

# C3 Continuous Mini Spools

## Military Grade Self Extinguishing Identification Sleeves

### TECHNICAL DATA SHEET

Revision Number. 1  
Last Edited 7. februar 2019



The C3- 3:1 shrink ratio, continuous 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 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.

## Industry



Industry



Marine



Wind power



Commercial



Aerospace



Construction



Railway



Military



Electrical installations



Petrochemical



Telecom

### STANDARD TUBE COLOR



### OTHER COLORS



### MATERIAL

Extruded, cross linked polyolefin.

### SHRINK RATIO

3:1

### OPERATING TEMPERATURE

-55°C up to +135°C

(-67°F to 275°F)

Shrink Temperature

≥90° (194°F)

### COMPLIANCES

Mark Permanence:

SAE AS-5942

Print Resistance to solvents:

MIL-STD-202G

Test method 215K

### RECOMMENDED BLACK RIBBON

FTI-Y, FTI-X

### FIRE PROPAGATION

ASTM D2671 Procedure B

### TOXICITY

N-A

### AIRBUS STANDARD

NSA937201 Table 7

**UL224** 135°C

Certificate E228117

### CSA-C22.2

No. 198.1-06

### Material performance

AMS SAE DTL 23053/5 Class 1

### 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.

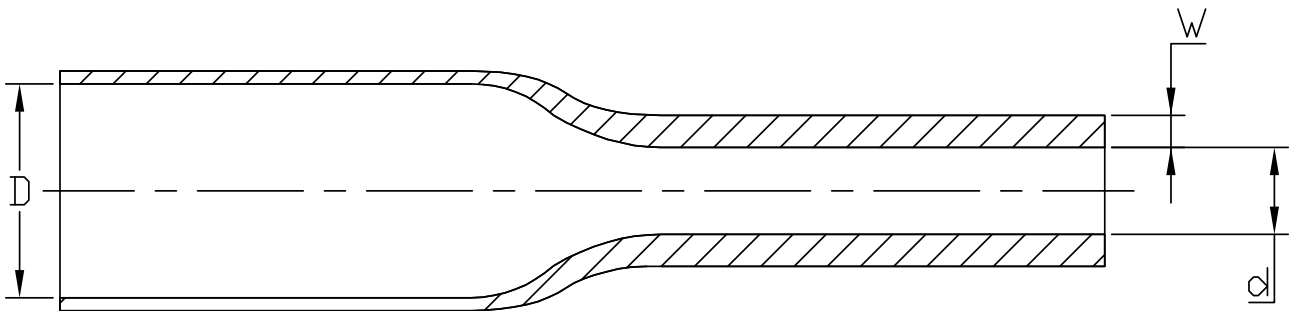
### APPLICATIONS

Specific developed to be used in Aerospace, Military, Industrial, energy 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	2.5 (0.098)	0.8 (0.031)	0.43 (0.017)
1/8	3.2	3.4 (0.134)	1.0 (0.039)	0.43 (0.017)
3/16	4.8	5.0 (0.196)	1.6 (0.063)	0.43 (0.017)
1/4	6.4	6.5 (0.255)	2.0 (0.079)	0.56 (0.022)
3/8	9.5	10.0 (0.393)	3.0 (0.118)	0.56 (0.022)
1/2	12.7	13.0 (0.511)	4.0 (0.157)	0.56 (0.022)
3/4	19.1	19.3 (0.76)	6.0 (0.236)	0.80 (0.031)
1	25.4	25.7 (1.01)	8.0 (0.314)	0.81 (0.031)
1 ½	38.1	38.3 (1.50)	12.7 (0.50)	0.90 (0.035)



Heat Shrink Product in as supplied "D" and fully recovered state "d" with recovered wall "W"

## Airbus NSA 937201 Material Compliance

SIZE, INCHES	SIZE, MM	MINIMUM ID (D), AS SUPPLIED MM (INCHES)	MAXIMUM ID, RECOVERED (D) MM (INCHES)	RECOVERED WALL THICKNESS (W), MM (INCHES)	MAX MASS PER 1 METER (G)
3/32	2.4	2.5 (0.098)	0.8 (0.031)	0.43 (0.017)	3.0
1/8	3.2	3.4 (0.134)	1.0 (0.039)	0.43 (0.017)	3.7
3/16	4.8	5.0 (0.196)	1.6 (0.063)	0.43 (0.017)	4.0
1/4	6.4	6.5 (0.255)	2.0 (0.079)	0.56 (0.022)	6.1
3/8	9.5	10.0 (0.393)	3.0 (0.118)	0.56 (0.022)	9.0
1/2	12.7	13.0 (0.511)	4.0 (0.157)	0.56 (0.022)	11.0
3/4	19.1	19.3 (0.76)	6.0 (0.236)	0.80 (0.031)	20.5
1	25.4	25.7 (1.01)	8.0 (0.314)	0.81 (0.031)	27.7
1 ½	38.1	38.3 (1.50)	12.7 (0.50)	0.90 (0.035)	59.0

# General Tests for Identification Products

## PHYSICAL

PROPERTIES	TEST METHOD	TYPICAL VALUE
Tensile strength	ASTM D 638	>11.0 N/mm <sup>2</sup> .
Elongation at break	ASTM D 638	≥200%
Longitudinal change	ASTM D 2671	≤+5% to ≤ -10%
Water absorption	ASTM D 570	0,20%
Specific gravity	ASTM D 792	1,40 g/cm <sup>3</sup>

