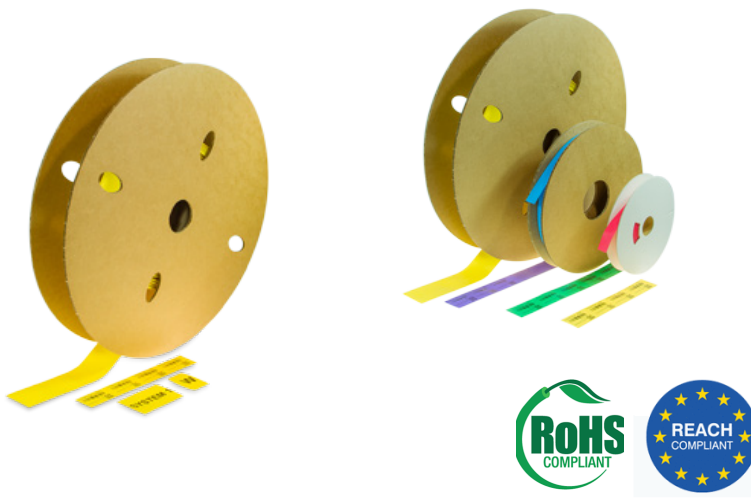


AMD Continuous bulk spool

Flame retardant self-extinguishing identification Sleeves

TECHNICAL DATA SHEET

Revision Number. 1
Last Edited 11. februar 2019



The AMD 2X and 3X Heat Shrinkable Wire Markers are made of flame retardant, self-extinguishing flexible heat shrinkable polyolefin tubing with ideal printability properties for identification purposes.

This product is designed for aerospace, military, defence and marine applications where UL224 and SAE-AMS-DTL-23053/5 class 1 & 3 characteristics are required.

For use in wire bundling and assemblies, panel building.

AMD grade identification sleeves meets UL224 VW-1/CSA and AMS-DTL-23053/5 class 1 & 3.

The AMD grade identification sleeve are very versatile through excellent balance of chemical, electrical and mechanical properties.

Industry



Industry



Marine



Wind power



Commercial



Aerospace



Construction



Railway



Military /
Defence



Electrical
installations



Petrochemical



Telecom

STANDARD TUBE COLOR



OTHER TUBE COLORS ON REQUEST

MATERIAL

Extruded, cross linked polyolefin.

SHRINK RATIO

2:1 & 3:1

OPERATING TEMPERATURE

-40°C to +135°C
(-40°F to 275°F)

SHRINK TEMPERATURE

>90°C (130°F)

COMPLIANCES

Mark Permanence:

SAE AS-5942

Recommended black ribbon:

FTI-Y, FTI-X

Chemical Resistance to solvents:

AMS-DTL-23053/5

MIL-STD-202G

Test method 215j

INDUSTRY STANDARDS

SAE-AMS-DTL-23053/5 class 1 & 3

FLAMMABILITY

UL224 125°C 600 VW-1

File E203950

CSA 125°C 600V VW-1

File 220127

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 aerospace, military, defence, marine cable harnesses, marking, insulation, wire bundling and mechanical protection.

