

# HT

## High Temperature, heat shrink identification sleeves

### TECHNICAL DATA SHEET

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The WM-HT-2X Heat Shrinkable Wire Markers are made of flame retarded modified PVDF tubing with ideal printability properties for identification purposes.  
 Ideal for applications where high temperature and extreme fluid resistance characteristics are required.  
 This product is designed for use in Aerospace, Defence, and Mass Transit applications, wire bundling and assemblies, panel building and industrial installations.  
 Meets AMS-DTL-23053/18 UL224 VW-1 for vertical burn test / flammability.  
 This product is not recommended where strain relief is required.

### Industry



Industry



Marine



Wind power



Commercial



Aerospace



Construction



Railway



Military



Electrical installations



Petrochemical



Telecom



### STANDARD TUBE COLOR



### OTHER TUBE COLORS ON REQUEST



### BACKING TAPE COLORS



### MATERIAL

Extruded flame retarded polyvinylidene fluoride.

### SHRINK RATIO

2:1

### OPERATING TEMPERATURE

-55°C to +225°C  
 (-67°F to 437°F)

### MIN RECOVERY TEMPERATURE

>200°C (392°F)

### MIN RECOVERY TEMPERATURE

>135°C (275°F)

### SPECIFICATION / APPROVALS

SAE-AMS-DTL-23053/18 class 1  
 UL224 VW-1

### RECOMMENDED RIBBONS

FTI-X black & FTI-X-CO-WE white

### MARK PERMANENCE

SAE AS-5942

### PRINT RESISTANCE TO SOLVENT

MIL-STD-202 Method 215

Note.

Markers must be fully shrunk using the FTI-X ribbon black

### 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

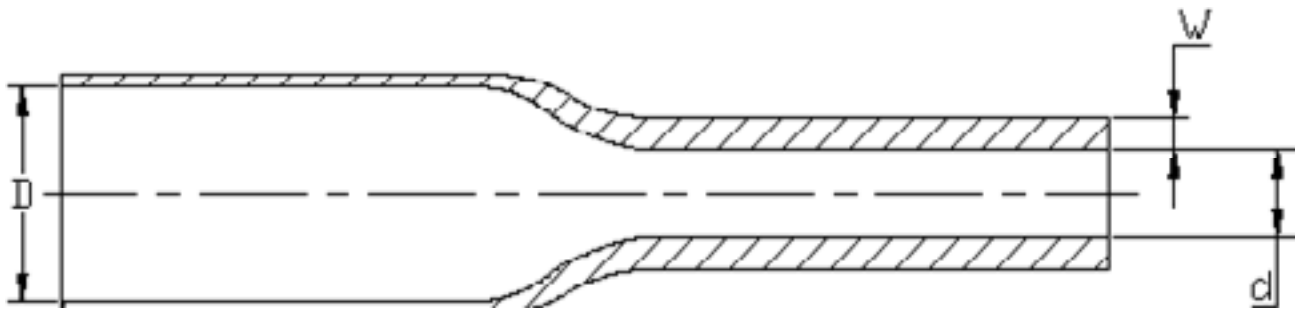
Specifically developed for the industries marked in green to the left.

Can be used in other industries also.

# Product Dimensions

## DIMENSIONS 2:1

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	2.36 (0.09)	1.18 (0.046)	0.49±0.06 (0.019 ± 0.002)
1/8	3.2	3.18 (0.125)	1.59 (0.063)	0.51±0.06 (0.02 ± 0.002)
3/16	4.8	4.75 (0.187)	2.36 (0.093)	0.54±0.06 (0.02 ± 0.002)
1/4	6.4	6.35 (0.252)	3.18 (0.125)	0.56±0.06 (0.022 ± 0.002)
3/8	9.5	9.53 (0.375)	4.75 (0.187)	0.59±0.06 (0.023 ± 0.002)
1/2	12.7	12.7 (0.50)	6.35 (0.250)	0.60±0.07 (0.024 ± 0.003)
3/4	19.1	19.05 (0.75)	9.53 (0.374)	0.62±0.07 (0.024 ± 0.003)
1	25.4	25.4 (1.00)	12.7 (0.500)	0.63±0.07 (0.025 ± 0.003)
1 ½	38.1	38.1 (1.50)	19.1 (0.750)	0.64±0.07 (0.025 ± 0.003)
2	50.8	50.8 (2)	25.4 (1.0)	0.64±0.08 (0.025 ± 0.003)
3	76.2	76.10 (3)	38.1 (1.5)	0.64±0.09 (0.025 ± 0.003)



