SPECIFICATION FOR CERTIFIED BreathSaver® XW FOR CORROSION PROOF 2-HOUR RATED CABLE SYSTEM (UL 2196 | FHIT 25C)

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## SECTION 1: DESCRIPTION & LISTING

### 1.1 Description

This specification outlines the requirements for the design, construction and performance of the Extra Heavy Wall (XW) BreathSaver® Reinforced Thermosetting Resin Conduit (RTRC) and fittings.

### 1.2 Product application & use

Conduits and fittings are Class 1, Division 2 which can be subject to physical damage per NEC®.

### 1.3 Materials

Conduits and fittings shall consist of continuous E or E-CR glass roving in a cured corrosion resistant phenolic resin system pigmented with UV inhibiting carbon black dispersed homogeneously manufactured for use at temperatures ranging from -40 °F (-40 °C) to 1850 °F (1010 °C). No resorcinol resin based system shall be allowed.

Phenolic resin system shall be impervious to a wide spectrum of chemicals. Conduit shall contain no halogens as chlorine and shall not contain other toxic materials in excess of trace levels limits compliant with OSHA requirements.

### 1.4 Joining Method

Each length of conduit is supplied with an integral bell on one end and spigot on the other end. All joints shall be adhesive bonded inside a bell end of even socket depth through out the raceway. Adhesive shall be supplied by the manufacturer of the conduit and shall have a minimum joint pull out load of 1 000 lb, (454 kg) per inch diameter trade size.

### 1.5 Fittings

All fittings, adapters and elbows shall be constructed in the same manner as the conduit (filament wound) and shall have a socket depth and an inside bell design consistent with the conduit.

## SECTION 2: DIMENSIONS

### 2.1 Sizes & wall thicknesses

Conduits and fittings shall be manufactured with nominal wall thicknesses as outlined below:

IPS EXTRA HEAVY WALL (XW)			
Diameter		Wall thickness	
in	mm	in	mm
¾	21	0.250	6.4
1	27	0.250	6.4
1 ¼	34	0.250	6.4
1 ½	41	0.250	6.4
8*	203	0.250	6.4

ID EXTRA HEAVY WALL (XW)			
Diameter		Wall thickness	
in	mm	in	mm
2	53	0.250	6.4
2 ½	63	0.250	6.4
3	78	0.250	6.4
3 ½	91	0.250	6.4
4	103	0.250	6.4
5	129	0.250	6.4
6	155	0.250	6.4

## SECTION 3: REQUIREMENTS

### 3.1 Workmanship

Conduits and fittings shall be free from defects and commercially practicable in color, opacity, density and other physical properties. The exterior surface finish shall be smooth per acceptable industry practices.

### 3.2 Marking

Conduits and fittings shall be marked with a suitable identifying mark printed on the outside of the product. Such marking shall contain:

(1) RTRC (2) for use -40 °F (40 °C) to 1850 °F (1010 °C) (3) trade size (4) manufacturer's name or trademark (5) part number (6) degrees and radii (elbows only) (7) date of manufacture.

### 3.3 Specifications

All Conduits and Fittings are UL listed against UL 2515A following tests made in laboratory by Underwriters Laboratories (UL file #E53373).

Furthermore, products comply with the NFPA 130 as well as NFPA 502 for exposed installations, FT4 rated (CSA). Product identified in Section 2.1 with “\*” is not UL Listed as 8” is not a recognized trade size dimension per National Electric Code (NEC) and Canadian Electric Code (CEC).

## SECTION 4: PRODUCT PROPERTIES & CHARACTERISTICS

4.1 Physical Properties	Test Results	Test Protocol
Glass Content	71% ± 3%	API 15LR
Specific Gravity	1.93 g/cm <sup>3</sup> ± 2	ASTM D792
Barcol Hardness	50 ± 2	ASTM D2583
Water Absorption	≤ 1.5%	ASTM D570 CSA C22.2 No. 2515
U.V. Resistance	> 3 500 Hrs (Xenon Arc)	CSA C22.2 No. 2515
<b>4.2 Flame &amp; Smoke Properties</b>	<b>Test Results</b>	<b>Test Protocol</b>
Flame Spread Index	0 (max: 35)	ASTM E84
Smoke Optical Density @ 4 minutes	1 (max: 200)	ASTM E662
Light Absorption	0% (no smoke generated)	SAV 242
Emissions NO <sub>2</sub>	5 ppm (max: 100 ppm)	SMP 800C
Emissions SO <sub>2</sub>	1 ppm (max: 500 ppm)	SMP 800C
Emissions HCl	< 2 ppm (max: 100 ppm)	SMP 800C
Emissions HF	< 2 ppm (max: 100 ppm)	SMP 800C
Emissions HBr	< 1 ppm (max: 100 ppm)	SMP 800C
Emissions HCN	< 1 ppm (max: 100 ppm)	SMP 800C
Emissions CO	604 ppm (max: 3 500 ppm)	SMP 800C
Emissions CO <sub>2</sub>	9585 ppm (max: 90 000 ppm)	SMP 800C
<b>4.3 Electrical Properties</b>	<b>Test Results</b>	<b>Test Protocol</b>
Dielectric Strength	500 volts/mil (19.68 kV/mm)	ASTM D149
Dielectric Breakdown Voltage	29.7 kV	ASTM D149
<b>4.4 Surface finish</b>		
Exterior (average)	<2000 microinches (50.8 micrometers)	
Interior (average)	<250 microinches (6.4 micrometers)	
Color	Black (standard)	
<b>4.5 Thermal Properties</b>	<b>Test Results</b>	<b>Test Protocol</b>
Coefficient of Thermal Expansion	1.40 E <sup>-5</sup> m./m./°C	ASTM D696
Thermal Conductivity	1.067 Btu.in/ft <sup>2</sup> .h. °F (0.154W/ m.K)	ASTM D335
Thermal Resistivity	0.938°F. ft <sup>2</sup> .h/Btu.in (6.502 mK/W)	ASTM D335
Heat Deflection Temperature (HDT)	>482°F (>250°C)	ASTM D648

## SECTION 5: MANUFACTURER

Conduits and fittings shall be manufactured by FRE Composites. No substitute shall be accepted.

This document is the property of FRE Composites Inc. ("FRE Composites"). It shall not be used, reproduced, copied or transmitted to other persons without written authorization.

# EMT and Color EMT

## Submittal Sheet

Western Tube EMT, made from durable strip steel, brings you quality you can depend on for your projects. Western Tube protects its electric resistance welded EMT from corrosion with an in-line galvanizing process and the application of a special secondary coating. Western Tube EMT is available in trade sizes ½-4, in a variety of colors.

### Listing

Western Tube EMT is UL® Listed to UL-797. It is manufactured in accordance with ANSI® C80.3 and federal specification WW-C-563, and it complies with CSA C22.2 No. 83.1.



### Locations

Western Tube EMT meets the requirements of National Electrical Code® Article 358 for open, concealed and concrete slab installations. It is compatible with all types of building materials.

### Testing

Western Tube performs regular tests of its EMT for weld strength, bendability, plating thickness, all dimensions, and uniform smoothness of the interior coating.

### Coatings

Western Tube EMT is in-line galvanized to prevent chipping, cracking and peeling, and a special transparent secondary coating provides further protection against corrosion.

Additionally, Western Tube applies a special polymer ID coating that has low friction to speed up wire installation.

### Color

Color EMT from Western Tube is constructed the same way and meets the same requirements as our standard EMT, and it is available in red, white, blue, green, yellow, orange, purple and black.

## Standard EMT and Color EMT Weights and Specifications

Trade Size	Metric Designator	Nominal OD	Nominal ID	Nominal Wall Thickness	Nominal Wt. per Foot	Feet in Sub-Bundle	Qty. in Master Bundle	Feet in Master Bundle	Nom. Wt. per Master Bundle	Banding Tape Color
	mm	in.	in.	in.	lbs.	ft.	qty.	ft.	lbs.	
½	16	0.706	0.622	0.042	0.30	100	700	7000	2100	● Black
¾	21	0.922	0.824	0.049	0.46	100	500	5000	2300	● Red
1	27	1.163	1.049	0.057	0.67	100	300	3000	2010	● Blue
1¼	35	1.510	1.380	0.065	1.01	50	200	2000	2020	● Red
1½	41	1.740	1.610	0.065	1.16	50	150	1500	1740	● Black
2	53	2.197	2.067	0.065	1.48	50	120	1200	1776	● Blue
2½	63	2.875	2.731	0.072	2.16	-	61	610	1318	● Black
3	78	3.500	3.356	0.072	2.63	-	51	510	1341	● Blue
3½	91	4.000	3.834	0.083	3.49	-	37	370	1291	● Black
4	103	4.500	4.334	0.083	3.93	-	30	300	1179	● Blue

Master bundle quantities conform to NEMA Standard RN-2. All Western Tube conduit is UL Listed.

