

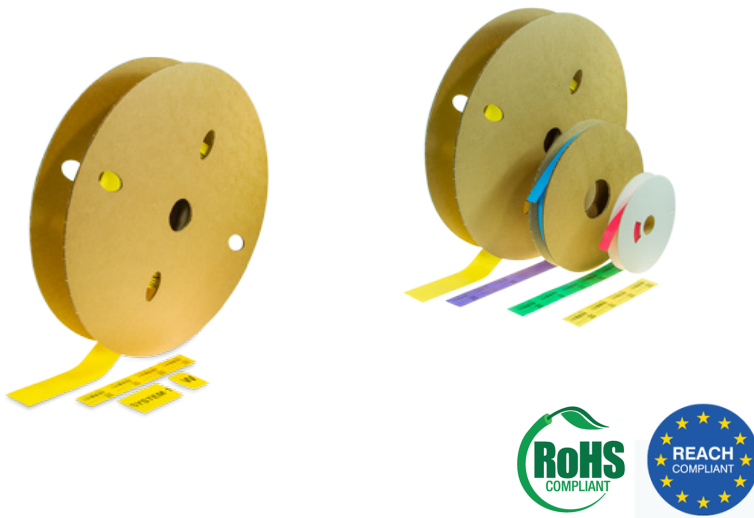
DR Continuous bulk spool

Diesel resistant, self extinguishing
heat shrinkable identification sleeve

TECHNICAL DATA SHEET

Revision Number. 1.1

Last Edited 20. august 2021



The WM-DR-3X Heat Shrinkable Wire Markers are made of diesel resistant, heat shrinkable polyolefin tubing with ideal printability properties for identification purposes, which provides fluid resistance as per NF-F00-608.

Ideal for applications where diesel resistancy characteristics are required.

This product is designed for use in railway and aerospace applications, wire bundling harnesses and assemblies, panel building.

The fluid resistance of the material has passed the NF-F00-608 linked to SNCF specifications where especially oils for long periods have been tested at elevated temperatures.

Meets ASTM D2671 & UL VW-1 standard for flammability which makes the material self-extinguishing and passes vertical burn test. The sleeve meet the material requirements of the SAE-AMS-DTL-23053/6 class 1.

Industry



Industry



Marine



Wind power



Commercial



Aerospace



Construction



Railway



Military



Electrical installations



Petrochemical



Telecom

STANDARD TUBE COLOR



OTHER TUBE COLORS ON REQUEST

MATERIAL

Extruded, cross linked polyolefin.

SHRINK RATIO

3:1

OPERATING TEMPERATURE

-40°C to +125°C

(-40°F to 193°F)

SHRINK TEMPERATURE

>90°C (130°F)

COMPLIANCES

Mark Permanence:

SAE AS-5942

NF F00-608 fluid test cat A & H

Recommended black ribbon:

FTI-Y - FTI-X - FTI-HXX

Chemical Resistance to solvents:

MIL-STD-202H

Test method 215

INDUSTRY STANDARDS

NFF F-00-608 cat. A & H

MIL-DTL-23053/6 class 1

FLAMMABILITY

AMS-DTL-23053 1999 4.6.14

ASTM D2671-09 Section 68-

74 Procedure B and AMS-

DTL-23053/6:1999

UL224

STORAGE

Cool and dry in original packaging. Recommended temperature at +10°C to +25°C and 45-55% relative humidity. Use within 2 years from date of manufacture.

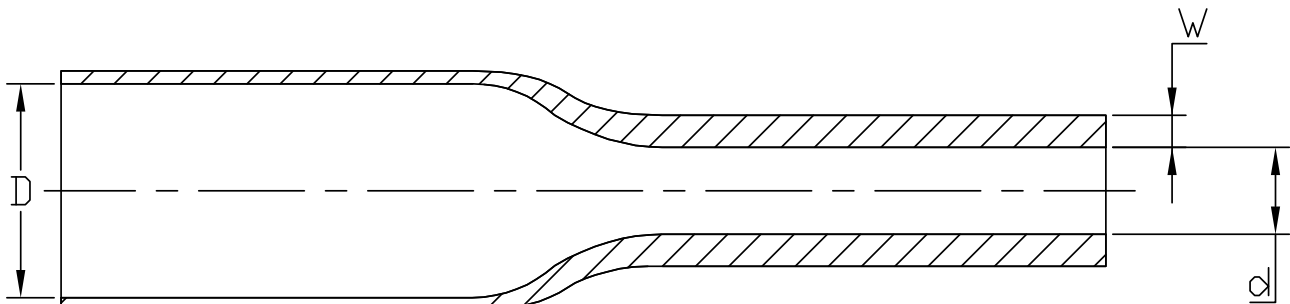
APPLICATIONS

Specific developed to be used in Rail, Defence, Aerospace, cable harnesses, Industrial marking, insulation, wire bundling and mechanical protection.

