

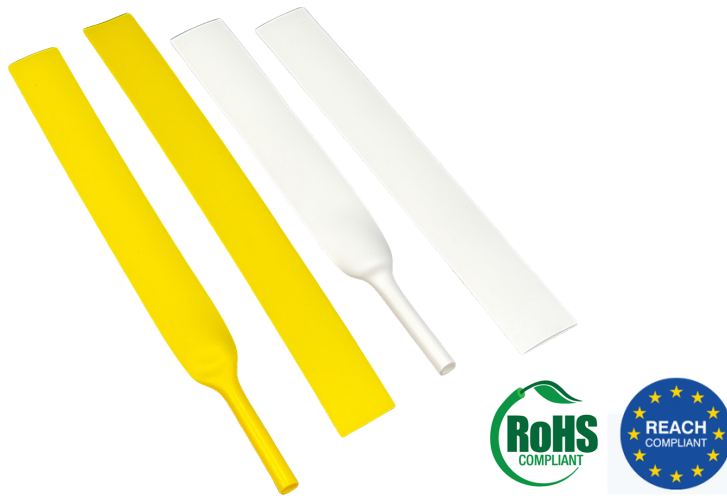


LSHH 2X - 3X

Zero halogen flame retardant low smoke identification Sleeves

TECHNICAL DATA SHEET

Revision Number. 1.6
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The LSHH 2X and 3X Heat Shrinkable, flattened continuous sleeving is made of halogen free, flame retardant and low smoke heat shrinkable polyolefin tubing with ideal printability properties for identification purposes.

Ideal for applications where the requirements are no halogens and low fire hazard characteristics combined with minimal smoke emission.

This product is designed for use in commercial and industrial sectors wire bundling and assemblies, panel building and commercial industrial installations.

Industry



Industry



Marine



Wind power



Commercial



Aerospace



Construction



Railway



Military



Electrical installations



Petrochemical



Telecom

STANDARD TUBE COLOR



MATERIAL

Extruded, cross linked polyolefin.

SHRINK RATIO

2:1 & 3:1

FORMAT

Supplied as flattened continuous sleeving

OPERATING TEMPERATURE

-40°C to +125°C
(-40°F to 193°F)

SHRINK TEMPERATURE

Nominal 120°C >90°C (130°F)

ZERO HALOGEN

Yes

RECOMENDED THERMAL TRANSFER RIBBON

Black: FTI-X, FTI-HXX
White: FTI-HLD

STORAGE

Cool and dry in original packaging. Recommended temperature at +10°C to +max 50°C and 45-55% relative humidity. Use within 2 years from date of manufacture.

APPLICATIONS

Usage in commercial , cable harnesses, industrial marking, insulation, wire bundling and mechanical protection.

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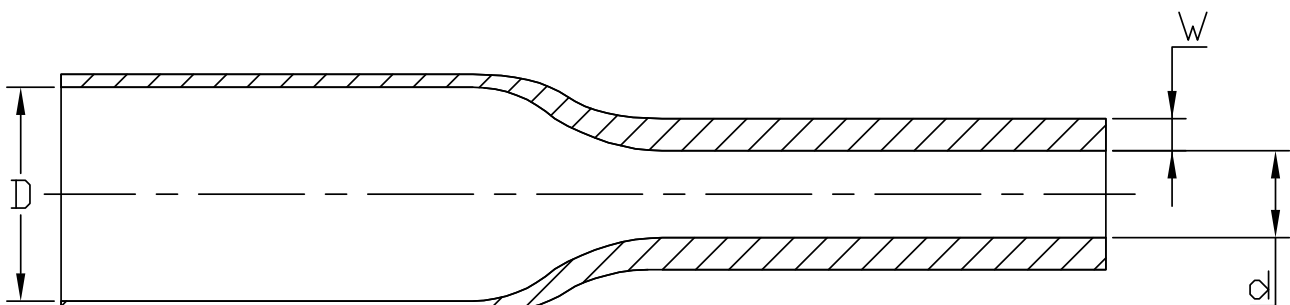
Product Dimensions

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)	Package Meter /Roll
3/32	2,4	3.0 ±0,2 (0.118)	≤ 1.3 (0.0511)	0.45±0.10 (±0,017± 0,0039)	50
1/8	3,2	3.5 ±0,2 (0.137)	≤ 1.5 (0.0590)	0.45±0.10 (±0,017 ± 0,039)	50
3/16	4,8	5.0 ±0,2 (0.196)	≤ 2.3(0.090)	0.45±0.10 (±0,017 ± 0,039)	100
1/4	6,4	6.5 ±0,2 (0.255)	≤ 3.0 (0.118)	0.56±0.10 (±0,0220 ±0,039)	100
3/8	9,5	10.5 ±0,3 (0.413)	≤ 5.0 (0.196)	0.56±0.10 (±0,0220 ± 0,039)	100
1/2	12,7	12.5 ±0,3 (0.492)	≤ 6.0 (0.236)	0.56±0.10 (±0,0220 ± 0,039)	100
3/4	19	19.0 ±0,5 (0.748)	≤ 9.0 (0.354)	0.70±0.15 (0.027 ± 0.0059)	100
1	25	26.0 ±0,5 (1.02)	≤ 12.5 (0.492)	0.9±0.15 (0.027 ± 0.0059)	50
1 ½	38	41.5 ±1,0 (1.63)	≤ 20.0 (0.787)	1.0±0.15 (0.039 ± 0.0027)	50