## Submittal Information

PROJECT: \_\_\_\_\_ CONTRACTOR: \_\_\_\_\_ DATE: \_\_\_\_\_

ENGINEER: \_\_\_\_\_ SPECIFICATION REFERENCE: \_\_\_\_\_ SYSTEM TYPE: \_\_\_\_\_

LOCATIONS: \_\_\_\_\_ COMMENTS: \_\_\_\_\_

WTE-111617

 2001 East Dominguez Street  
Long Beach, CA 90810  
P 800.310.8823  
F 310.604.9785

westerntube.com  
Follow us on Twitter:  
@WesternTube



# Electrical Metallic Tubing (EMT) and True Color™ EMT



A PART OF **atkore**  
INDUSTRIAL

## E-Z Pull® EMT

- Hot galvanized steel using patented inline Flo-Coat® process for long lasting exterior protection
- E-Z Pull interior coating provides a smooth raceway for fast, easier wire-pulling
- Excellent mechanical protection for conductors
- Ductility for faster and easier bending
- Optimal EMI shielding characteristics
- Listed to Underwriters Laboratories Safety Standard UL 797
- Manufactured in accordance with ANSI C80.3
- Available in sizes 1/2 (16) - 4 (103)

## True Color™ EMT

- All the benefits of E-Z Pull EMT
- Instant identification of multiple circuits
- Fire Alarm® Red EMT
- Healthcare Green EMT
- Data Com Blue EMT
- Available in 8 colors
- Available in sizes 1/2 (16) - 4 (103)

## Quality Electrical Metallic Tubing



## Identify Important Circuits Instantly!



## True Color™ Applications

### Black EMT

- Blends in dark colored areas

### Fire Alarm® EMT

- Emergency circuits
- Fire alarm and Security systems

### Orange EMT

- Construction/research areas
- Fiber optic systems
- Auto repair/maintenance

### Yellow EMT

- High voltage wiring
- Caution areas
- Special equipment

### Green EMT

- Hospital and healthcare areas
- Nurse call stations
- Critical circuits

### Blue EMT

- Low voltage wiring
- Data com/video
- Network security

### Purple EMT

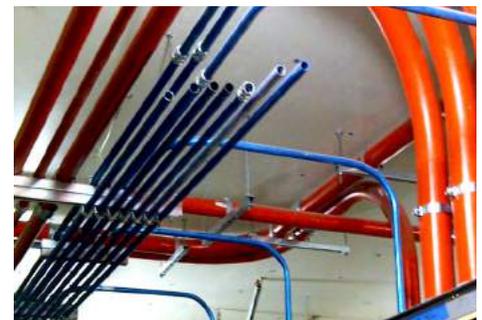
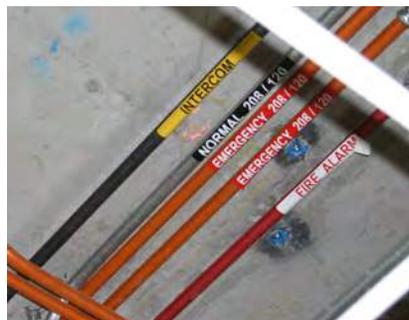
- Specialty wiring systems
- Security systems

### White EMT

- Blends in light colored areas

### Silver EMT

- Standard Use
- Contemporary architecture



## Project Information

Company Name: \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_

State & Zip: \_\_\_\_\_

Phone: \_\_\_\_\_

Project Name: \_\_\_\_\_

City: \_\_\_\_\_

State: \_\_\_\_\_

# Electrical Metallic Tubing (EMT) and True Color™ EMT



A PART OF **atkore**  
INTERNATIONAL

## FEATURES & SPECIFICATIONS

### Manufactured for Long Life

Allied Tube & Conduit® EMT is precision manufactured from high grade mild strip steel for exceptional durability and long-lasting life. Allied EMT is hot galvanized using a patented inline Flo-Coat® process. This process combines zinc, a conversion coating, and a clear organic polymer topcoat to form a triple layer of protection against corrosion and abrasion.

E-Z Pull® EMT combines strength with ductility, providing easy bending, cutting and joining while resisting flattening, kinking and splitting. Available in sizes 1/2 (16) - 4 (103).

### Coatings

Allied's EMT (Electrical Metallic Tubing) has a special low friction ID coating called E-Z Pull that greatly improves the slip properties between conduit and wire. With E-Z Pull EMT, wire pulls through the EMT smoothly and easily, making installation easier and faster.

### EMI Shielding

Allied EMT is very effective in reducing electromagnetic field levels for encased power distribution circuits, shielding computers and other sensitive electronic equipment from the effects of electromagnetic interference. For more information on EMT shielding, visit [www.alliedeg.com](http://www.alliedeg.com) to obtain the **GEMI (Grounding and Electro-Magnetic Interference)** software analysis program.

## Electrical Metallic Tubing (EMT) and True Color™ EMT

Listed to Underwriters Laboratories Safety Standard UL 797  
Manufactured in accordance with ANSI C80.3



Trade Size	Metric Designator	Outside Diameter <sup>1</sup>		Nominal Wall Thickness <sup>2</sup>		Approximate Weight Per 100 Ft. (30.5M)		Red and Galvanized Master Bundle Quantity		True Color** Bundle Qty.	
		in	mm	in	mm	lb	kg	ft	m	ft	m
1/2	16	0.706	17.93	0.042	1.07	30	13.6	7000	2135	3500	1066.8
3/4	21	0.922	23.42	0.049	1.24	46	20.9	5000	1525	2500	762.0
1	27	1.163	29.54	0.057	1.45	67	30.4	3000	915	1500*	457.2
1-1/4	35	1.510	38.35	0.065	1.65	101	45.8	2000	610	2000	609.6
1-1/2	41	1.740	44.20	0.065	1.65	116	52.6	1500	457.5	1500	457.2
2	53	2.197	55.80	0.065	1.65	148	67.1	1200	366.0	1200	365.7
2-1/2	63	2.875	73.03	0.072	1.83	216	98.0	610	186.1	610	185.9
3	78	3.500	88.90	0.072	1.83	263	119.3	510	155.6	510	155.4
3-1/2	91	4.000	101.60	0.083	2.11	349	158.3	370	112.9	370	112.7
4	103	4.500	114.30	0.083	2.11	393	178.3	300	91.5	300	91.5

<sup>1</sup>Outside diameter tolerances: +/- .005 in. (.13mm) for trade sizes 1/2 (16mm) through 2 (53mm);  
+/- .010 in. (.25mm) for trade sizes 2-1/2 (63mm);  
+/- .015 in. (.38mm) for trade size 3 (78mm);  
+/- .020 in. (.51mm) for trade sizes 3-1/2 (91mm) and 4 (103mm).

\*Blue trade size 1 master bundle size: 3000 ft / 915 m  
\*\* Other Color Trade Sizes 2 - 4 are available thru special order  
NOTE: Length = 10 ft. (3.05m) with a tolerance of +/- .25 in. (6.35 mm)

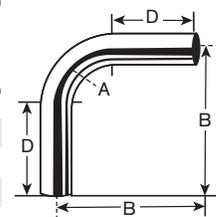
# Electrical Metallic Tubing (EMT) Elbows

## EMT 90° Elbows

Listed to Underwriters Laboratories Safety Standard UL 797  
Manufactured in accordance with ANSI C80.3



Trade Size	Metric Designator	Radius (A) <sup>1</sup>		Offset (B) <sup>2</sup>		Straight (D) <sup>1</sup>		Approximate Weight Per 100 Pieces		Standard Package
		in	mm	in	mm	in	mm	lb	kg	
1/2	16	4	102	5 7/8	149	1 1/2	38	25	11.3	25
3/4	21	4 1/2	114	7	178	1 1/2	38	46	20.9	50
1	27	5 3/4	146	8 3/4	222	1 7/8	48	84	38.1	25
1 1/4	35	7 1/4	184	10 1/8	257	2	51	144	65.3	20
1 1/2	41	8 1/4	210	11 3/4	298	2	51	193	87.5	15
2	53	9 1/2	241	14	356	2	51	296	134.3	10
2 1/2	63	10 1/2	267	16 1/4	413	3	76	504	228.6	1
3	78	13	330	18 3/4	476	3 1/8	79	701	318.0	1
3 1/2	91	15	381	21 1/4	540	3 1/4	83	1047	474.9	1
4	103	16	406	23 3/8	594	3 3/8	86	1310	594.2	1



<sup>1</sup>Minimum requirement as per UL Standard

<sup>2</sup>Dimensions and weights are approximate

Sizes 2-1/2 (63) and larger shipped in palletized cartons or bulk.