Product Dimensions

DIMENSIONS 3:1

SIZE, INCHES	SIZE, MM	MINIMUM ID (D), AS SUPPLIED MM (INCHES)	MAXIMUM ID, RECOVERED (D) MM (INCHES)	RECOVERED WALL THICKNESS (W), MM (INCHES)
3/32	2.4	2.79 (0.109)	0.79 (0.031)	0.57±0.10 (0.022 ± 0.004)
1/8	3.2	3.64 (0.143)	1.0 (0.039)	0.61±0.10 (0.024 ± 0.004)
3/16	4.8	5.26 (0.207)	1.6 (0.063)	0.67±0.10 (0.0263 ± 0.004)
1/4	6.4	6.92 (0.272)	2.4 (0.094)	0.71±0.10 (0.0279 ± 0.004)
3/8	9.5	10.2 (0.401)	3.2 (0.126)	0.77±0.10 (0.030 ± 0.004)
1/2	12.7	13.5 (0.531)	4.75 (0.187)	0.80±0.10 (0.031 ± 0.004)
3/4	19.1	20.1 (0.791)	6.4 (0.250)	0.84±0.15 (0.0330 ± 0.006)
1	25.4	26.7 (1.05)	8.47(0.333)	0.86±0.15 (0.034 ± 0.006)
1 ½	38.1	39.8 (1.57)	12.9 (0.507)	0.89±0.15 (0.035 ± 0.006)
2	50.8	53.0 (2)	17.2 (0.677)	0.90±0.15 (0.035 ± 0.006)
3	76.2	79.4 (3)	25.8 (1.05)	0.92±0.15 (0.036 ± 0.006)



Heat Shrink Product in as supplied "D" and fully recovered state "d" with recovered wall "W"

General Tests for Identification Products

PHYSICAL

PROPERTIES	TEST METHOD	TYPICAL VALUE
Tensile strength	NF F00-608	17.21 Mpa (min.)
Elongation at break	NF F00-608	≥200%
Longitudinal change	NF F00-608	<10%
Tensile strength after heat aging	NF F00-608	<25%
Elongation at break after heat aging	NF F00-608	<25%
Tensile Strength after diesel oil	NF F00-608	≥7MPa
Elongation at break after diesel oil	NF F00-608	≥200%
Water absorption	NF F00-608	<2%
IRM 902 oil Tensile strength (50 °C x 72h)	MIL-DTL-23053E	16.2 N/mm ²
IRM 902 oil Ultimate elongation (50 °C x 72h)	MIL-DTL-23053E	540%
IRM 903 oil Tensile strength (70 °C x 168h)	MIL-DTL-23053E	12.2 N/mm ²
IRM 903 oil Ultimate elongation (70 °C x 168h)	MIL-DTL-23053E	535%
Petrol oil 97 Tensile strength (24 °C x 24h)	MIL-DTL-23053E	13.7 N/mm ²
Petrol oil 97 Ultimate elongation (24 °C x 24h)	MIL-DTL-23053E	550%
Hydraulic fluid MIL-PRF-5606 (24 °C x 24h)	MIL-DTL-23053E	17.2 N/mm ²
Hydraulic fluid MIL-PRF-5606 (24 °C x 24h)	MIL-DTL-23053E	523%

ELECTRICAL

PROPERTIES	TEST METHOD	TYPICAL VALUE
Dielectric strength	NF F00-608	31.56 kV/mm ²
Volume resistivity	IEC 93	1.82 x10 ¹⁴ Ω/cm

CHEMICAL

PROPERTIES	TEST METHOD	TYPICAL VALUE
Chemical resistance	AMS-DTL-23053/E	Good
Copper corrosion	ASTM D 2671B	No corrosion