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 D412	≥31,3 Mpa (min.)
Elongation at break	ASTM D421	≥330%
Longitudinal change	SAE-AMS-DTL-23053	+5%
Specific gravity	ASTM D 792	1,73 g/cm <sup>3</sup>
Secant Modulus	ASTM D882	≥730 MPA

### ELECTRICAL

PROPERTIES	TEST METHOD	TYPICAL VALUE
Dielectric strength	ASTM D 2671	≥43 kV/mm
Volume resistivity	ASTM D 876	≥ 9,1 x 10 <sup>14</sup> Ω/cm
Voltage Rating		600 Volt

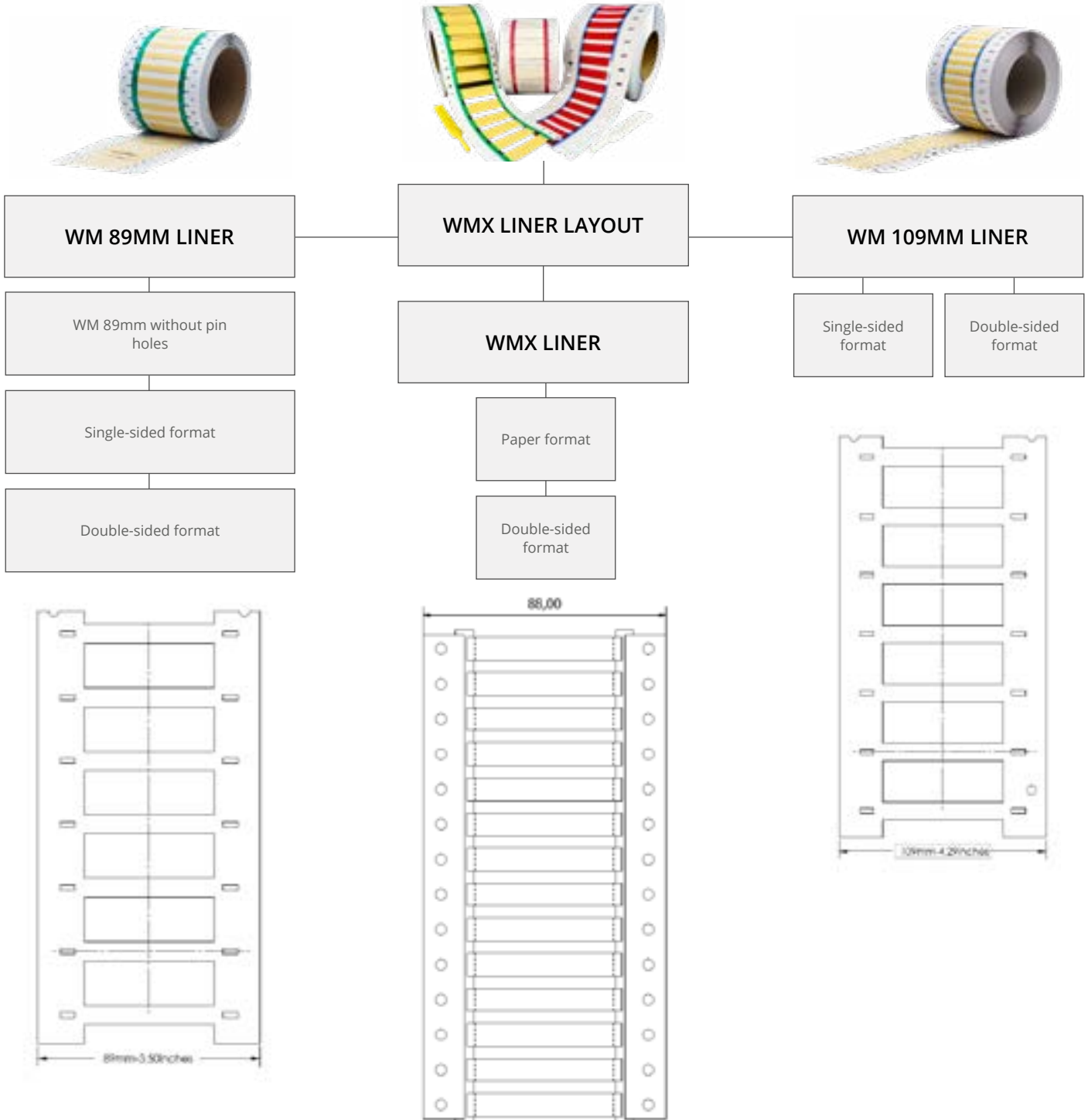
### CHEMICAL

PROPERTIES	TEST METHOD	TYPICAL VALUE
Fluid resistance	AMS-DTL-23053/5	Good - Pass
Water absorption	ASTM D 570	≤ 0,2 %
Flammability	UL224 VW-1	Pass
Fungus resistance	ASTM G 21	Pass

