

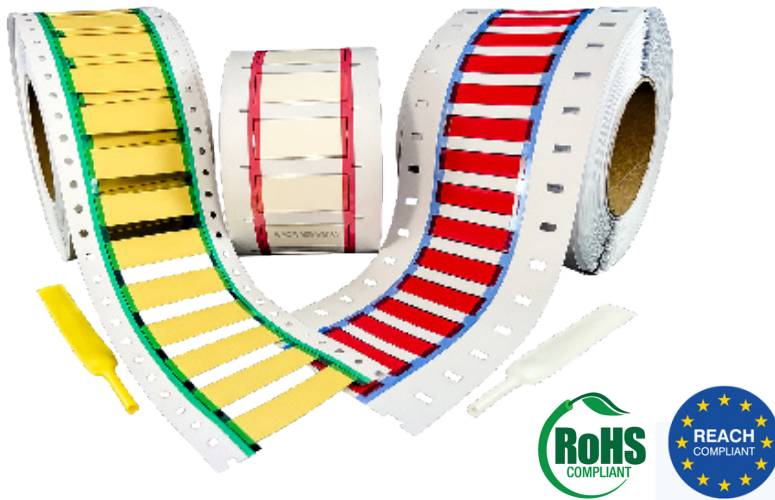
# DR

## Diesel resistant, self extinguishing heat shrinkable identification sleeve

### TECHNICAL DATA SHEET

Revision Number. 1.3

Last Edited 17. januar 2025



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 F 00 608. Ideal for applications where diesel resistanty 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 F 00 608 linked to SNCF specifications where especially oils for long periods have been tested at elevated temperatures. The low halogen content ensures minimal release of toxic and corrosive gases, aligning with safety expertations internationally. 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 AS 23053/6 class 1. The material is classified and tested to EN45545-2. Test available upon request.

### 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, cross linked polyolefin.

### SHRINK RATIO

3:1

### OPERATING TEMPERATURE

-55°C to +135°C  
(-35°F to 275°F)

### SHRINK TEMPERATURE

>90°C (130°F)

Recommended black ribbon for best performance to meet AS5942, MIL-STD-202H, NF F 00 608 FTI-X - FTI-HXX

### INDUSTRY STANDARDS

MIL-DTL-23053/6 class 1  
EN45545-2  
R22: HL1  
R23: HL1, HL2  
R24: HL1, HL2, HL3

### FLAMMABILITY

AS 23053 1999 4.6.14  
ASTM D2671-09 Section 68-74  
Procedure B and AS23053/6  
UL224

### HALOGEN CONTENT

Below 0,09%

### 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.

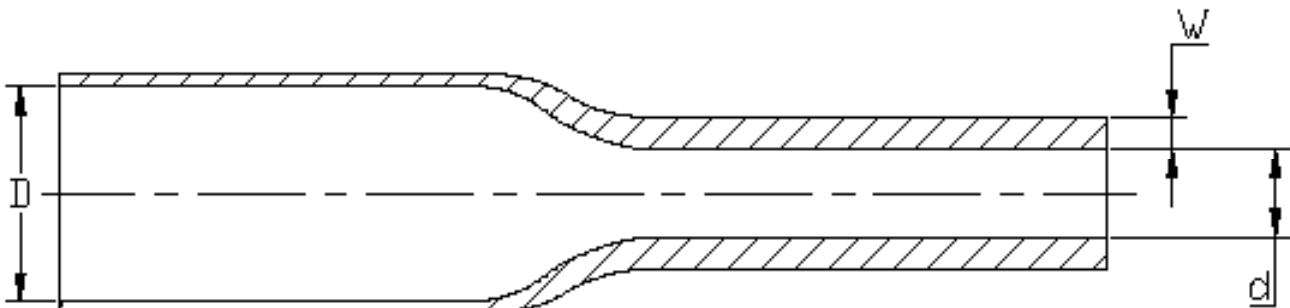
### APPLICATIONS

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 <sup>2</sup>
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 <sup>2</sup>
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 <sup>2</sup>
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 <sup>2</sup>
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 <sup>2</sup>
Volume resistivity	IEC 93	1.82 x 10 <sup>14</sup> Ω/cm