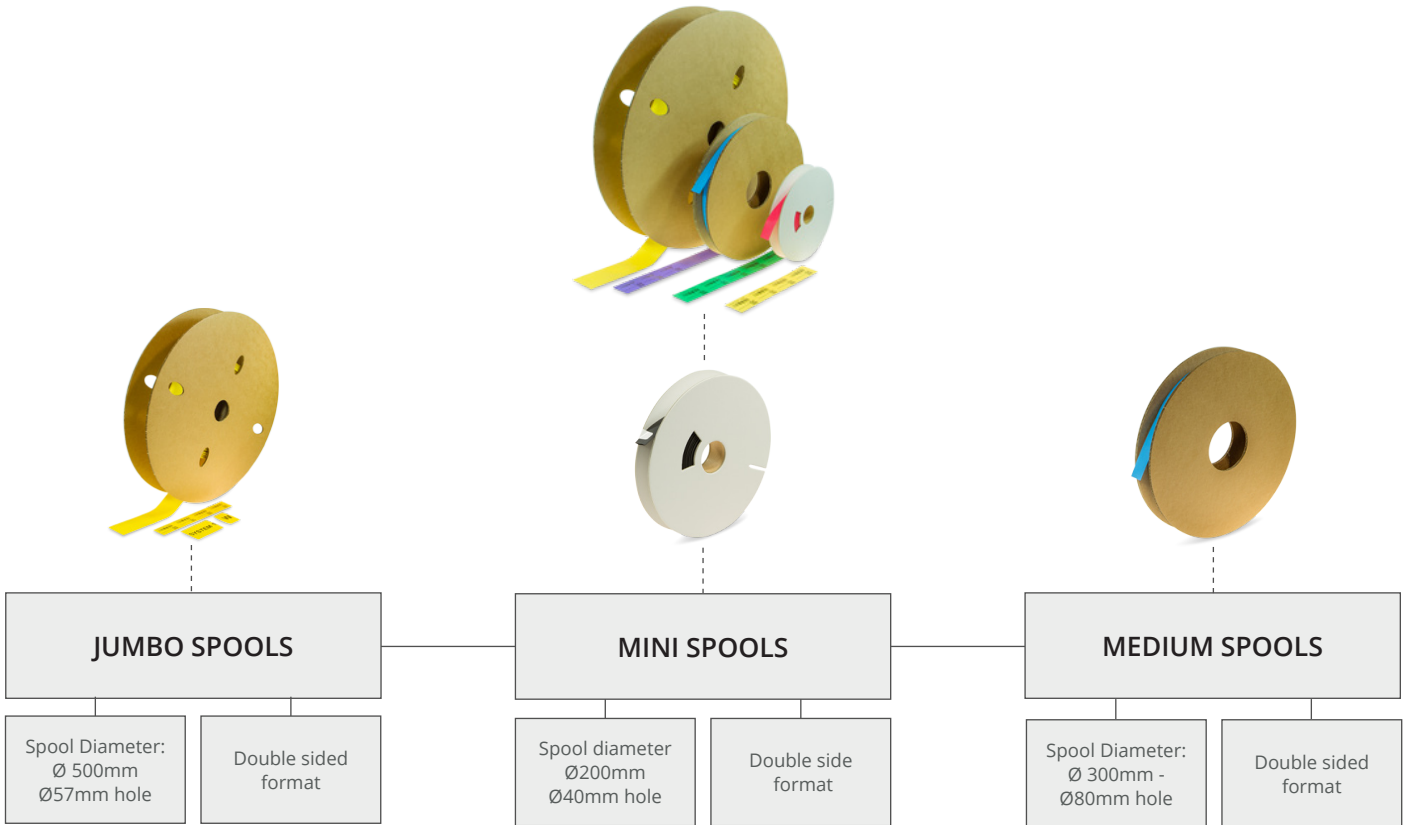
THERMAL

PROPERTIES	TEST METHOD	TYPICAL VALUE
Heat shock 4 hours at 225°C	AMS-DTL-23053:1999 4.6.8	No dripping, cracking or flowing through to 360°C
Heat aging 168 hours at 158°C	ASTM D 638	Elongation 100%
Flammability	NF F00-608	VW-1 Pass » Flame retardant
Oxygen Index	NF F00-608	28%
Low temperature flexibility / Bending	NF F00-608	No cracking, no break, pass