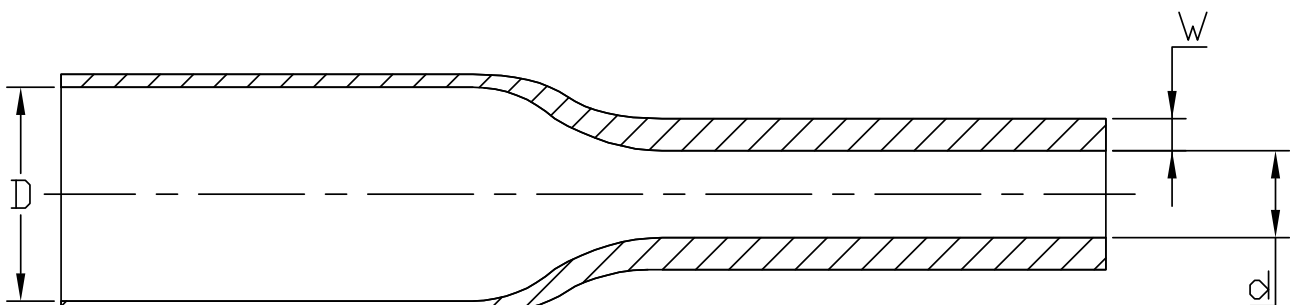
Product Dimensions

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	2.79 (0.109)	1.18 (0.046)	0.49±0.06 (0.019 ± 0.002)
1/8	3.2	3.64 (0.143)	1.59 (0.063)	0.51±0.06 (0.02 ± 0.002)
3/16	4.8	5.26 (0.207)	2.36 (0.093)	0.54±0.06 (0.02 ± 0.002)
1/4	6.4	6.92 (0.272)	3.18 (0.125)	0.56±0.06 (0.022 ± 0.002)
3/8	9.5	10.2 (0.401)	4.75 (0.187)	0.59±0.06 (0.023 ± 0.002)
1/2	12.7	13.5 (0.531)	6.35 (0.250)	0.60±0.07 (0.024 ± 0.003)
3/4	19.1	20.1 (0.791)	9.53 (0.374)	0.62±0.07 (0.024 ± 0.003)
1	25.4	26.7 (1.05)	12.7 (0.500)	0.63±0.07 (0.025 ± 0.003)
1 ½	38.1	39.8 (1.57)	19.1 (0.750)	0.64±0.07 (0.025 ± 0.003)
2	50.8	53.0 (2)	25.4 (1.0)	0.64±0.08 (0.025 ± 0.003)
3	76.2	79.4 (3)	38.1 (1.5)	0.64±0.09 (0.025 ± 0.003)

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	ASTM D638	10.3 Mpa (min.)
Elongation at break	ASTM D638	≥200%
Longitudinal change	UL224	+/-5%
2% Secant Modulus	SAE-AMS-DTL-23053/5	118MPa
Water absorption	SAE-AMS-DTL-23053/5	0.09 %
Specific gravity	ASTM D 792	1.34g/ cm ³

ELECTRICAL

PROPERTIES	TEST METHOD	TYPICAL VALUE
Dielectric strength	ASTM D876	19.7 kV/mm ² no flashover or dielectric breakdown occurred
Volume resistivity	ASTM D876	≥ 10 ¹⁴ Ω/cm
Voltage Rating	UL224	600 Volt