### THERMAL

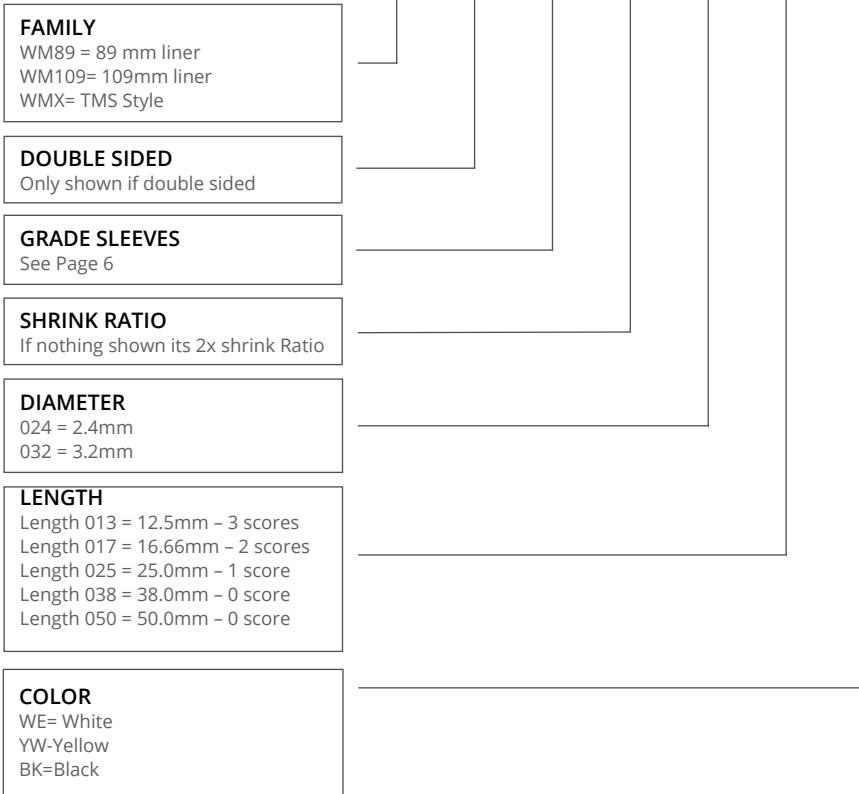
PROPERTIES	TEST METHOD	TYPICAL VALUE
Heat shock 4 hours at 250°C	SAE-AMS-DTL-23053	No dripping, cracking or flowing - Pass
Heat aging 168 hours at 225°C	SAE-AMS-DTL-23053	Elongation ≥200%
Copper corrosion (225°C x 16h)	SAE-AMS-DTL-23053	Pass
Low temperature flexibility (-55°C x4h)	SAE-AMS-DTL-23053	Pass
Copper corrosion (160°C x16h)	SAE-AMS-DTL-23053	Pass
Clairity stability (200°C x 24h)	SAE-AMS-DTL-23053	Pass