Environmental UV Stability

PROPERTIES	TEST METHOD	TYPICAL VALUE
UV-A	ASTM G154 - Machine setup Temp 50-60°C (140°F) Cycle 8 h light 4h condensation UV wavelength 280-400nm Test duration 1000 h of exposure.	Pass - No damage to the marker and print legible after 20 rubs in accordance with SAE-AS 815314.6.2

Available Formats



Product code

CON - DR - 3X - 024 -100M- YW

FAMILY CON = Continuous Spools	CON
GRADE SLEEVES See Page 6	DR
SHRINK RATIO 3X Shrink Ratio	3X
DIAMETER 024 = 2.4mm - 3/32 inches 032 = 3.2mm - 1/8 inches	024
LENGTH Length in meters 100 Meter - 328 Feet 50 Meter - 164 Feet 20 Meter - 66 feet	-100M-
COLOR WE= White YW=Yellow	YW

Available options -

SIZE MM	SIZE INCHES	MINI SPOOL LENGTH METER	MEDIUM SPOOL LENGTH METER	JUMBO SPOOL LENGTH METER
2,4 mm	3/32	20 Meter - 66 Feet	50 Meter - 164 Feet	100 Meter - 328 Feet
3,2 mm	1/8	20 Meter - 66 Feet	50 Meter - 164 Feet	100 Meter - 328 Feet
4,8 mm	3/16	20 Meter - 66 Feet	50 Meter - 164 Feet	100 Meter - 328 Feet
6,4 mm	1/4	20 Meter - 66 Feet	50 Meter - 164 Feet	100 Meter - 328 Feet
9,5 mm	3/8	15 Meter - 49 Feet	50 Meter - 164 Feet	100 Meter - 328 Feet
12,7 mm	1/2	15 Meter - 49 Feet	25 Meter - 82 Feet	50 Meter - 164 Feet
19,0 mm	3/4	15 Meter - 49 Feet	25 Meter - 82 Feet	50 Meter - 164 Feet
25,4 50 mm	1	15 Meter - 49 Feet	25 Meter - 82 Feet	50 Meter - 164 Feet
38,1 mm	1 1/2	10 Meter - 33 Feet	25 Meter - 82 Feet	50 Meter - 164 Feet
50,8 50 mm	2	10 Meter - 33 Feet	25 Meter - 82 Feet	50 Meter - 164 Feet