## CHEMICAL

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

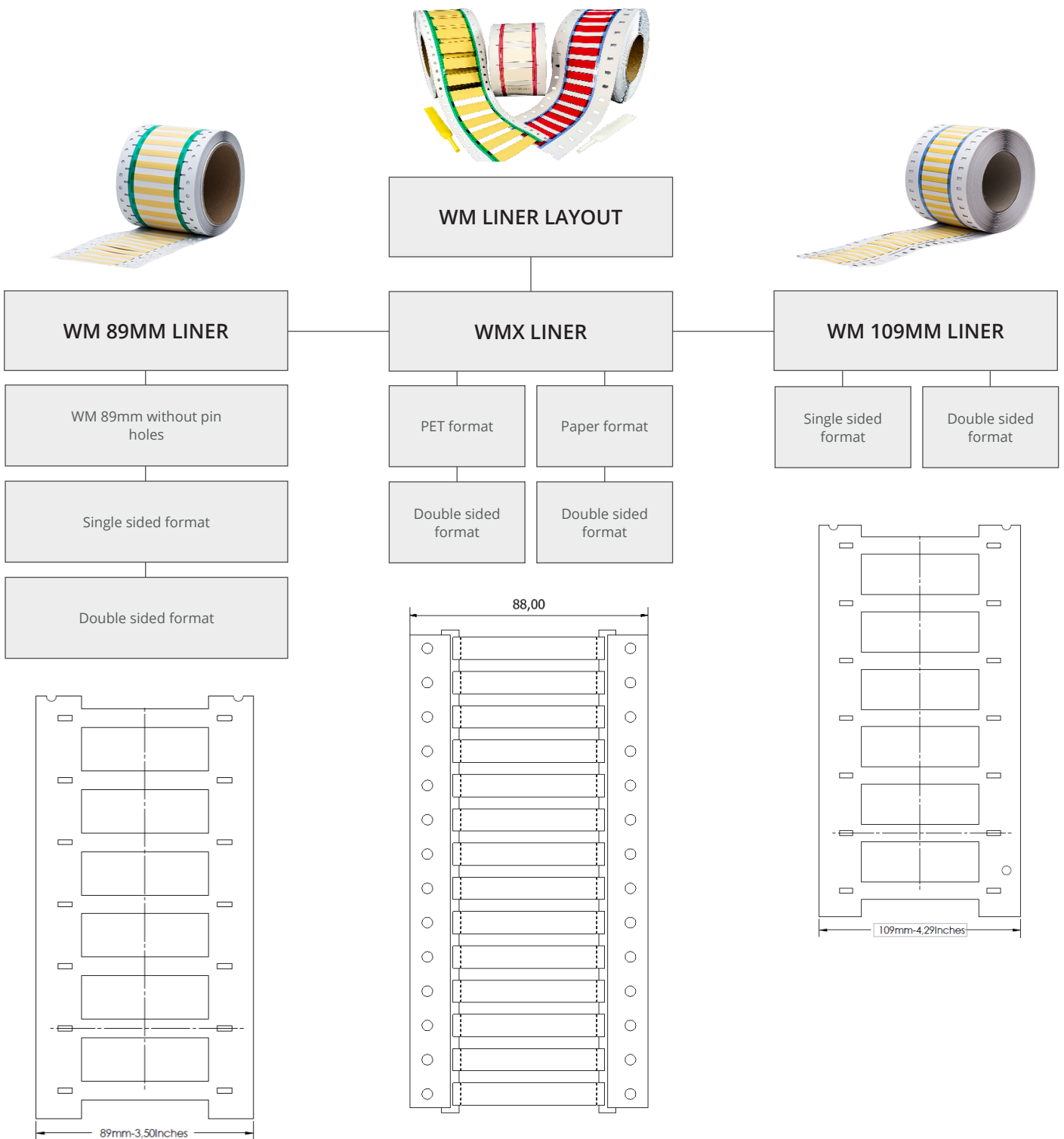
## THERMAL

PROPERTIES	TEST METHOD	TYPICAL VALUE
Heat shock 4 hours at 225°C	AS 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