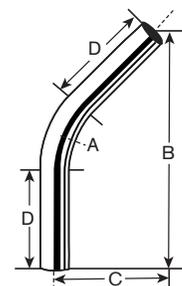
Also available in the following Degrees (60°, 45°, 30°, 22-1/2°, 15° & 11-1/4°)

## EMT 45° Elbows

Listed to Underwriters Laboratories Safety Standard UL 797  
Manufactured in accordance with ANSI C80.3



Trade Size	Metric Designator	Radius (A) <sup>1</sup>		Offset (B) <sup>2</sup>		Offset (C) <sup>2</sup>		Straight (D) <sup>1</sup>		Approximate Weight Per 100 Pieces		Standard Package
		in	mm	in	mm	in	mm	in	mm	lb	kg	
1/2	16	4	102	6 1/8	156	2 1/2	64	1 1/2	38	18	8.2	25
3/4	21	4 1/2	114	7 3/8	187	3 1/8	79	1 1/2	38	33	15.0	50
1	27	5 3/4	146	8 3/4	222	3 5/8	92	1 7/8	48	56	25.4	25
1 1/4	35	7 1/4	184	10 1/8	257	4 1/8	105	2	51	97	44.0	20
1 1/2	41	8 1/4	210	13 1/8	333	5 3/8	137	2	51	145	65.8	15
2	53	9 1/2	241	13 1/8	333	5 1/2	140	2	51	185	83.9	10
2 1/2	63	10 1/2	267	17 1/2	445	7 1/4	184	3	76	360	163.3	1
3	78	13	330	17 1/2	445	7 1/4	184	3 1/8	79	438	198.7	1
3 1/2	91	15	381	26 1/8	664	10 7/8	276	3 1/4	83	873	396.0	1
4	103	16	406	26 1/4	667	10 7/8	276	3 3/8	86	983	445.9	1



<sup>1</sup>Minimum requirement as per UL Standard

<sup>2</sup>Dimensions and weights are approximate

Sizes 2-1/2 (63) and larger shipped in palletized cartons or bulk.

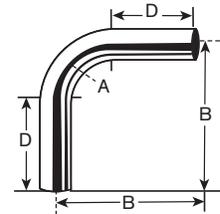
Also available in the following Degrees (90°, 60°, 30°, 22-1/2°, 15° & 11-1/4°)

NOTE: Special orders are non-cancelable, non-returnable and non-refundable

# Electrical Metallic Tubing (EMT) Elbows

## EMT Large Radius 90° Elbows

Listed to Underwriters Laboratories Safety Standard UL 797  
 Manufactured in accordance with ANSI C80.3



Trade Size	Metric Designator	Radius (A)		Offset (B) <sup>2</sup>		Straight (D) <sup>2</sup>		Approximate Weight Per 100 Pieces	
		in	mm	in	mm	in	mm	lb	kg
1	27	12	305	20 5/8	524	8 5/8	219	201	91.2
1	27	15	381	24 1/4	616	9 1/4	235	235	106.6
1	27	18	457	27 7/8	708	9 7/8	251	268	121.6
1	27	24	610	34 5/8	879	10 5/8	270	329	149.2
1	27	30	762	41	1041	11	279	385	174.6
1	27	36	914	46 3/4	1187	10 3/4	273	436	197.8
1	27	42	1067	54	1372	12	305	503	228.2
1	27	48	1219	60 1/4	1530	12 1/4	311	558	253.1
1 1/4	35	12	305	20 5/8	524	8 5/8	219	303	137.4
1 1/4	35	15	381	24 1/4	616	9 1/4	235	354	160.6
1 1/4	35	18	457	27 7/8	708	9 7/8	251	404	183.3
1 1/4	35	24	610	34 5/8	879	10 5/8	270	497	225.4
1 1/4	35	30	762	41	1041	11	279	581	263.5
1 1/4	35	36	914	46 3/4	1187	10 3/4	273	657	298.0
1 1/4	35	42	1067	54	1372	12	305	758	343.8
1 1/4	35	48	1219	60 1/4	1530	12 1/4	311	842	381.9
1 1/2	41	15	381	24 1/4	616	9 1/4	235	406	184.2
1 1/2	41	18	457	27 7/8	708	9 7/8	251	464	210.5
1 1/2	41	24	610	34 5/8	879	10 5/8	270	570	258.6
1 1/2	41	30	762	41	1041	11	279	667	302.6
1 1/2	41	36	914	46 3/4	1187	10 3/4	273	754	342.0
1 1/2	41	42	1067	54	1372	12	305	870	394.6
1 1/2	41	48	1219	60 1/4	1530	12 1/4	311	967	438.6
2	53	15	381	24 1/4	616	9 1/4	235	518	235.0
2	53	18	457	27 7/8	708	9 7/8	251	592	268.5
2	53	24	610	34 5/8	879	10 5/8	270	728	330.2
2	53	30	762	41	1041	11	279	851	386.0
2	53	36	914	46 3/4	1187	10 3/4	273	962	436.4
2	53	42	1067	54	1372	12	305	1110	503.5
2	53	48	1219	60 1/4	1530	12 1/4	311	1233	559.3
2 1/2	63	18	457	27 7/8	708	9 7/8	251	864	391.9
2 1/2	63	24	610	34 5/8	879	10 5/8	270	1062	481.7
2 1/2	63	30	762	41	1041	11	279	1242	563.4
2 1/2	63	36	914	46 3/4	1187	10 3/4	273	1404	636.9
2 1/2	63	42	1067	54	1372	12	305	1620	734.8
2 1/2	63	48	1219	60 1/4	1530	12 1/4	311	1800	816.5

<sup>2</sup>For information only, not a requirement as per UL Standard  
 Sizes 2-1/2 (63) and larger shipped in palletized cartons or bulk.  
 Also available in the following Degrees (60°, 45°, 30°, 22-1/2°, 15° & 11-1/4°)

Chart continued on the next page

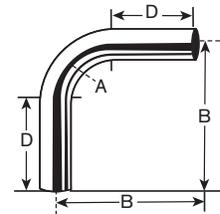
# Electrical Metallic Tubing (EMT) Elbows

## EMT Large Radius 90° Elbows (continued)

Listed to Underwriters Laboratories Safety Standard UL 797  
 Manufactured in accordance with ANSI C80.3



Trade Size	Metric Designator	Radius (A)		Offset (B) <sup>2</sup>		Straight (D) <sup>2</sup>		Approximate Weight Per 100 Pieces	
		in	mm	in	mm	in	mm	lb	kg
3	78	15	381	24 1/4	616	9 1/4	235	921	417.8
3	78	18	457	27 7/8	708	9 7/8	251	1052	477.2
3	78	24	610	34 5/8	879	10 5/8	270	1293	586.5
3	78	30	762	41	1041	11	279	1512	685.8
3	78	36	914	46 3/4	1187	10 3/4	273	1710	775.7
3	78	42	1067	54	1372	12	305	1973	895.0
3	78	48	1219	60 1/4	1530	12 1/4	311	2192	994.3
3 1/2	91	18	457	27 7/8	708	9 7/8	251	1396	633.2
3 1/2	91	24	610	34 5/8	879	10 5/8	270	1716	778.4
3 1/2	91	30	762	41	1041	11	279	2007	910.4
3 1/2	91	36	914	46 3/4	1187	10 3/4	273	2269	1029.2
3 1/2	91	42	1067	54	1372	12	305	2618	1187.5
3 1/2	91	48	1219	60 1/4	1530	12 1/4	311	2908	1319.1
4	103	24	610	34 5/8	879	10 5/8	270	1932	876.4
4	103	30	762	41	1041	11	279	2260	1025.1
4	103	36	914	46 3/4	1187	10 3/4	273	2555	1158.9
4	103	42	1067	54	1372	12	305	2948	1337.2
4	103	48	1219	60 1/4	1530	12 1/4	311	3275	1485.5



<sup>2</sup>For information only, not a requirement as per UL Standard  
 Sizes 2-1/2 (63) and larger shipped in palletized cartons or bulk.  
 Also available in the following Degrees (60°, 45°, 30°, 22-1/2°, 15° & 11-1/4°)

NOTE: Special orders are non-cancelable, non-returnable and non-refundable

## COMPRESSION CONNECTORS - STEEL



Uninsulated Throat  
Connectors

UNINSULATED CATALOG #	TRADE SIZE	UNIT CARTON QTY.	SHIP CARTON QTY.	BAR CODE
<b>Compression Connectors – Steel</b>				
2902	1/2"	50	500	—
2902-8	1/2"	1	25	
2903	3/4"	25	250	—
2903-8	3/4"	1	20	
2904	1"	25	100	—
2904-8	1"	1	10	
2905	1-1/4"	5	25	—
2906	1-1/2"	—	20	—
2908	2"	—	20	—
2940	2-1/2"	—	5	—
2942	3"	—	1	—
2944	3-1/2"	—	1	—
2946	4"	—	1	—

### APPLICATIONS

- For use when bonding EMT conduit to a box or enclosure
- RACO® 1/2" to 4" connectors provide concrete-tight connections
- RACO® compression connectors are suitable for applications above 600V