## Available Formats



## Product code

WM - DS -AMD- 3X - 024 - 013 - YW

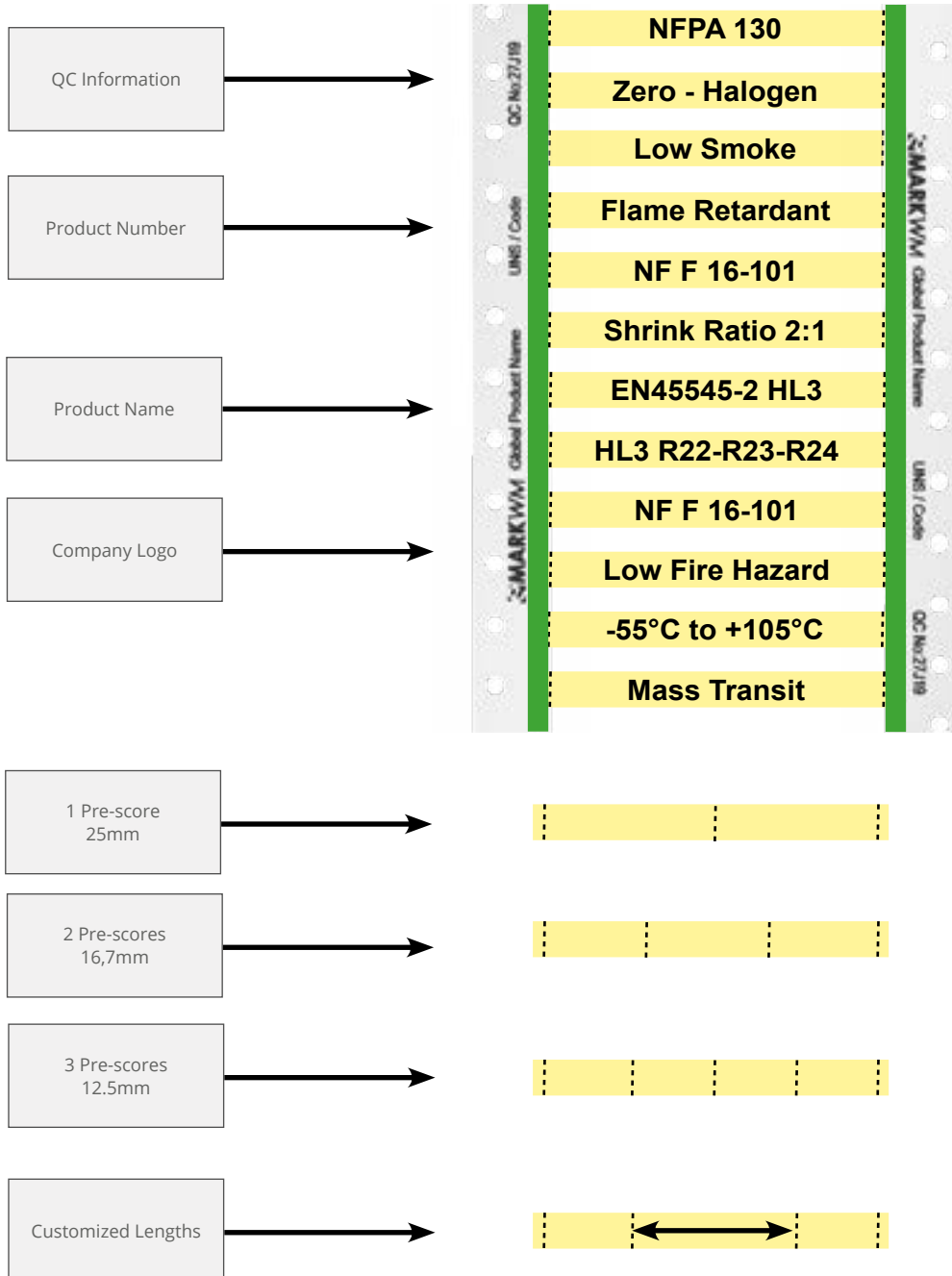


## Available options -

SIZE MM	SIZE INCHES	STANDARD	BULK	JUMBO
2,4 x 50 mm	3/32 - 2.0	1.000	5.000	10.000
3,2 x 50 mm	1/8 - 2.0	1.000	5.000	10.000
4,8 x 50 mm	3/16 - 2.0	1.000	5.000	10.000
6,4 x 50 mm	1/4 - 2.0	1.000	3.000	6.000
9,5 x 50 mm	3/8 - 2.0	500	2.000	4.000
12,7 x 50 mm	1/2 - 2.0	500	1.500	3.000
19,0 x 50 mm	3/4 - 2.0	500	1.500	3.000
25,4 x 50 mm	1 - 2.0	300	1.000	2.000
38,1 x 50 mm	1 1/2 - 2.0	100	600	1.200
50,8 x 50 mm	2 - 2.0	100	600	1.200