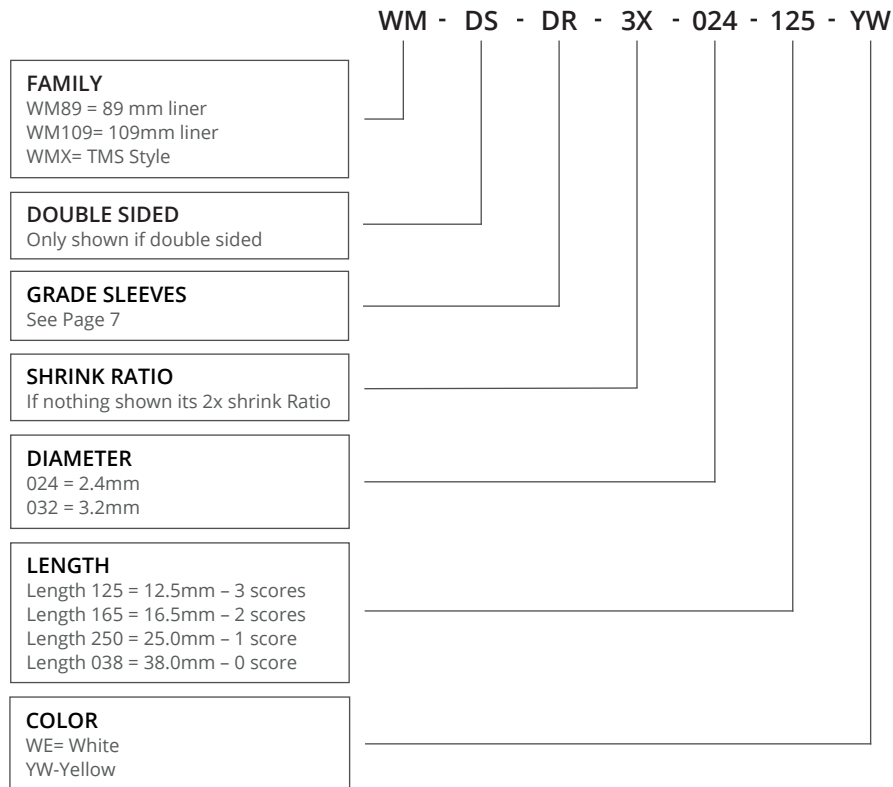
## Environmental UV Stability

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

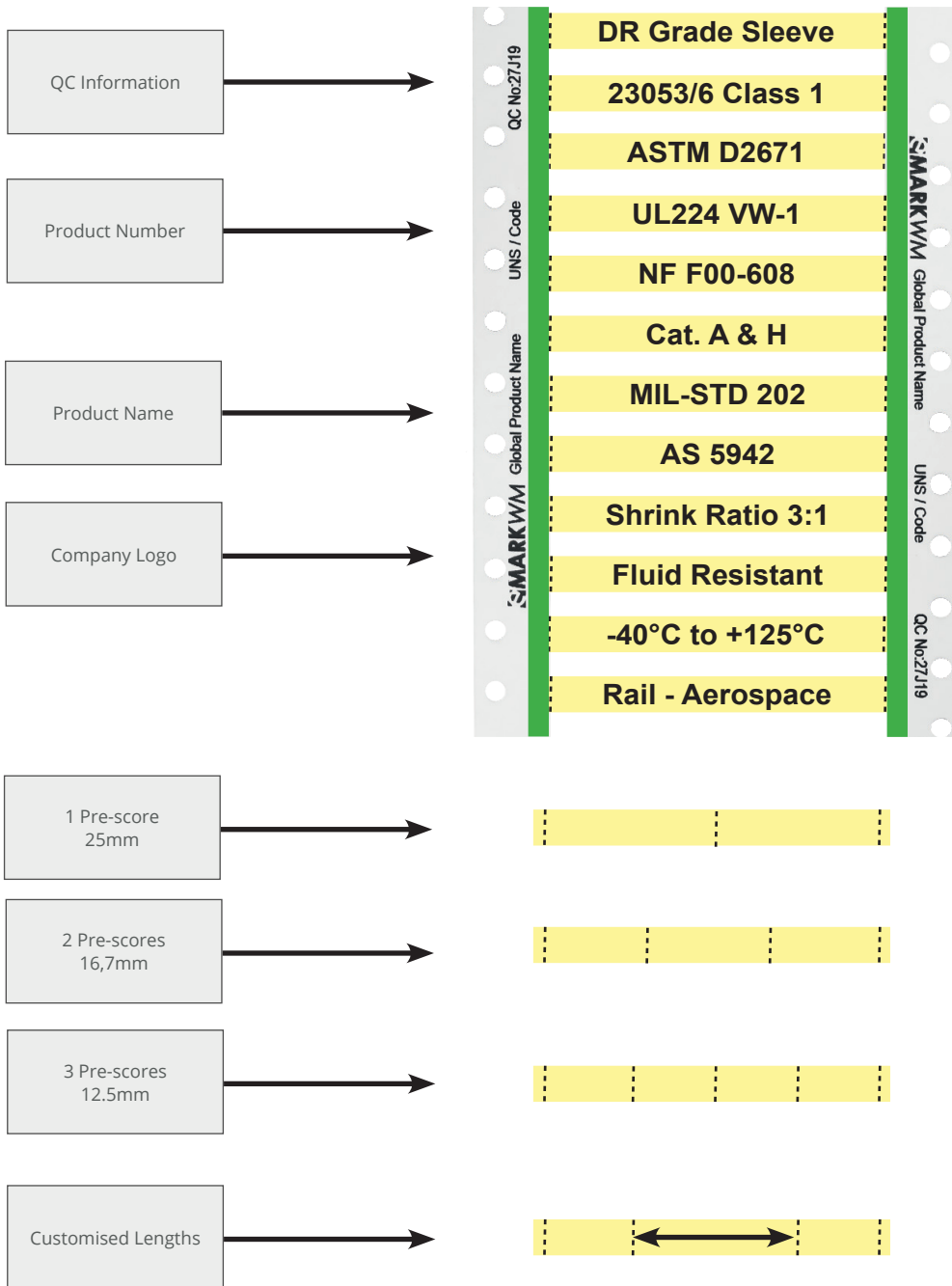


## Available options -

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 -

## Customised 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 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-AS 23053/5 AS 5942 MIL-STD-202H method 215 AS 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 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-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-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 AS 23053/8 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 00 608 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 AS 23053/6 Class 1 AS 5942 MIL-STD-202H method 215 EN45545-2
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 AS-23053/5 Class 1 & 3 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 AS 23053/5 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

## 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	Heat aging 168 at 158°C
ASTM D 2671 C	Flammability testing.
ASTM D2671 -UL224	Longitudinal change
ASTM G154-GB/T1408	Dielectrical strength.
ASTM D2671B - UL224	Copper corrosion (Section 93 procedure A) damaged area of copper mirror,
AS 23053/6 class 1	Matrial specification
ASTM D257 -IEC 93	Volume resistivity $\Omega$ -cm
MIL-DTL-23053E	Insulation Sleeving, Electrical, Heat Shrinkable, General Specification for marking of electrical insulation materials
MIL-STD-202H Test method 215	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.
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.
EN45545-2	<p>EN45545-2 is a standard that describes the material requirements for different hazard levels - HL1 - HL-2 -HL3 in railway applications. The standard sets the flammability, smoke emissions and toxicity requirements for internal and external applications.</p> <p>The HL levels are defined as follows:</p> <ul style="list-style-type: none"> <li>- **HL 1***: Applies to vehicles that operate on open tracks with easy access and low speed. Examples are freight trains, shunting locomotives and maintenance vehicles.</li> <li>- **HL 2***: Applies to vehicles that operate on open tracks with easy access and high speed, or on closed tracks with easy access and low speed. Examples are regional trains, trams and metros.</li> <li>- **HL 3***: Applies to vehicles that operate on closed tracks with difficult access and high speed, or on open tracks with difficult access and low speed. Examples are high-speed trains, underground trains and trains that operate in long tunnels.</li> </ul> <p>The higher the hazard level, the more stringent the requirements for fire behaviour of materials and components. The requirements are specified in terms of flammability, smoke emission and toxicity for internal and external applications.</p>