### PRODUCT FEATURES

- All steel construction ensures mechanical protection for the raceway
- All components are zinc-electroplated for corrosion protection
- UPC bar coded fittings are individually polybagged with a preprinted UPC-A bar code and packaged in pre-scored tear top cartons for attractive presentation

### COMPLIANCE

- - Standard 514B  
C22.2 # 1  
UL Listed E195970

## COMPRESSION COUPLINGS - STEEL



Couplings

### APPLICATIONS

- For use in dry locations to couple two ends of EMT conduit
- RACO® steel compression couplings provide concrete-tight connections
- RACO® compression couplings are suitable for applications above 600V

### PRODUCT FEATURES

- All steel construction ensures mechanical protection for the raceway
- All components are zinc-electroplated for corrosion protection
- UPC bar coded fittings are individually polybagged with a preprinted UPC-A bar code and packaged in pre-scored tear top cartons for attractive presentation

### COMPLIANCE

- - Standard 514B  
C22.2 # 18  
UL Listed E195970

CATALOG #	TRADE SIZE	UNIT CARTON QTY.	SHIP CARTON QTY.	BAR CODE
<b>Compression Couplings – Steel</b>				
2922	1/2"	50	500	—
2922-8	1/2"	1	25	
2923	3/4"	25	250	—
2923-8	3/4"	1	15	
2924	1"	25	100	—
2924-8	1"	1	10	
2925	1-1/4"	5	25	—
2926	1-1/2"	—	20	—
2928	2"	—	20	—
2950	2-1/2"	—	5	—
2952	3"	—	1	—
2954	3-1/2"	—	1	—
2956	4"	—	1	—

# Redapt DPE increased safety (Exe) breather/drains

Cl. I, Zone 1, Ex e II  
IECEX/ATEX  
NEMA 4X  
IP66

5F  
5F

## Features:

- International Ex approvals
- IP66, CSA enclosure type (NEMA) 4X
- Available in two thread lengths: 10mm two drain holes or 15mm three drain holes
- Available in brass, stainless steel and glass-filled nylon
- Metric and NPT threads available

## Certifications and compliances:

### Code of protection categories:

- ATEX: I M2/II 2 GD, Ex e I/II Mb Gb, Ex tb IIIC Db IP66; nylon: II2GD, Ex e IIGb Ex tb IIIC Db IP66
- IECEX: Ex e I/II Mb/Gb, Ex tb IIIC Db IP66; nylon: Ex e IIC Gb, Ex tb Db IP66
- EAC: ExelU nylon, ExellU IP66
- CSA: Class I, Zone 1, Ex e II IP66, CSA enclosure type 4X (NEMA 4X)

### Compliance standards:

- ATEX: EN 60079-0, EN 60079-7, EN 60079-31
- IECEX: IEC 60079-0, IEC 60079-7, IEC 60079-31
- CSA: CSA standard C22.2 No. 0-M, CSA standard C22.2 No. 0.5, CSA standard C22.2 No. 94, CAN/CSA E79-7-95, UL2279

### Certificate details:

- ATEX: ITS16 ATEX101338X
- IECEX: IECEX ITS 16.0014X
- EAC: TR RU C-GB.GB06.B.00106
- CSA: 185887-2500003408 (LR106084)

## Standard materials:

- Brass CZ121
- 316 stainless steel
- Aluminum
- Glass-filled nylon

## Plating options:

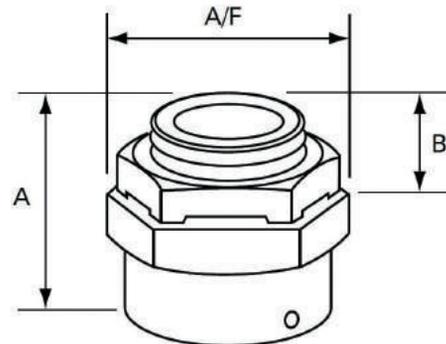
- Electroless nickel
- Zinc
- Others on application

## Temperature ratings:

- Metallic body dependent on filter and seal material
- Nylon body: -50°C to +125°C, unless limited by filter material
- HDPE filter: -50°C to 85°C
- Metallic filter dependent on body and interface material
- Nitrile: -30°C to +100°C (supplied as standard)



## Dimensions (in inches):



Size	A/F	Minimum overall length (A)	Minimum thread length (B)
M20	1.13	0.91	0.39
M25	1.37	0.91	0.39
M32	1.63	0.91	0.39
1/2" NPT	1.13	1.10	0.59
3/4" NPT	1.37	1.10	0.59
1" NPT	1.63	1.10	0.59

# Redapt DPE increased safety (Exe) breather/drains

Cl. I, Zone 1, Ex e II  
IECEX/ATEX  
NEMA 4X  
IP66

## Ordering information:

Part number example  
DPE3029S3

# DP

# E

# 3

# 0

# 29

# S3

### Certification

<b>E</b>	Exe I and IIC
----------	---------------

### Material

<b>1</b>	Brass
<b>3</b>	Stainless steel
<b>4</b>	Glass-filled nylon <sup>A</sup>

### Plating

<b>0</b>	Unplated
<b>1</b>	Electroless nickel
<b>2</b>	Zinc

### Thread type

<b>04</b>	M20
<b>05</b>	M25
<b>06</b>	M32
<b>29</b>	½" NPT
<b>30</b>	¾" NPT
<b>31</b>	1" NPT

### Thread length

<b>S1</b>	10mm, 2 holes, with castellated locknut
<b>S2</b>	10mm, 2 holes, without castellated locknut
<b>S3</b>	15mm, 3 holes, with castellated locknut
<b>S4</b>	15mm, 3 holes, without castellated locknut

**Note:** NPT threaded breather/drains are only available in S3 and S4 options.



POLYWATER® LZ PERFORMANCE LUBRICANT

**DESCRIPTION**

Polywater® LZ Lubricant is a high-performance, cable pulling lubricant. Polywater LZ is compatible with a broad variety of LSZH/LSHF compounds. Polywater LZ is also compatible with other high-performance cable jackets. It provides excellent tension reduction and is recommended for all types of cable pulling.

Polywater LZ is slow drying and leaves a thin, slippery film that retains its lubricity for months after use. Polywater LZ does not sustain flame when used with fire-retardant cables and systems. Its dried residue is nonconductive and noncombustible.

Polywater LZ is a stringy gel. It can be applied by hand or using Polywater’s LP-D5 Pump. It is also available in the unique Front End Pack™ prelubrication bags.

**FRICITION TESTING**

**Lubricity:** Polywater LZ shows superior friction reduction on a variety of jacket types. Typical friction coefficients at 200 lbs/ft (2.91 kN/m) normal pressure are shown. Test results are based on the method described in the white paper, “Coefficient of Friction Measurement on Polywater’s Friction Table, 2007” ([polywater.com/FTable.pdf](http://polywater.com/FTable.pdf)). Values are averages based on cable jacket and conduit materials from multiple manufacturers.

CABLE JACKET	CONDUIT TYPE				
	STEEL	FRP	HDPE	PVC	EMT
LSZH	.16	.17	.07	.08	.21
CSPE	.21	.24	.12	.16	.24
CPE	.15	.19	.09	.10	.17
XLPE	.13	.12	.06	.06	.12
LLDPE	.10	.11	.05	.06	.13

Coefficient of friction data on additional or specific cable jackets or conduits can be obtained from American Polywater Corporation.



*Polywater LZ is a specification grade lubricant*

**PRODUCT FEATURES**

- **Low Friction Coefficient:** Maximum tension reduction on all types of cable jackets.
- **Universal:** Suitable for all types of jackets and cable, including power, control, and instrumentation cable.
- **Low-Smoke Zero Halogen (LSZH/LSHF) Compatible:** Extensively tested on LSZH/LSHF thermoplastic and thermoset jackets.

**END USE**

Polywater LZ is a specification grade lubricant that meets the performance requirements of:

- Nuclear and other generation plants
- Mass transit systems and airports
- Oil and petrochemical

**OFFICIAL APPROVALS**

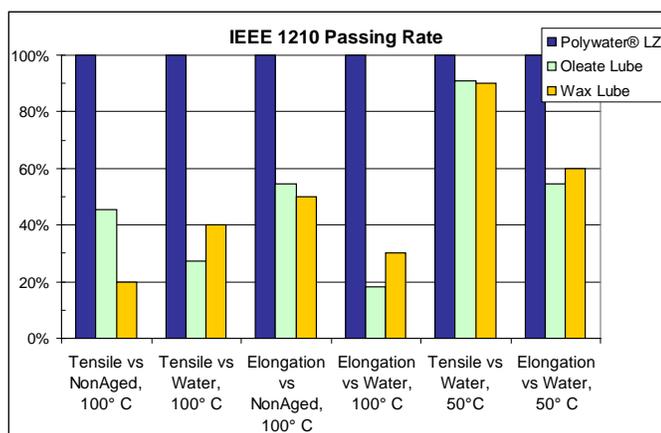
UL Listed  
 UL Listed to Canadian safety standards

## CABLE COMPATIBILITY

### Tensile and Elongation:

LSZH, CSPE, LLDPE, XLPE, CPE, and PVC cable jacket materials aged in Polywater Lubricant LZ per IEEE Standard 1210<sup>1</sup> meet the tensile and elongation retention requirements of that standard.