Other spool lengths on request - *

Available Tube Grades

PRODUCT GROUP	TUBE GRADE	CHARACTERISTICS	COMPLIANCES
WMX-WM89-WM109	C3	The C3- 3:1 shrink ratio, heat shrinkable wire Markers are made of, flame retardant in inch sizes heat shrinkable polyolefin tubing with ideal printability properties for identification purposes. C3 meets NFPA 130 requirements. The C3 material are fabricated to meet the material performance requirements of the AMS-DTL-23053/5 class 1 and meet the features in Airbus specification NSA 937201. The compound is also UL224 and CSA compliant. Ideal for Aerospace, military, industrial and energy applications. Marker sleeves meet the mark permanence requirements of AS5942 and MIL 202 Method 215K	EN 60684-3 NFPA 130 UL224 CSA 22.2 No. 198- SAE-AMS-DTL-23053/5 SAE AS 5942 MIL-STD-202H method 215 AMS-DTL-23053/5 AIRBUS NSA937201
WMX-WM89-WM109	ZH	The ZH heatshrink tubing are made of halogen free, flame retardant, heat shrinkable polyolefin tubing with ideal printability properties for identification purposes. The compound of the tubing is excluded for halogens and offers excellent fire safety characteristics combined with minimal smoke emission. The material meet Boeing BS 7239 for toxic gas generation M7 specification- The ZH material is classified with EN45545-2 Class HL3 requirement set R22 (interior) and R23 (exterior) and be used without any restriction for any application. R24 (electrotechnical products) "PCB Printed Circuit Boards" by test method EN ISO 4589-2, burning behavior determined by Oxygen Index only and be used without any restriction for any application. NFPA 130 & EN 60684-3 test report are available on request	EN 45545-2 HL3, R22/R23/R24 NFPA 130 EN 60684-3 LUL 1-085 A3 compliant BS 6853 (1999) cat 1a DIN5510-2 UNI CEI 11170-3 NF F 16 101 ASTM E 662, BSS 7239 SAE AS 5942 MIL-STD-202H method 215
WMX-WM89-WM109	LFH	The LFH printable heatshrink tubing are made of halogen free, flame retardant and low smoke heat shrinkable polyolefin tubing with ideal printability properties for identification purposes. The compound of the tubing is excluded for halogens and offers excellent low fire hazard characteristics combined with minimal smoke emission.	UL224 CSA 22.2 No. 198- SAE AS 5942 MIL-STD-202H method 215 EN50343 Annex H Section H.3
WMX-WM89-WM109	LFH-3X	The LFH printable heatshrink tubing are made of halogen free, flame retardant and low smoke heat shrinkable polyolefin tubing with ideal printability properties for identification purposes. The compound of the tubing is excluded for halogens and offers excellent low fire hazard characteristics combined with minimal smoke emission.	UL224 CSA 22.2 No. 198- SAE AS 5942 MIL-STD-202H method 215 EN50343 Annex H Section H.3
WMX-WM89-WM109	HT	The HT printable heatshrink tubing are made of semi flexible highly flame retardant polyvinylidene fluoride tubing. High temperature rated thin wall markers with high transparency. Excellent chemical resistance to most industrial fuels, chemicals, solvents and high degree of mechanical strength properties suitable for aerospace, defense and mass transit applications. It is inherently flame retardant, semi-rigid and highly resistant to most industrial fuels, chemicals and solvents.	UL224 SAE-AMS-DTL-23053/8 SAE AS 5942 MIL-STD-202H method 215
WMX-WM89-WM109	DR	The DR printable is printable irradiated cross linked, flame retardant, semi-rigid, diesel oil resistant heat shrinkable polyolefin tubing. Especially suitable for railways and complies with SNCF requirements NF F 00608 cat. A & H. Used where resistance to organic fluids, common fuels, lubricants and solvents properties are required for use in mass transit, aerospace, marine and industrial installations.	NF F 00-608 Class A & H UL224 SAE-AMS-DTL-23053/6 Class 1 SAE AS 5942 MIL-STD-202H method 215
WMX-WM89-WM109	AMD	The AMD printable heatshrink are made of highly flame retardant, self-extinguishing and very flexible heat shrinkable polyolefin tubing with ideal printability properties for identification purposes within aerospace, military and defence specified applications. UL VW1/CSA recognized and complies to AMS-DTL-23053/5 Class 1&3. This heatshrink are very versatile through excellent balance of chemical, electrical and mechanical properties.	NFPA 130 UL224 SAE-AMS-DTL-23053/5 Class 1 & 3 SAE AS 5942 MIL-STD-202H method 215
WMX-WM89-WM109	AMD-3X	The AMD printable heatshrink are made of highly flame retardant, self-extinguishing and very flexible heat shrinkable polyolefin tubing with ideal printability properties for identification purposes within aerospace, military and defence specified applications. UL VW1/CSA recognized and complies to AMS-DTL-23053/5 Class 1&3. This heatshrink is very versatile through excellent balance of chemical, electrical and mechanical properties.	NFPA 130 UL224 SAE-AMS-DTL-23053/5 SAE AS 5942 MIL-STD-202H method 215
WMX-WM89-WM109	3-1	The 3-1 a very flexible heatshrink tubing are made of flame retarded, heat shrinkable polyolefin tubing with ideal printability properties for identification purposes. Meets the requirements of a wide range of industrial standards such as SAE-AMS-DTL 23053/5 class 1 & 3. Yellow green versio also available. Material: Irradiated cross-linked flexible flame-retarded polyolefin Shrink Temperature: Min 90 dgc.	SAE-AMS-DTL-23053/5 class 1&3 UL224 600V VW-1 rating CSA 22.2 No. 198.1-98 SAE AS 5942 MIL-STD-202H method 215J
WMX-WM89-WM109	ZHR	ZHR-2X and 3X Heat Shrinkable Wire Markers are made of halogen free, flame retardant and low smoke heat shrinkable polyolefin tubing with ideal printability properties for identification purposes, which provides fluid resistance as per EN50343. This product meets rail standards EN50343 Appendix H and EN45545-2 requirement set R22/R23/R24 hazard level classification 1 and 2. The compound of the tubing is excluded for halogens and offers excellent low fire hazard characteristics combined with minimal smoke emission. It can also be used for applications where limited fire hazard characteristics are necessary.	Diesel Resistance: EN50343 annex H (section 6.6) Fire Propagation: EN45545-1 HL3, R22-R23-R24 Chemical and Diesel Resistance: EN50343 annex H (section 6.6) MIL-STD-202H Method 215 Mark Permanence: EN50343 annex H (section 6.6) & SAE AS-5942