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)	Package Meter /Roll
3/32	2.4	≥ 2.4 (0.94)	≤ 0.8 (0,0314)	0.55±0.10 (0.021 ± 0.004)	50
1/8	3.2	≥ 3 (0.118)	≤ 1.0 (0.039)	0.55±0.10 (0.021 ± 0.004)	50
3/16	4.8	≥ 4,5 (0.236)	≤ 1.5 (0.063)	0.60±0.10 (0.0236 ± 0.004)	100
1/4	6.4	≥ 6 (0.251)	≤ 2 (0.094)	0.60±0.10 (0.0236 ± 0.004)	100
3/8	9.5	≥ 9 (0.354)	≤ 3 (0.126)	0.75±0.10 (0.029 ± 0.004)	100
1/2	12.7	≥ 12 (0.472)	≤ 4 (0.188)	0.75±0.10 (0.029 ± 0.004)	100
3/4	19	≥ 18 (0.708)	≤ 6 (0.250)	0.85±0.15 (0.0334 ± 0.059)	100
1	25	≥ 24 (1.00)	≤ 8(0.330)	1.00±0.15 (0.0393 ± 0.059)	50
1 ½	38	≥ 39 (1.53)	≤ 13 (0.500)	1.00±0.15 (0.0393 ± 0.059)	50



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 2671	10.34 Mpa (min.)
Elongation at break	ASTM D 2671	≥200%
Longitudinal change	UL224	≤ +/-5%
Water absorption	ASTM D 570	≤ 1.0%

ELECTRICAL

PROPERTIES	TEST METHOD	TYPICAL VALUE
Dielectric strength	IEC 243	≥ 15 kV/mm ²
Volume resistivity	IEC 93	≥ 10 ¹⁴ Ω/cm