Modern LSZH jackets are numerous and vary significantly in formulation. Polywater LZ shows broad compatibility with this jacket technology. As shown in the graph below, the common cable pulling lubricants available through local supply houses show significant and sometimes devastating effects on LSZH cable jackets.



### Polyethylene Stress Cracking:

Polywater LZ shows no stress cracking on LDPE, MDPE, or HDPE cable jackets when tested per IEEE Standard 1210<sup>1</sup>.

### Volume Resistivity:

There are no significant changes in the conductive properties of XLPE and EPR semi-conducting compounds when volume resistivity is tested according to IEEE Standard 1210<sup>1</sup>.

### Building Wire Testing:

THHN and XLPE building wire meet UL tensile, elongation, and voltage withstand requirements after exposure to Polywater LZ as tested by UL requirements<sup>2</sup>.

### Cable Approvals:

Polywater LZ is approved by many cable manufacturers. Contact American Polywater for details.

<sup>1</sup> IEEE Std 1210-2004; IEEE Standard Tests for Determining Compatibility of Cable-Pulling Lubricants with Wire and Cable.

<sup>2</sup> UL Subject 267, Investigation for Wire-Pulling Compounds.

## PHYSICAL PROPERTIES

PROPERTY	RESULT
Appearance	White, stringy gel
% Nonvolatile solids (weight)	4.0
VOC content	0 gms/L 200 gms/L (Winter Grade)
Viscosity (Brookfield)	35,000–50,000 cps @10 rpm
pH	6.5–7.5

## PERFORMANCE PROPERTIES

### Cling Factor:

*Cling factor is a measure of the ability to apply the lubricant and have it stay on the jacket while the cable enters the conduit.*

A six-inch length (152 mm) of a one-inch (25 mm) diameter cable will hold at least 35 grams of Polywater LZ for one minute when held vertically at 70°F (21°C).

### Coatability:

*Coatability is a measure of the lubricant's ability to coat the jacket as a thin film for continued lubricity on longer pulls.*

Polywater LZ will wet out evenly on cable jacket surfaces. It will not bead up or rub off the jacket sample. A one-inch (25 mm) diameter XLPE cable dipped six inches (152 mm) into Polywater LZ, then withdrawn and held vertically, will retain at least 25 grams of Polywater LZ for one minute at 70°F (21°C).

### Combustibility:

*Combustibility is a measure of combustion properties of the lubricant residue in a fire situation (with an impinging heat flux).*

Polywater LZ has no flash point and its dried residue will not support combustion and spread flame. A 15-gram sample of the Polywater LZ, when placed in a one-foot, split, metal conduit and fully dried for 24 hours at 105°C, will not ignite and spread a flame more than three inches beyond the point of ignition when subjected to a continuous heat flux of 85 kW/m<sup>2</sup>. The total test time was 30 minutes.

Test method described in "Fire Parameters and Combustion Properties of Cable Pulling Compound Residues," presented to the International Wire & Cable Symposium, 1987.

## APPLICATION PROPERTIES

### Application Systems:

Polywater LZ has a stringy gel consistency that makes it easy to lift, carry, and hand apply.

Polywater LZ can also be pumped directly into the conduit or onto the cable using the Polywater LP-D5 specialty lubricant pump. This allows hands-free transfer and consistent application of lubricant. Polywater's low-shear pump will not change the gel character of Polywater LZ. The LP-D5 pump applies lubricant at a rate of 1–2 gallons (4–8 liters) per minute.

Polywater LZ Front End Packs are bag packages that “prelubricate” the head end of the cable during the pull. The Front End Pack attaches to the winch line and prelubricates as it goes through the conduit. Two sizes are available to fit 2” and larger conduits.

Pull-Planner™ Tension Calculation Software is available from Polywater. Pulling tension estimations can ensure the use of appropriate pulling equipment and that the cable is installed within safe limits.

*Polywater LZ is also available in a special-order, pourable version (lower viscosity) called Polywater PLZ.*

### Temperature Use Range:

Polywater LZ:

20°F to 120°F (-5°C to 50°C).

Polywater WLZ (Winter Grade version):

-20°F to 120°F (-30°C to 50°C)

### Temperature Stability:

Polywater LZ will not phase-out or separate after five freeze/thaw cycles or 5-day exposure at 120°F (50°C).

### Cleanup:

Polywater LZ is nonstaining. Complete cleanup is possible with water.

### Storage and Shelf Life:

Store Polywater LZ in a tightly sealed container away from direct sunlight. Lubricant shelf life is 24 months.

## DIRECTIONS FOR USE

Polywater LZ can be hand applied or pumped onto the cable as it enters the conduit.

For long pulls, place approximately two-thirds of the recommended quantity of lubricant into the conduit using the Front End Packs or by pumping.

For Front End Packs use, attach the packs of Polywater LZ to the winch line or pulling rope in front of the cable by using tape or cable ties. Start the pull and slit open the entire length of the pack(s) with a sharp knife as it enters the conduit.

Supplement with direct jacket lubrication as the cable enters the conduit.

Clean up by wiping off any excess lubricant with a rag.

### Recommended Lubricant Quantity:

$$Q = k \times L \times D$$

Where:

Q = quantity in gallons (liters)

L = length of conduit run in feet (meters)

D = ID of the conduit in inches (mm)

k = 0.0015 (0.0008 if metric units)

The quantity that is appropriate for any given pull can vary from this recommendation by 50%, depending on the complexity of the pull. Consider the following factors:

Cable weight and stiffness

*(Increase quantity for stiff, heavy cable)*

Conduit condition

*(Increase quantity for old, dirty, or rough conduits)*

Conduit fill

*(Increase quantity for high percent conduit fill)*

Number of bends

*(Increase quantity for pulls with several bends)*

Pulling environment

*(Increase quantity for high temperatures)*

## MODEL SPECIFICATION

*The statement below may be inserted into a specific job specification to help maintain engineering standards and ensure project integrity.*

The cable pulling lubricant shall be Polywater® LZ Lubricant. The cable pulling lubricant shall provide excellent friction reduction with good cling and wetting through long pulls and multiple bends. The lubricant shall leave minimal, noncombustible residue. It shall be compatible with most cable jacket materials and be extensively tested on a broad variety of low smoke, halogen-free cable jacket materials.

Cable jacket compatibility shall be tested with the specific LSZH jacket material used on the cable. Test data shall be provided by the cable manufacturer or the lubricant manufacturer. It shall not stress crack polyethylene per ASTM Standard 1693. There shall be no significant changes in the conductive properties of XLPE and EPR semi-conducting compounds when the lubricant's effect on volume resistivity is tested according to IEEE Standard 1210.

A 15-gram sample of the lubricant, when placed in a one-foot, split metal conduit and fully dried for 24 hours at 105 degrees C, shall not spread a flame more than three inches beyond a point of ignition at a continued heat flux of 85 kW/meter<sup>2</sup>. Total time of test shall be 30 minutes.

## ORDER INFORMATION

CAT #	PACKAGE DESCRIPTION
LZ-55	½-gal. bag in a box (1.9 liters) 6/case
LZ-110	½-gal. bag in a pail (1.9 liters) 10/pail
LZ-35	1-qt. squeeze bottle (.95 liter) 12/case
LZ-128	1-gal. pail (3.78 liter) 4/case
LZ-640	5-gal. pail (18.9 liter)
LZ-DRUM	55-gal. drum (208 liter)
	<b>Winter Grade</b>
WLZ-55	½-gal. bag in a box (1.9 liters) 6/case
WLZ-110	½-gal. bag in a pail (1.9 liters) 10/pail
WLZ-35	1-qt. squeeze bottle (.95 liter) 12/case
WLZ-128	1-gal. pail (3.78 liter) 4/case
WLZ-640	5-gal. pail (18.9 liter)

## CONTACT US

1-800-328-9384 Toll Free | 1-651-430-2270 Main | 1-651-430-3634 Fax | email: [support@polywater.com](mailto:support@polywater.com)

**IMPORTANT NOTICE:** The statements here are made in good faith based on tests and observations we believe to be reliable. However, the completeness and accuracy of the information is not guaranteed. Before using, the end-user should conduct whatever evaluations are necessary to determine that the product is suitable for the intended use.

American Polywater expressly disclaims any implied warranties and conditions of merchantability and fitness for a particular purpose. American Polywater's only obligation shall be to replace such quantity of the product proven to be defective. Except for the replacement remedy, American Polywater shall not be liable for any loss, injury, or direct, indirect, or consequential damages resulting from product's use, regardless of the legal theory asserted.

