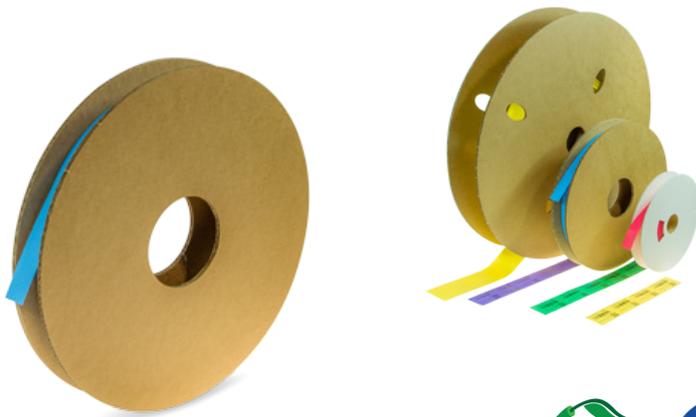


3-1 Continuous bulk spool

Flame retardant heat shrinkable identification sleeve

TECHNICAL DATA SHEET

Revision Number. 1
Last Edited 15. juni 2020



The 3-1 material is 3:1 flexible heat shrink. Made of heat UL & CSA recognised shrinkable polyolefin tubing with ideal printability properties for identification purposes. Supplied on rolls and flattened format on various liner types. Ideal for a wide variety of applications where flammability and self-extinguishing characteristics are required.

This product is designed for use in Automotive, Military, Aerospace applications, machinery, Industrial machinery, Electronics wire bundling harnesses and assemblies, panel building.

Meets ASTM D2671 & UL VW-1 standard for flammability which makes the material flame-retarded (PBDE/PBB-free), self-extinguishing and passes vertical burn test. The sleeve meet the material requirements of the SAE-AMS-DTL-23053/5 class 1 & 3.

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

CONTINUOUS OPERATING TEMPERATURE

-55°C to +135°C
(-67°F to 275°F)

SHRINK TEMPERATURE

>90°C (130°F)

COMPLIANCES

Mark Permanence:
SAE AS-5942 Superceeds
SAE AS 81531:1998 Section 4.6.2

Recommended black ribbon:

FTI-Y, FTI-X

Chemical Resistance to solvents:

MIL-STD-202G

Test method 215J

INDUSTRY STANDARDS

SAE-AMS-DTL-23053/1 class 1&3

FLAMMABILITY

UL224 VW-1 125°C 600V

File No. E48762

CSA C 22.2 198.1 600V VW-1

File No. 033298-0-000

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.

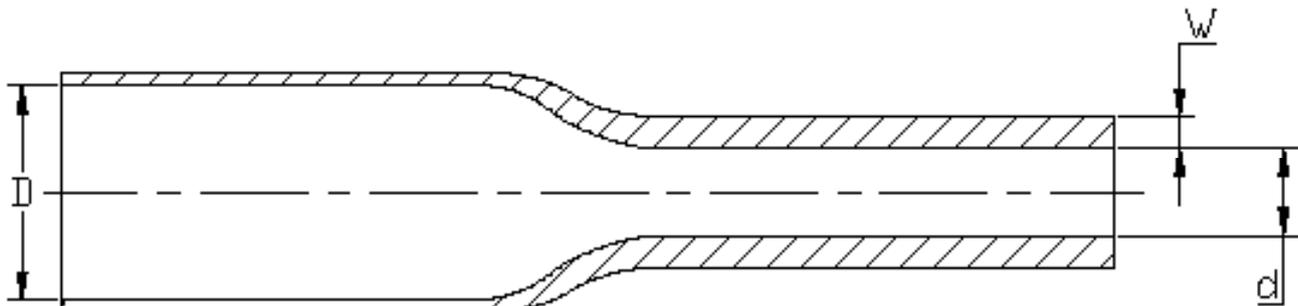
APPLICATIONS

Specific developed to be used in Automotive, Defence, Aerospace, industrial, electronics, 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	1.5/0,5	1.50 (0.059)	0.50 (0,019)	0.50
1/8	3.0/1	3.00 (0.118)	1.0 (0.039)	0.60
3/16	4.8/1,6	4.80 (0.188)	1.6 (0.063)	0.65
1/4	6.0/2	6.0 (0.236)	2.0 (0.078)	0.70
3/8	9.0/3	9.0 (0.354)	3.0 (0.118)	0.80
1/2	12.0/4	12.0 (0.472)	4.0 (0.157)	0.85
3/4	18.0/6	18.0 (0.70)	6.0 (0.236)	1.00
1	24.0/8	24.0 (0.944)	8.0(0.314)	1.20
1 ½	40.0/13	40.0 (1.57)	13.0 (0.512)	1.25