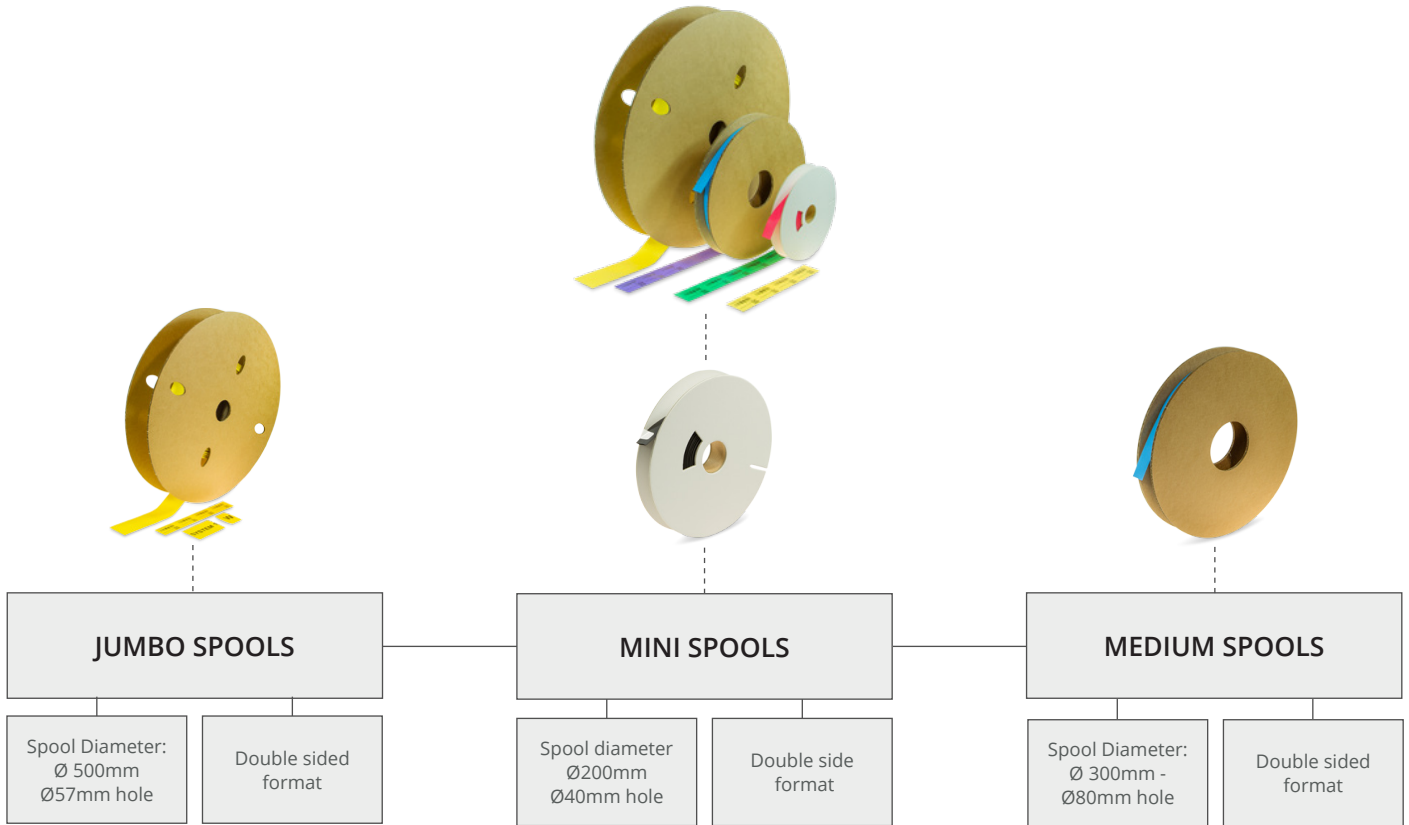
CHEMICAL

PROPERTIES	TEST METHOD	TYPICAL VALUE
Chemical resistance	AMS-DTL-23053/5	Good
Copper corrosion	UL224	No corrosion
Copper stability	UL224	No corrosion

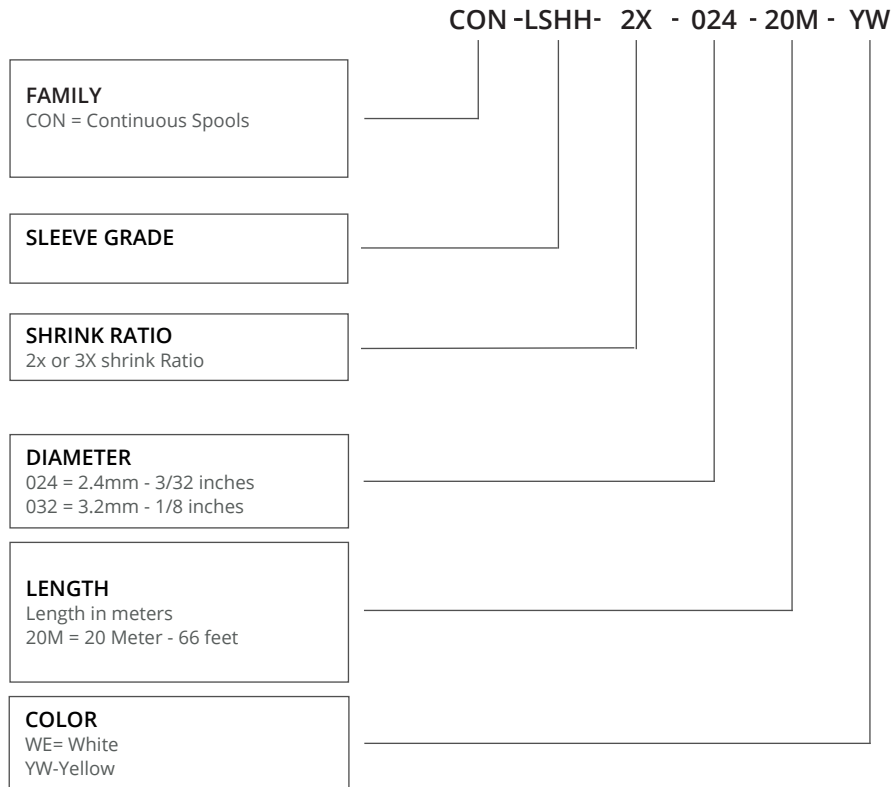
THERMAL

PROPERTIES	TEST METHOD	TYPICAL VALUE
Heat shock 4 hours at 250°C	UL224	No dripping, cracking or flowing
Heat aging 168 hours at 158°C	UL 224	Elongation min 100%
Flammability	UL224	No corrosion Pass » Flame retardant
Low temperature flexibility	UL224	No cracks

Available Formats



Product code Example



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 - *

Other 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. Meets NFPA 130 Standard. 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	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 NFPA 130
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 (R22-R23) BS 6853 DIN5510-2 UNI CEI 11170-3 NFPA130 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 File E361238 CSA File 220127 SAE AS 81531 / 5942 MIL-STD-202F method 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 File E361238 CSA File 220127 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 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. Meets NFPA 130 Standard	UL224 SAE-AMS-DTL-23053/5 SAE AS 81531 / 5942 MIL-STD-202F method 215J NFPA 130
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. Meets NFPA 130 Standard	UL224 SAE-AMS-DTL-23053/5 SAE AS 81531 / 5942 MIL-STD-202F method 215J NFPA 130
WMX-WM89-WM109	3-1	The 3-1 heatshrink tubing are made of halogen free, flame retarded, 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. Material: Irradiated cross-linked flexible flame-retarded polyolefin Shrink Temperature: Min 90 deg.	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

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	Dielectrical strength.
ASTM D2671B - UL224	Copper corrosion (Section 93 procedure A) damaged area of copper mirror,
AMS-DTL-23053/5	Chemical resistance - good
ASTM D257 -IEC 93	Volume resistivity Ω -cm
ASTM D 635-HB - SAE-AMS-DTL-23053/5	Flammability resistance - Fire propagation
GB/T 1040	Test Conditions for moulding and extrusion plastics
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.