American  
**Polywater**  
Corporation

12/2/2022

### **Lifeline® RHW-2 Insulating Bushing**

The installation of the “Insulating Bushing” is required as part of FHIT 25C, Item 9; and within TIS 301H (Manufacturers Installation Instructions), Item 5.

The Insulation Bushings are only required when installing the Lifeline® RHW-2 system with the approved EMT conduits/connectors. The bushings are designed to be placed inside the inner diameter of the connector from inside an enclosure after the Lifeline® RHW-2 cables have been installed. The purpose of these bushings is to prevent the cable from shorting to the connector during a fire event. Occasionally, during very high temperature fires, EMT conduits can become malleable and begin to sag which creates tension on the cables inside the conduits/enclosures. This added tension may lead to the ceramified insulation on the wires to rub against the connector body as the wires exit (into the enclosure) the connector. Generally, this happens when the wires in the enclosure are bent causing each wire to move to one side of the connector housing. Tension may cause the wire(s) to rub on the connector side they are closest to.

To prevent the remote chance of an electrical short from occurring, Prysmian has selected and tested a woven silica fabric that can withstand extremely high temperatures while providing insulating properties. The approved woven silica fabric (called a tape by the manufacturer) is AVSil Silica Woven Tape Type WT65CH. Prysmian supplies this silica woven “tape” in lengths pre-cut for EMT connector sizes per the catalog numbers below:

<b>Conduit Trade size</b>	<b>Insulating Bushing Cat No.</b>	<b>Bushing Dimensions (in)</b>	
0.5	CUSEMT-050	1	X 3
75	CUSEMT-075	1.3	X 3
1	CUSEMT-100	1.6	X 3
1.25	CUSEMT-125	2.2	X 3
1.5	CUSEMT-150	2.5	X 3
2	CUSEMT-200	3.2	X 3
2	CUSEMT-200	3.2	X 3
2.5	CUSEMT-250	4.3	X 3
3	CUSEMT-300	5.3	X 3
3.5	CUSEMT-350	6	X 3
4	CUSEMT-400	6.8	X 3

While each bushings length is cut per the ID of the connector, the width is constant at 3 inches. This extra width allows for a minimum of ½ inch to overhang past the end of the EMT connector.

To install the bushing, simply wrap the bushing around the exposed cables within the enclosure and slide the bushing fabric 2½ inches into connector with ½ inch outside connector. This may require some movement of the cables to ensure the bushing is in place. Fold the ½ inch excess fabric (outside connector) over the threaded OD of the

connector. The bushing shall be secured to connector by circumferentially wrapping connector threads and exposed bushing with at least three layers of supplied 3M 69 Glass Cloth tape. Completed bushing installation shown below:



Each bushing kit supplied by Prysmian will contain:  
2 each pre-cut silica fabric tape  
1 roll of 3M 69 Glass Cloth tape

**Important Note:** Each CUSEMT-XXX kit is sufficient for 2 EMT connectors!

The following pages will show technical data sheets and safety data sheets for the silica woven tape as well as the 3M 69 Glass Cloth Tape.

A video tutorial on how to apply the Insulating Bushing can be found here: [Link to Video](#)

We remain at your disposal for any clarification.

**Colin Williams**  
Technical Account Manager

**Prysmian**  
Group



PRYSMIAN  
Draka  
General Cable



WHEN THE **HEAT** IS ON, KEEP YOUR COOL WITH **AVS!**

**TDS-13**  
**May 2019**

## **AVSIL® SILICA WOVEN TAPES**

### **Product Description**

**AVSi® WT19, WT180, WT36CH and WT65CH** are “woven edge” silica tapes for protection of electrical lines, piping and equipment from fire, extreme heat, welding splatter and molten metal. **AVSi® WT19, WT180, WT36CH and WT65CH** represents four different thickness of silica tape, and all have the added benefit of woven edges to prevent unraveling. **AVSi® Silica Woven Tapes** can withstand thermal temperatures up to 1800°F (982°C) for extended periods of time. These tapes are used in high temperature applications as insulation or thermal protection over: electrical cabling, pipe, water jacketed tubing, cords, and hoses. **AVSi® Silica Woven Tapes** are also used as “mop style” furnace curtains, furnace door gasketing, high temperature seals, and as a replacement for refractory ceramic fiber tape. **AVSi® Silica Woven Tapes** are used extensively in the Power Generation, Shipbuilding, Construction, Welding and Metal Processing industries.

### **Features**

- Resists high temperature and penetration of molten metal weld “slag”
- Fireproof
- Woven edge
- Excellent insulating properties
- Can be used in fabrication

### **Benefits**

- Protects cables, pipes, cords and other equipment in the toughest welding applications
- Protects against hot work fires
- Does not unravel like slit tape
- Lower energy costs
- Reinforces edges of blankets & curtains

### **Technical Data**

#### **Typical Properties**

	<b>WT19</b>	<b>WT180</b>	<b>WT36CH</b>	<b>WT65CH</b>
Silicon Dioxide Content	≥96%	≥96%	≥96%	≥96%
Nominal Thickness (inches/mm)	0.015/0.381	0.250/6.35	0.062/1.57	0.125/3.17
Nominal Roll Length (feet/meters)	100/30.48	50/15.24	100/30.48	50/15.24

#### **NOTES:**

1. WT19 is available in 1.5” width only. WT180 is available in 1”, 2” and 3” width only. WT36CH and **WT65CH** tapes are available in .5”, 1”, 1.5”, 2”, 3”, 4” and 6” width.
2. Rolls may consist of three pieces. Minimum piece length is 10 feet (3.09 meters).
3. Other roll lengths are available upon request.
4. Silica tapes are made of amorphous silica and contain no asbestos or ceramic fibers.
5. The melt point of all AVSi® Silica Woven Tapes is 3000°F (1648°C).

AVS Industries cannot predict all of the potential applications for which customers may attempt to use the AVSi® Silica Woven Tapes. AVSi® Silica Woven Tapes will have varying degrees of effectiveness for each potential application depending on the maximum temperature attained, the length of use, and the amount of temperature fluctuation. If the customer has any questions regarding the use of AVSi® Silica Woven Tapes in a particular application, please contact AVS Industries at (302) 221-1720 and we will provide a sample of the AVSi® Silica Woven Tape for testing. This product is not warranted against injuries or damages of any kind caused by uses for which this product was not designed, intended, or tested by AVS Industries.



WHEN THE **HEAT** IS ON, KEEP YOUR COOL WITH AVS!

## Safety Data Sheet (SDS)

SDS-103  
May 2019

### Product: AVSil® Silica Woven Tape

#### 1. Chemical Product and Company Identification

**Trade Name:** AVSil® Silica Woven Tape

**Synonyms:**

WT36CH-1	WT65CH-1	WT180-3" x 1/4"
WT36CH-1½	WT65CH-1½	
WT36CH-2	WT65CH-2	
WT36CH-3	<b>WT65CH-3</b>	
WT36CH-4	WT65CH-4	
WT36CH-6	WT65CH-6	
WT19- 1½	WT180-2" x 1/4"	

**Manufacturer:**

AVS Industries LLC  
21 Bellecor Drive  
Unit C  
New Castle, DE 19720

Phone Product Information (302) 221-1720  
Revision Date: May 31, 2019

#### DESCRIPTION

**No Hazard Rating is available for this Product**

#### 2. Hazard Identification

**Emergency Overview**

Off-White or tan colored flexible woven tape with no odor.

**Effects of Overexposure:**

**Eye Contact:** Slight irritation may be caused in contact with eyes.

**Skin Contact:** Temporary irritation of skin may be produced.

**Inhalation:** Inhalation of airborne fibers may cause irritation to the mouth, nose and throat.

**Ingestion:** May cause temporary irritation of the digestive tract, but not an expected route of entry in industrial uses.

**Chronic Hazards:** There are no known chronic health effects associated with the use of this product under normal working conditions.

**Primary Routes of Entry:** Skin contact, inhalation, ingestion & eye contact.

**Carcinogenicity Information:** None of the components present in this material at concentrations equal to or greater than 0.1% are listed by IARC, NTP, OSHA or ACGIH as a carcinogen.

**Product: AVSil® Silica Woven Tape**

**3. Composition and Information on Ingredients**

<b>Ingredients(s)</b>	<b>CAS Number</b>	<b>Approx. Percent</b>
Amorphous Silica	7631-86-9	96%

**4. First Aid Information**

Eye Contact: Flush eyes immediately with large amounts of water for at least 15 minutes holding eyelids open while flushing. Seek medical attention promptly.

Skin Contact: Wash contaminated skin thoroughly with mild soap and cool water. Seek medical attention if irritation persists.

Inhalation: Remove person from source of exposure and then seek medical attention immediately.

Ingestion: Seek medical attention immediately.

**5. Fire Fighting Measures**

Flash Point: N.A.

Lower Explosive Limit (%): N.A.

Upper Explosive Limit (%): N.A.

Autoignition Temperature: N.D.