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	ASTM D 638	13.00 MPA
Elongation at break	ASTM D 638	≥400%
Longitudinal change	SAE-AMS-DTL-23053	-7%
Specific gravity	ASTM D 792	1,34
Secant Modulus	ASTM D 882	65 MPa

ELECTRICAL

PROPERTIES	TEST METHOD	TYPICAL VALUE
Dielectric strength	ASTM D876	≥30.00 kV/mm
Volume resistivity	ASTM D876	$3.10 \times 10^{14} \Omega/\text{cm}$
Voltage Rating	UL 224	600Volt
Dielectric Voltage Withstand (2.5kV x 60s)	UL 224	Pass no breakdown

CHEMICAL

PROPERTIES	TEST METHOD	TYPICAL VALUE
Water absorption	ASTM D 570	0,25%
Copper corrosion (158°C x 168h)	SAE-AMS-DTL-23053	No corrosion
Stability against copper (158°C x 168)	SAE-AMS-DTL-23053	Elongation min 100% - Pass
Fluid Resistance (after immersion 24°C x24h)	SAE-AMS-DTL-23053	7,25-14 MPa Min 6,9 MPa (Tensile Strength)
Fungus Resistance	SAE-AMS-DTL-23053 requirement ASTM G21	Pass
Ozone resistance	NF F 00-608	No cracking or sweating - Pass