This information and data is believed to be accurate and reliable. Although the information and recommendations set forth herein are presented in good faith and believed to be correct as of this date, Link Solutions makes no representations as to the completeness or accuracy thereof. We place at your disposal the technical information necessary for the correct use of our products. As conditions and methods of use are beyond our control, that the person receiving the same will make their own determination as to the suitability for their purpose. We reserve the right to modify characteristics with the aim of improving the product and adapting it to the requirements of the market.

Ordering description

ORDERING DESCRIPTION EXAMPLES	STANDARD SPOOL SIZE	SUPPLIED DIAMETER		RECOVERED DIAMETER		RECOMMENDED USE RANGE (MIN- MAX)	
		mm	inches	mm	inches	mm	inches
Family-Tube Grade-3X-024-100-Colour	100 Meter - 328 Feet	2,4	3/32	0.79	0.031	0.8-1.9	0.032-0.075
Family-Tube Grade-3X-032-100-Colour	100 Meter - 328 Feet	3,2	1/8	1.0	0.042	1.1-2.6	0.044-0.105
Family-Tube Grade-3X-048-100-Colour	100 Meter - 328 Feet	4,8	3/16	1,6	0.062	1.7-4.0	0.069-0.160
Family-Tube Grade-3X-064-100-Colour	100 Meter - 328 Feet	6,4	1/4	2.4	0,095	2.3-5.4	0.091-0.215
Family-Tube Grade-3X-095-100-Colour	100 Meter - 328 Feet	9,5	3/8	3.2	0.125	3.4-8.1	0.137-0.320
Family-Tube Grade-3X-127-50-Colour	50 Meter - 164 feet	12,7	1/2	4.75	0,187	4.6-10.7	0.183-0.425
Family-Tube Grade-3X-190-50-Colour	50 Meter - 164 feet	19,0	3/4	6.4	0.250	6.9-16.2	0.275-0.640
Family-Tube Grade-3X-254505-Colour	50 Meter - 164 feet	25,4	1	8.47	0.33	9.2-21.5	0.366-0.850
Family-Tube Grade-3X-381-50-Colour	50 Meter - 164 feet	38,1	1 1/2	12.9	0.51	20.9-33.0	0.825-1.300
Family-Tube Grade-3X-508-50-Colour	50 Meter - 164 feet	50,8	2	17.2	0.68	27.9-44.9	1.100-1.750
Family-Tube Grade-3X-762-25-Colour	25 Meter - 82 feet	76.2	79.4	25.8	1.05	45.0	1.75-3,54

Related Standard Test Methods And Documents

Document	Description
ASTM D638	Heat aging 168 at 158°C
ASTM D 2671 C	Flammability testing.
ASTM D2671 -UL224	Longitudinal change
ASTM G154-GB/T1408	Dialectrical strength.
ASTM D2671B - UL224	Copper corrosion (Section 93 procedure A) damaged area of copper mirror,
AMS-DTL-23053/6 class 1	Material specification
ASTM D257 -IEC 93	Volume resistivity Ω -cm
MIL-DTL-23053E	Insulation Sleeving, Electrical, Heat Shrinkable, General Specification for marking of electrical insulation materials
MIL-STD-202H Test method 215J	Chemical resistance to solvents mark permance
NF F00-608:1995	This document defines the characteristics, testing, certification of heat-shrinkable sleeve marker for mechanical and electrical protection used in railway equipment.
SAE AS5942;2014	Marking og insulation materials- Print permance testing using the mechanical crockmeter
UL224 VW-1	This Standard specifies the requirements for insulating tubing that is usually round in cross-section and that consists entirely of extruded compounds whose characteristic constituents are thermosetting, elastomeric, or thermoplastic polymers (see Table 1 for materials and ratings). These requirements also cover heat-shrinkable and crosslinked tubing.