Extinguishing Media: Carbon dioxide, water, foam or dry chemical as suitable for type of surrounding fire.

Unusual Fire & Explosion Hazards: During sustained fire irritating and/or toxic gases may be generated by combustion.

Fire Fighting Instructions: Wear full fire-fighting protective equipment including self-contained breathing apparatus.

**6. Accidental Release Measures**

Step to be taken in case material is released or spilled:

Dust or loose fibers can be vacuumed or swept with the aid of a dust suppressant.

Dispose according to federal, state, and local environmental regulations.

**7. Handling and Storage**

Store material in a clean dry place, and keep container closed.

Particular care should be taken when working with "used" material to minimize dust. If exposure limits are exceeded or if irritation is experienced, NIOSH approved respiratory protection should be worn.

## Product: AVSil® Silica Woven Tape

### 8. Exposure Controls and Personal Protection

#### ENGINEERING CONTROLS:

Ventilation: General ventilation and/or local exhaust ventilation are adequate.

Respiratory Protection: Respirators are not necessary under normal working conditions.

Eye Protection: Eye protection is not necessary under normal working conditions.

Protective Clothing: Protective Clothing is not necessary under normal working conditions.

Hygienic Practices: Use good personal hygiene practices.

#### EXPOSURE LIMITS:

Amorphous Silica

PEL (OSHA) 80mg/m<sup>3</sup> + % SiO<sub>2</sub> or 20 mppcf

TLV (ACGIH) 10 mg/m<sup>3</sup> (inhalable); 3 mg/m<sup>3</sup> (respirable)

NIOSH 6 mg/m<sup>3</sup>

IDHL 3000 mg/m<sup>3</sup>

### 9. Physical and Chemical Properties

Physical and Chemical Properties of Base Silica Woven Tape Only

#### PHYSICAL DATA:

Boiling Point: 4046° F

Melting Point: >3000° F

Solubility in Water: Insoluble

Vapor Pressure: N.D.

Vapor Density: N.D.

Specific Gravity: 2.2

Color: Off-white or tan colored

Odor: None

Physical State: Woven Tape

### 10. Stability and Reactivity

Chemical Stability: Product is stable at normal temperature and storage conditions.

Incompatibilities: Basic phosphates, hydrofluoric acid, and some oxides and hydroxides.

Hazardous Polymerization: Hazardous polymerization will not occur under normal conditions.

Hazardous Decomposition Products (Coating Only): Oxidation of the coating produces carbon monoxide and carbon dioxide.

### 11. Toxicological Information

Material which has been subjected to elevated temperatures (>1800°F) may undergo partial conversion to cristobalite, a form of crystalline silica, which may cause respiratory illness. The amount of cristobalite present will depend on the temperature and length of service. The OSHA PEL for cristobalite is 0.05 mg/m<sup>3</sup> (respirable).

### 12. Ecological Information

No information is available; however, toxicity is expected to be low based on the insolubility in water of the product.

## Product: AVSil® Silica Woven Tape

### 13. Disposal Considerations

Dispose of waste material in accordance with applicable federal, state, and local environmental regulations.

### 14. Transportation Information

DOT Proper Shipping Name: Silica Woven Tape  
DOT Hazardous Class: None  
DOT UN/NA Number: None  
Emergency Response Guide Number: None

### 15. Regulatory Information

U.S. FEDERAL REGULATIONS AS FOLLOWS:

SARA Section 313: This product contains the following substances subject to the reporting requirements of Section 313 of Title III of the Superfund Amendment and Reauthorization Act of 1986 and 40 SFR Part 372: None

TSCA: The chemical substances in this product are on the TSCA Section 8 Inventory.

EXPORT NOTIFICATION: This product contains the following chemical substances subject to the reporting requirements of TSCA 12(B) if exported from the United States: None

INTERNATIONAL REGULATIONS AS FOLLOWS:

Canadian WHMIS: This MSDS has been prepared in compliance with Controlled Product Regulations except for the use of the 16 headings.

Canadian WHMIS CLASS: Not Regulated.

DSL: The chemical substances in this product are listed on the Domestic Substances List (DSL).

### 16. Other Information

This Material Safety Data Sheet was revised in its entirety in May 2019.

ABBREVIATIONS:

- 1) ACGIH – American Conference of Governmental Industrial Hygienists
- 2) OSHA – Occupational Safety and Health Administration
- 3) NIOSH – National Institute of Occupational Safety and Health
- 4) IARC – International Agency for Research on Cancer
- 5) NTP – National Toxicology Program
- 6) TLV – Threshold Limit Value
- 7) PEL – Permissible Exposure Limit
- 8) TWA – Time Weighted Average
- 9) STEL – Short Term Exposure Limit
- 10) IDHL – Immediately Dangerous to Life or Health
- 11) N.A. – Not Applicable
- 12) N.D. – Not Determined
- 13) N.E. – Not Established
- 14) DSL – Domestic Substances List

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# 3M<sup>TM</sup> Glass Cloth Electrical Tape 69 with Silicone Pressure-Sensitive Adhesive

Data Sheet

November 2008

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## Description

3M<sup>TM</sup> Glass Cloth Electrical Tape 69 is a white glass cloth tape with a high-temperature thermosetting silicone pressure-sensitive adhesive. It is designed for use in 600-volt dry location applications motors, and transformers with and without varnish coating. Key attributes like high mechanical strength and resistance to high temperatures provide excellent performance. The thermosetting adhesive provides an increased bond once applied in areas of high ambient temperatures. The thermosetting adhesive provides elevated temperature performance up to Class N 392°F (200° C) temperature rating.

This tape provides insulation and solvent-resistant protection for use as coil cover, anchor, banding and core, layer and crossover insulation. This tape features a non-corrosive adhesive. It is conformable, printable and flame retardant.

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## Agency Approvals, Self Certifications, MIL Specs

Meets Requirements of:

- Military Specification No. Mil-1-19166C
- UL Recognized Component listing for 200° C (Guide OANZ2, File E17385)
- CSA Accepted Component 180° C, File LR93411

RoHS Compliant 2002/95/EC" means that the product or part ("Product") does not contain any of the substances in excess of the maximum concentration values in EU Directive 2002/95/EC, as amended by Commission Decision 2002/618/EC, unless the substance is in an application that is exempt under RoHS. This information represents 3M's knowledge and belief, which may be based in whole or in part on information provided by third party suppliers to 3M.



# 3M™ Glass Cloth Electrical Tape 69

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## Applications

- Insulating electric and induction-type furnace power supply leads
- Securing high-temperature, non-PSA insulation (such as asbestos and glass) in high-temperature areas
- Securing Scotch® Fire Retardant Electric Arc Proofing Tape 77
- Splicing wire SF and SFF rated 302° F (150° C), 356° F (180° C)
- Reinsulating and repairing coils on mining machines
- Splicing silicone-covered glass wire where splices require more abrasion resistance and mechanical strength than can be provided by silicone tapes Insulating Class “H” dry-type transformer leads
- Insulating splices made on SA type wire in heat treat areas
- Especially suited to high-temperature applications
- Used in a variety of coil/transformer and motor applications, including an outer wrap for bobbin wound coils, banding arbor wound coils, lead pad hold down, end turn and lead anchor and connection.

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## Typical Properties

Data is not for specifications. Values are typical and should not be considered minimum or maximum. Properties measured at room temperature 73° F (~23° C) unless otherwise stated.

### Physical

Property (Test Method) (ASTM D1000 unless noted)	Typical Value US units (metric)
<b>Color</b>	white
<b>Adhesive</b>	silicone
<b>Backing Thickness</b>	5.0 mils (0,125 mm)
<b>Total Thickness</b>	7.0 mils (0,177 mm)
<b>Elongation (% at break)</b>	5%
<b>Operating Temperature</b>	200° C
<b>Adhesion to Steel</b>	40 oz/in (4.4 N/10 mm)
<b>UL 510 Flame Retardant</b>	Yes

### Electrical

Property (Test Method) (ASTM D1000 unless noted)	Typical Value US units (metric)
<b>Dielectric Breakdown</b>	3000 V
<b>Breaking Strength</b>	180 lbs/in (314 N/10 mm)
<b>Insulation Resistance</b>	4.8 x 10 <sup>4</sup> megohms
<b>CTI Material Group</b>	1
<b>Electrolytic Corrosion Factor</b> 3M Test Method	0.9

# 3M™ Glass Cloth Electrical Tape 69

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<b>Specifications</b>	3M™ Glass Cloth Electrical Tape 69 is a glass cloth electrical tape with a rubber thermosetting adhesive. The tape shall be white and 7 mils (0,177 mm) thick. The tape shall be coated on one side with pressure-sensitive adhesive which shall not require heat, moisture, or other preparation prior to or subsequent to application. The adhesive coating shall be smooth and uniform, and be free of lumps and bare spots. There shall be no separator between adjacent layers of the roll. The tape shall be UL Recognized under UL Standard 510. The tape shall perform at a temperature of 392° F (200° C) without loss of physical or electrical properties.
<b>Engineering/ Architecture</b>	All splices for 600-volt wire rated at 266° F (130° C) shall be insulated with a minimum of two half-lapped layers of Scotch® Glass Cloth Electrical Tape 69.
<b>Shelf Life &amp; Storage</b>	This product has a 5-year shelf life from date of manufacture when stored in a humidity controlled storage (50°F/10°C to 80°F/27°C and <75% relative humidity).
<b>Availability</b>	<p>3M™ Glass Cloth Electrical Tape 69 is available in standard and custom lengths and widths. Standard length is 36 yards.</p> <p>For availability, please contact your local distributor. Names and addresses are available from <a href="http://3M.com/electrical">3M.com/electrical</a> [Where to Buy], or call 1-800-676-8381 or 1-800-245-3573.</p>
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## Electrical Markets Division

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## Material Safety Data Sheet

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This material safety data sheet (MSDS) is provided as a courtesy in response to a customer request. This product is not regulated under, and a MSDS is not required for this product by the OSHA Hazard Communication Standard (29 CFR 1910.1200) because, when used as recommended or under ordinary conditions, it should not present a health and safety hazard. However, use or processing of the product not in accordance with the product's recommendations or not under ordinary conditions may affect the performance of the product and may present potential health and safety hazards.

### SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

**PRODUCT NAME:** Scotch® Glass Cloth Tape 69 with Silicone Adhesive  
**MANUFACTURER:** 3M  
**DIVISION:** Electrical Markets Division  
**ADDRESS:** 3M Center, St. Paul, MN 55144-1000

**EMERGENCY PHONE: 1-800-364-3577 or (651) 737-6501 (24 hours)**

**Issue Date:** 10/23/12  
**Supercedes Date:** 10/23/12

**Document Group:** 31-3090-3

**Product Use:**

Intended Use: Electrical

### SECTION 2: INGREDIENTS

<u>Ingredient</u>	<u>C.A.S. No.</u>	<u>% by Wt</u>
Glass Cloth	65997-17-3	50 - 75
Silicone Adhesive	Mixture	25 - 50

### SECTION 3: HAZARDS IDENTIFICATION

#### 3.1 EMERGENCY OVERVIEW

**Specific Physical Form:** Roll of Tape

**Odor, Color, Grade:** White

**General Physical Form:** Solid

**Immediate health, physical, and environmental hazards:** This product, when used under reasonable conditions and in accordance with the 3M directions for use, should not present a health hazard. However, use or processing of the product in a manner not in

accordance with the product's directions for use may affect the performance of the product and may present potential health and safety hazards.

### 3.2 POTENTIAL HEALTH EFFECTS

**Eye Contact:**

No health effects are expected.

**Skin Contact:**

No health effects are expected.

**Inhalation:**

No health effects are expected.

**Ingestion:**

No health effects are expected.

## SECTION 4: FIRST AID MEASURES

### 4.1 FIRST AID PROCEDURES

The following first aid recommendations are based on an assumption that appropriate personal and industrial hygiene practices are followed.

**Eye Contact:** No need for first aid is anticipated.

**Skin Contact:** No need for first aid is anticipated.

**Inhalation:** No need for first aid is anticipated.

**If Swallowed:** No need for first aid is anticipated.

## SECTION 5: FIRE FIGHTING MEASURES

### 5.1 FLAMMABLE PROPERTIES

Autoignition temperature	No Data Available
Flash Point	Not Applicable
Flammable Limits(LEL)	Not Applicable
Flammable Limits(UEL)	Not Applicable
OSHA Flammability Classification:	Not Applicable

### 5.2 EXTINGUISHING MEDIA

Use fire extinguishers with class B extinguishing agents (e.g., dry chemical, carbon dioxide).

### 5.3 PROTECTION OF FIRE FIGHTERS

**Special Fire Fighting Procedures:** Wear full protective equipment (Bunker Gear) and a self-contained breathing apparatus (SCBA).

**Unusual Fire and Explosion Hazards:** No unusual fire or explosion hazards are anticipated.

**Note:** See STABILITY AND REACTIVITY (SECTION 10) for hazardous combustion and thermal decomposition information.

## SECTION 6: ACCIDENTAL RELEASE MEASURES

### 6.1. Personal precautions, protective equipment and emergency procedures

Not applicable.

### 6.2. Environmental precautions

Not applicable.

### Clean-up methods

Not applicable.

## SECTION 7: HANDLING AND STORAGE

### 7.1 HANDLING

This product is considered to be an article which does not release or otherwise result in exposure to a hazardous chemical under normal use conditions.

### 7.2 STORAGE

Not applicable.

## SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

### 8.1 ENGINEERING CONTROLS

Not applicable.

### 8.2 PERSONAL PROTECTIVE EQUIPMENT (PPE)

#### 8.2.1 Eye/Face Protection

Not applicable.

#### 8.2.2 Skin Protection

Not applicable.

#### 8.2.3 Respiratory Protection

Under normal use conditions, airborne exposures are not expected to be significant enough to require respiratory protection.

#### 8.2.4 Prevention of Swallowing

Not applicable.

### 8.3 EXPOSURE GUIDELINES

None Established

## SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

Specific Physical Form:	Roll of Tape
Odor, Color, Grade:	White
General Physical Form:	Solid

Autoignition temperature	No Data Available
Flash Point	Not Applicable
Flammable Limits(LEL)	Not Applicable
Flammable Limits(UEL)	Not Applicable
Boiling Point	Not Applicable
Vapor Density	Not Applicable
Vapor Pressure	Not Applicable
Specific Gravity	No Data Available
pH	Not Applicable
Melting point	Not Applicable
Solubility In Water	Not Applicable
Evaporation rate	Not Applicable
Volatile Organic Compounds	0 %
Kow - Oct/Water partition coef	No Data Available
Percent volatile	0 %
VOC Less H2O & Exempt Solvents	0 %
Viscosity	Not Applicable

## SECTION 10: STABILITY AND REACTIVITY

**Stability:** Stable.

**Materials and Conditions to Avoid:**

**10.1 Conditions to avoid**

None known

**10.2 Materials to avoid**

None known

**Hazardous Polymerization:** Hazardous polymerization will not occur.

### Hazardous Decomposition or By-Products

<u>Substance</u>	<u>Condition</u>
Carbon monoxide	Not Specified
Carbon dioxide	Not Specified

**Hazardous Decomposition:** Under recommended usage conditions, hazardous decomposition products are not expected. Hazardous decomposition products may occur as a result of oxidation, heating, or reaction with another material.

## SECTION 11: TOXICOLOGICAL INFORMATION

Please contact the address listed on the first page of the MSDS for Toxicological Information on this material and/or its components.

## SECTION 12: ECOLOGICAL INFORMATION

## ECOTOXICOLOGICAL INFORMATION

Not determined. Not applicable.

## CHEMICAL FATE INFORMATION

Not determined. Not applicable.

## SECTION 13: DISPOSAL CONSIDERATIONS

**Waste Disposal Method:** Dispose of waste product in a sanitary landfill.

**EPA Hazardous Waste Number (RCRA):** Not regulated

Since regulations vary, consult applicable regulations or authorities before disposal.

## SECTION 14: TRANSPORT INFORMATION

**ID Number(s):**

80-0020-4003-0, 80-0120-4005-3, 80-0180-0360-0, 80-1006-1119-5, 80-6108-6823-6, 80-6109-1900-5

For Transport Information, please visit <http://3M.com/Transportinfo> or call 1-800-364-3577 or 651-737-6501.

## SECTION 15: REGULATORY INFORMATION

### US FEDERAL REGULATIONS

Contact 3M for more information.

### 311/312 Hazard Categories:

Fire Hazard - No Pressure Hazard - No Reactivity Hazard - No Immediate Hazard - No Delayed Hazard - No

### STATE REGULATIONS

Contact 3M for more information.

### CHEMICAL INVENTORIES

The components of this product are in compliance with the chemical notification requirements of TSCA.

This product is an article as defined by TSCA regulations, and is exempt from TSCA Inventory listing requirements.

Contact 3M for more information.

### INTERNATIONAL REGULATIONS

Contact 3M for more information.

This MSDS has been prepared to meet the U.S. OSHA Hazard Communication Standard, 29 CFR 1910.1200.

## SECTION 16: OTHER INFORMATION

### NFPA Hazard Classification

Health: 0 Flammability: 1 Reactivity: 0 Special Hazards: None

National Fire Protection Association (NFPA) hazard ratings are designed for use by emergency response personnel to address the hazards that are presented by short-term, acute exposure to a material under conditions of fire, spill, or similar emergencies. Hazard ratings are primarily based on the inherent physical and toxic properties of the material but also include the toxic properties of combustion or decomposition products that are known to be generated in significant quantities.

Revision Changes:

Section 1: Product name was modified.

Page Heading: Product name was modified.

Section 1: Initial issue message was modified.

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