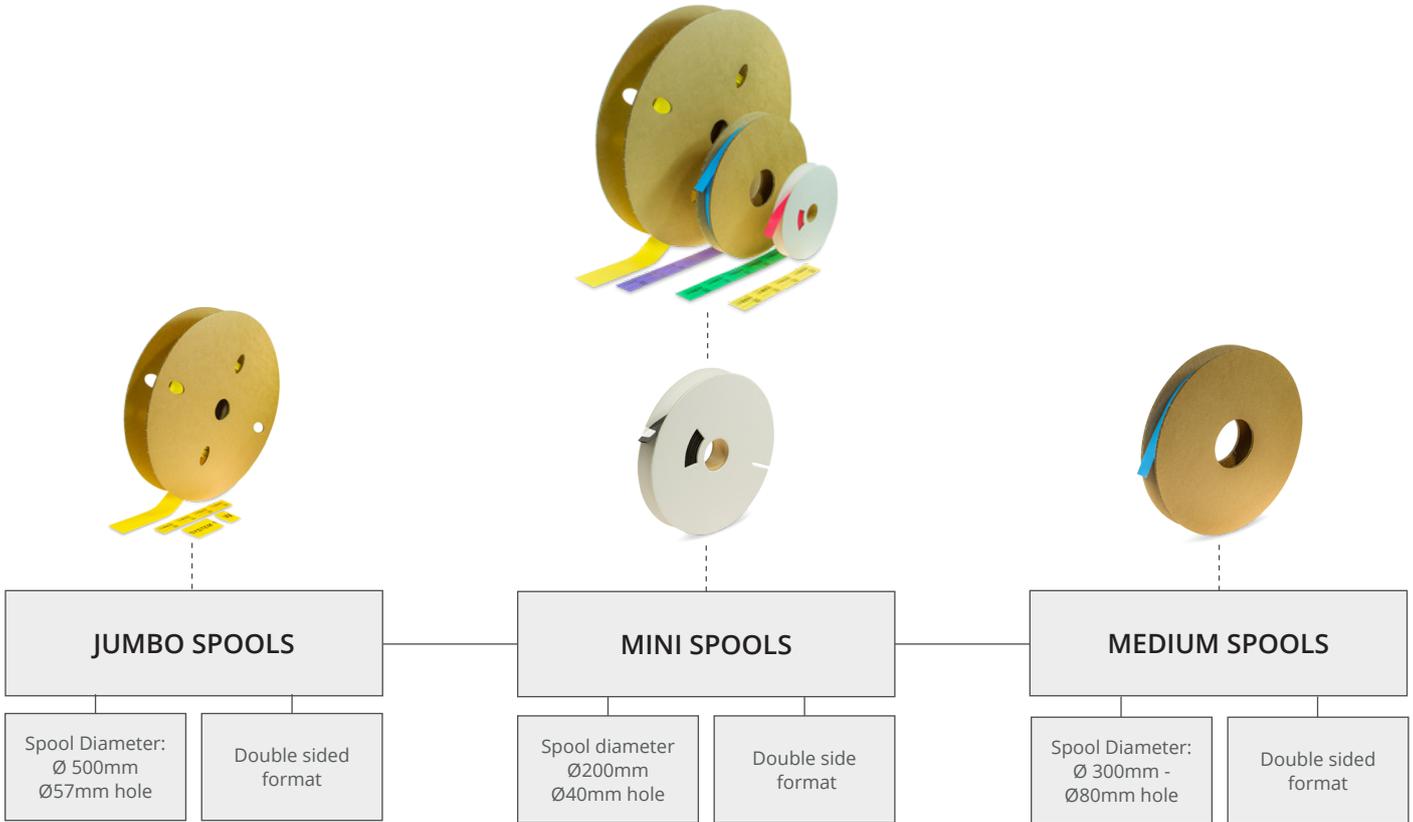
THERMAL

PROPERTIES	TEST METHOD	TYPICAL VALUE
Heat shock 4 hours at 250°C	SAE-AMS-DTL-23053	No dripping, cracking or flowing - Pass
Heat aging 168 hours at 158°C	SAE-AMS-DTL-23053	Elongation ≥400%
Flammability	UL224	VW-1 Pass » Flame retardant
Low temperature flexibility / Bending (-55°C x 4h)	UL 224	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 - 3-1 - 3X - 024 -100M- YW

FAMILY CON = Continuous Spools	
GRADE SLEEVES See Page 6	
SHRINK RATIO 2x shrink Ratio 3x shrink Ratio	
DIAMETER 024 = 2.4mm - 3/32 inches 032 = 3.2mm - 1/8 inches	
LENGTH Length in meters 100 Meter - 328 Feet 50 Meter - 164 Feet 20 Meter - 66 feet	
COLOR WE= White YW=Yellow	

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 fabrikated 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	NFPA 130 UL224 CSA 22.2 No. 198- SAE-AMS-DTL-23053/5 SAE AS 81531 / 5942 MIL-STD-202F method 215J 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.	EN 45545-2 HL3, R22/R23 NFPA 130 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 81531 / 5942 MIL-STD-202F method 215J
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 81531 / 5942 MIL-STD-202F method 215J 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 81531 / 5942 MIL-STD-202F method 215J 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 81531 / 5942 MIL-STD-202F method 215J
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 81531 / 5942 MIL-STD-202F method 215J
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 SAE AS 81531 / 5942 MIL-STD-202F method 215J
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 81531 / 5942 MIL-STD-202F method 215J
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 81531 / 5942 MIL-STD-202F 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 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 Chemical and Diesel Resistance: EN50343 annex H (section 6.6) MIL-STD-202F Method 215J Mark Permanence: EN50343 annex H (section 6.6) & SAE AS-5942

Ordering description

ORDERING DESCRIPTION EXAMPLES	STANDARD SPOOL SIZE	SUPPLIED DIAMETER		RECOVERED DIAMETER		RECOMMENDED USE RANGE (MIN-MAX)	
	Meter	mm	inches	mm	inches	mm	inches
Family-Tube Grade-3X-015-100-Colour	100 Meter - 328 Feet	1,5	3/32	0.5	0.019	0.8-1.9	0.032-0.075
Family-Tube Grade-3X-030-100-Colour	100 Meter - 328 Feet	3,0	1/8	1.0	0.039	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	0.063	1.7-4.0	0.069-0.160
Family-Tube Grade-3X-060-100-Colour	100 Meter - 328 Feet	6,0	1/4	2.0	0,078	2.3-5.4	0.091-0.215
Family-Tube Grade-3X-090-100-Colour	100 Meter - 328 Feet	9,0	3/8	3.0	0.118	3.4-8.1	0.137-0.320
Family-Tube Grade-3X-120-50-Colour	50 Meter - 164 Feet	12,0	1/2	4.0	0,157	4.6-10.7	0.183-0.425
Family-Tube Grade-3X-180-50-Colour	50 Meter - 164 Feet	18,0	0,7	6.0	0,236	6.9-16.2	0.275-0.640
Family-Tube Grade-3X-240-50-Colour	50 Meter - 164 Feet	24,0	0,944	8.0	0,314	9.2-21.6	0.366-0.850
Family-Tube Grade-3X-400-50-Colour	50 Meter - 164 Feet	40,0	1,57	13.0	0,512	20.9-33.0	0.825-1.300

Related Standard Test Methods And Documents

Document	Description
ASTM D 570	Water absorption
ASTM D638	Heat aging 168 at 158°C
ASTM D 638	Tensile strength testing
ASTM D 638	Elongation at break testing
ASTM D 792	Specific gravity
ASTM D 876	Dialectrical strength
ASTM D 876	Volume resistivity
ASTM D 882	Secant modulus
AMS-DTL-23053/5 class 1 & 3	Material specification heatshrinkable polyolefin flexible, cross-linked
ASTM D257 -IEC 93	Volume resistivity Ω -cm
SAE-AMS-DTL-23053	Insulation Sleeving, Electrical, Heat Shrinkable, General Specification for marking of electrical insulation materials
MIL-STD-202G 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 permanence 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.