## Other Spool sizes on request -

## Customized liner information example



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 heat shrinkable polyolefin tubing with ideal printability properties for identification purposes. C3 meets NFPA 130 requirements. The C3 material is fabricated to meet the material performance requirements of the AMS-DTL-23053/5 class 1 and meets the features in Airbus specification NSA 937201. The compound is also UL224 and CSA compliant. Ideal for aerospace, military, industrial and energy applications. The marker sleeves meets the mark permanence requirements of AS5942 and MIL 202 Method 215K	EN 60684-3-209 NFPA 130 UL224 CSA 22.2 No. 198- SAE-AMS-DTL-23053/5 SAE AS 5942 MIL-STD-202F method 215 AMS-DTL-23053/5 AIRBUS NSA937201
WMX-WM89-WM109	ZH	The ZH heatshrink tubing is 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 meets Boeing BS 7239 for toxic gas generation M7 specification, and is classified with EN45545-2 Class HL3 requirement set R22 (interior) and R23 (exterior). R24 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 60684-3-216 test report are available on request	EN 45545-2 HL3, R22/R23/R24 NFPA 130 EN 60684-3-216 LUL S1085 NF F 16 101 SAE 5942 MIL-STD-202 method 215 DIN EN 50343 appendix H
WMX-WM89-WM109	LFH	The LFH printable heatshrink tubing is made of halogen-free flame retardant and low smoke heat shrinkable polyolefin tubing with ideal printing properties for identification purposes. The compound 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-202 method 215 EN50343 Annex H Section H.3
WMX-WM89-WM109	LFH-3X	The LFH printable heatshrink tubing is made of halogen-free flame retardant and low smoke heat shrinkable polyolefin tubing with ideal printing properties for identification purposes. The compound 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-202 method 215 EN50343 Annex H Section H.3
WMX-WM89-WM109	HT	The HT printable heatshrink tubing is 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-202 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 railway 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-202 method 215
WMX-WM89-WM109	AMD	The AMD printable heatshrink is 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-202 method 215
WMX-WM89-WM109	AMD-3X	The AMD printable heatshrink is 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-202 method 215
WMX-WM89-WM109	3-1	The 3-1 flexible heatshrink tubing is made of flame retarded, heat shrinkable polyolefin tubing with ideal printability properties for identification purposes. The 3-1 tubing meets the requirements of a wide range of industrial standards such as SAE-AMS-DTL 23053/5 class 1 & 3. Yellow green version 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-202 method 215
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, which provides fluid resistance as per EN50343. The product meets rail standards EN50343 Appendix H and EN45545-2 requirement set R22/R23/24 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-202 Method 215 Mark Permanence: EN50343 annex H (section 6.6) & SAE AS-5942

## Ordering description

ORDERING DESCRIPTION EXAMPLES	STANDARD PACK SIZE	SUPPLIED DIAMETER		RECOVERED DIAMETER		RECOMMENDED USE RANGE (MIN-MAX)	
		pcs	mm	inches	mm	inches	mm
Family-Tube Grade-3X-024-50-Colour	1.000	2,4 x 50mm	3/32-2.0	0.7	0.031	0.8-1.9	0.032-0.075
Family-Tube Grade-3X-032-50-Colour	1.000	3,2 x 50mm	1/8-2.0	1.0	0.042	1.1-2.6	0.044-0.105
Family-Tube Grade-3X-048-50-Colour	1.000	4,8 x 50mm	3/16-2.0	1,5	0.062	1.7-4.0	0.069-0.160
Family-Tube Grade-3X-064-50-Colour	1.000	6,4 x 50mm	1/4-2.0	2.3	0,095	2.3-5.4	0.091-0.215
Family-Tube Grade-3X-095-50-Colour	500	9,5 x 50mm	3/8-2.0	3.1	0.125	3.4-8.1	0.137-0.320
Family-Tube Grade-3X-127-50-Colour	500	12,7 x 50mm	1/2-2.0	4.75	0,187	4.6-10.7	0.183-0.425
Family-Tube Grade-3X-190-50-Colour	500	19,0 x 50mm	3/4-2.0	6.35	0.250	6.9-16.2	0.275-0.640
Family-Tube Grade-3X-254-50-Colour	300	25,4 x 50mm	1-2.0	8.47	0.33	9.2-21.5	0.366-0.850
Family-Tube Grade-3X-381-50-Colour	100	38,1 x 50mm	1 1/2-2.0	12.9	0.51	20.9-33.0	0.825-1.300
Family-Tube Grade-3X-508-50-Colour	100	50,8 x 50mm	2-2.0	17.2	0.68	27.9-44.9	1.100-1.750



## Related Standard Test Methods And Documents

Document	Description
ASTM D638 - ASTM G154 - ISO 37 -GB/T1040	Tensile strength and ultimate elongation
ASTM D638- ISO188	Heat aging 168 at 158°C
ASTM D 2671	Flammability testing. Heat shock 4 hours at 225°C
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-23053/5	Chemical resistance - <b>good</b>
ASTM D257 -IEC 93	Volume resistivity $\Omega$ -cm
ASTM D 635-HB - SAE-AMS-DTL-23053/5	Flammability resistance - Fire propagation
GB/T 1040	Test Conditions for moulding and extrusion plastics
SAE AS5942;2014	Marking og insulation materials- Print permanence testing using the mechanical crockmeter
BS EN 50343:2014 Annex H Section H.3	Railway applications. Rolling stock. Rules for installation of cabling- Mark Permanence
UL224	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.