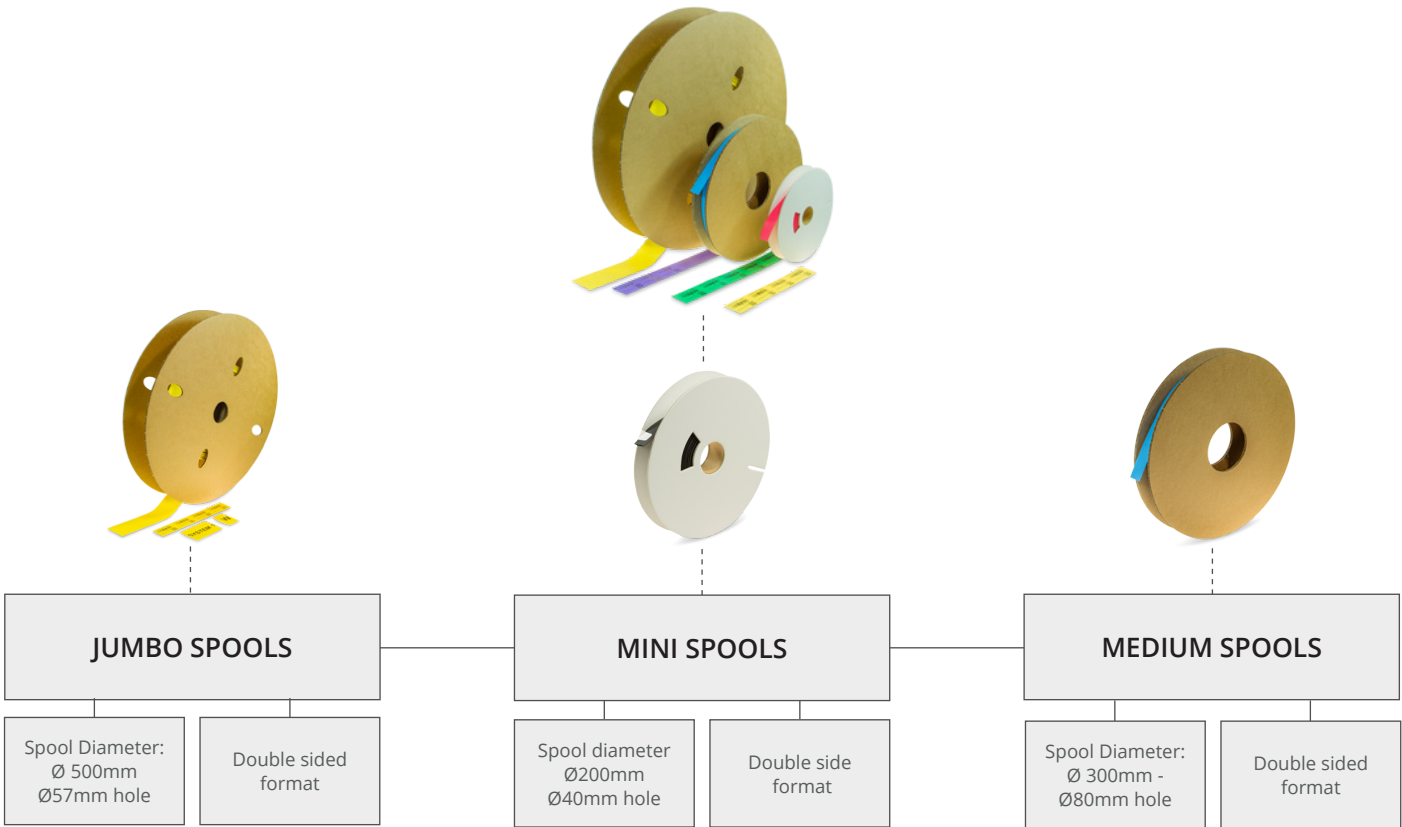
CHEMICAL

PROPERTIES	TEST METHOD	TYPICAL VALUE
Chemical resistance	AMS-DTL-23053/5	Good
Copper corrosion	SAE-AMS-DTL-23053/5	No corrosion
Copper stability	SAE-AMS-DTL-23053/5	No corrosion
Fluid resistance (23°C, 24h) AMS-DTL-23053	ASTM D638	6.9 Min

THERMAL

PROPERTIES	TEST METHOD	TYPICAL VALUE
Heat shock 4 hours at 250°C	AMS-DTL-23053/5	No dripping, cracking or flowing
Elongation after heat aging 168 hours at 175°C	ASTM D 638	Elongation 100%
Flammability	UL224 VW-1 - ASTM2671-13 Section 68 - SAE-AMS-DTL 23053/5A	Pass » Flame retardant
Low temperature flexibility / bending	ASTM D2671- SAE-AMS-DTL-230537/5	No cracking - pass

Available Formats



Product code

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

FAMILY
CON = Continuous Spools

GRADE SLEEVES
See Page 6

SHRINK RATIO
If nothing shown its 2x 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. 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
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 (ASTM E 162, 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 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 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.	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.	UL224 SAE-AMS-DTL-23053/5 SAE AS 81531 / 5942 MIL-STD-202F method 215J
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 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 3X shrink ratio

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	0.039	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-064-100-Colour	100 meter - 328 feet	6,4	1/4	2.4	0,094	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	0.126	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	6.40	0.250	6.9-16.2	0.275-0.640
Family-Tube Grade-3X-254-50-Colour	50 meter - 164 feet	25,4	1	8.47	0.333	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-762-50-Colour	50 meter - 164 feet	79.4	3	25.8	1.05	45,0-	1,75-3,54

Related Standard Test Methods And Documents

Document	Description
ASTM D638 -	Tensile strength and ultimate elongation specification
ASTM D638-	Heat aging 168 at 158°C specification
ASTM D 2671	Flammability testing. Heat shock 4 hours at 225°C - specification
ASTM D2671 -UL224	Longitudinal change- specification
ASTM D 792	Specific gravity specification
ASTM D876	Dielectric strength - Volume resistivity- specification
ASTM D2671B - UL224	Copper corrosion (Section 93 procedure A) damaged area of copper mirror,
AMS-DTL-23053/5	Insulation Sleeving, Electrical, Heat Shrinkable, Polyolefin, Flexible, Crosslinked specification
A STM D876	Volume resistivity Ω -cm
ASTM D 635-HB - SAE-AMS-DTL-23053/5	Flammability resistance - Fire propagation
MIL 202 Method 215	Resistance to-of solvents. Test methods for electronic and electrical component parts
SAE AS5942;2014	Marking og insulation materials- Print permanence testing using the mechanical crockmeter
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.