## ELECTRICAL

PROPERTIES	TEST METHOD	TYPICAL VALUE
Dielectric strength	ASTM D 2671	20.0 kV/mm <sup>2</sup>
Volume resistivity	ASTM D 257	≥ 10 <sup>14</sup> Ω/cm

## CHEMICAL

PROPERTIES	TEST METHOD	TYPICAL VALUE
Chemical resistance	AMS-DTL-23053/5	Good
Copper corrosion	ASTM D 2671 B	No corrosion
Fungus resistance	AMS-DTL-7444	No Growth

## THERMAL

PROPERTIES	TEST METHOD	TYPICAL VALUE
Heat shock 4 hours at 250°C	ASTM D 2671	No dripping, cracking or flowing
Heat aging 168 hours at 175°C	ASTM D638	Elongation ≥ 200%
Flammability	ASTM D 635-HB	Pass » flame retardant
Low temperature flexibility	1h at - 55°C ASTM D2671C	No cracking, no break, no detachment of coating
Optical density of smoke (D <sub>m</sub> )	N-A	N-A
Smoke index	N-A	N-A

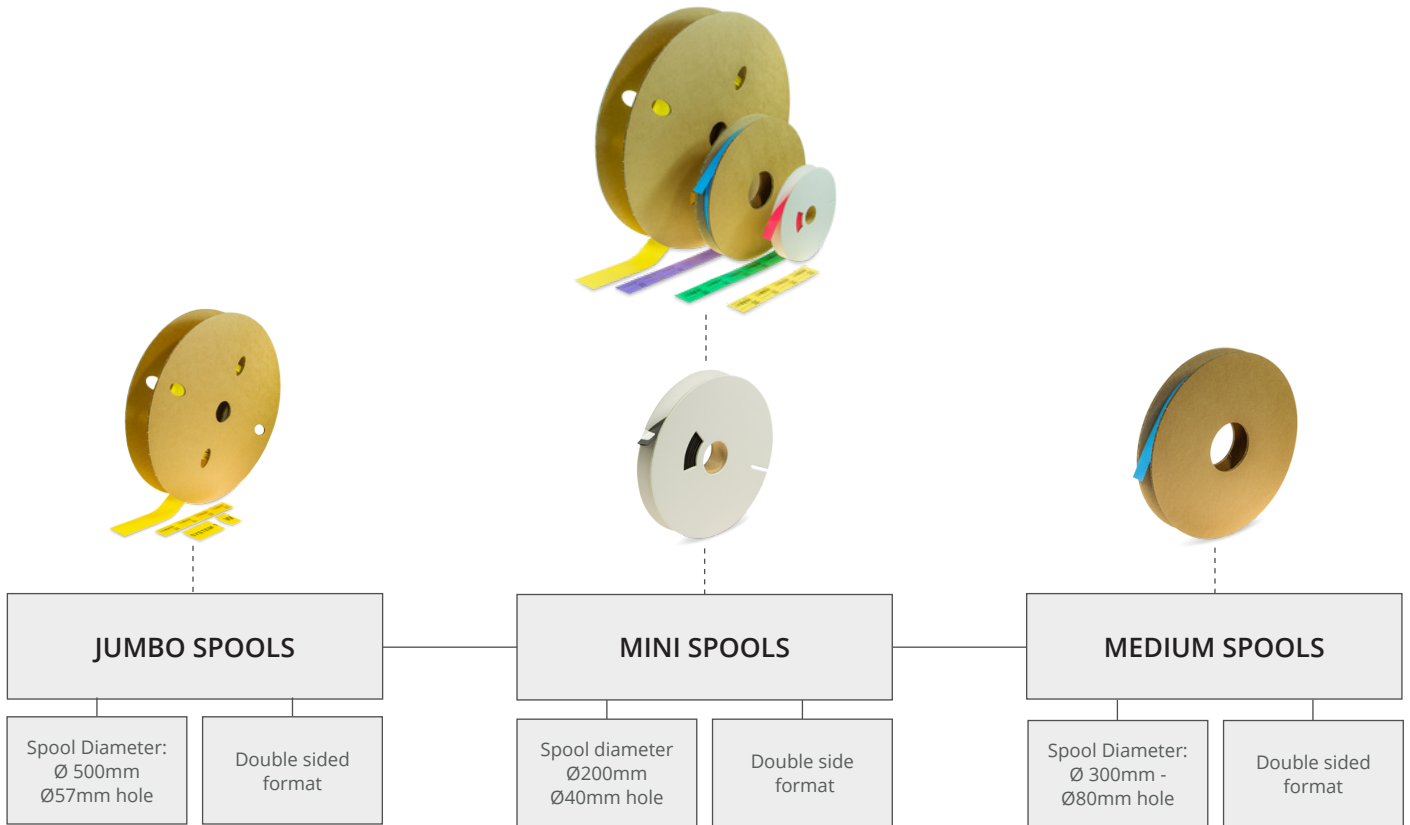
## FIRE PROPAGATION

PROPERTIES	TEST METHOD	TYPICAL VALUE
Fire resistance	ASTM D 2671 procedure B	pass
Flammability	UL224	pass

## ENVIRONMENTAL UV STABILITY

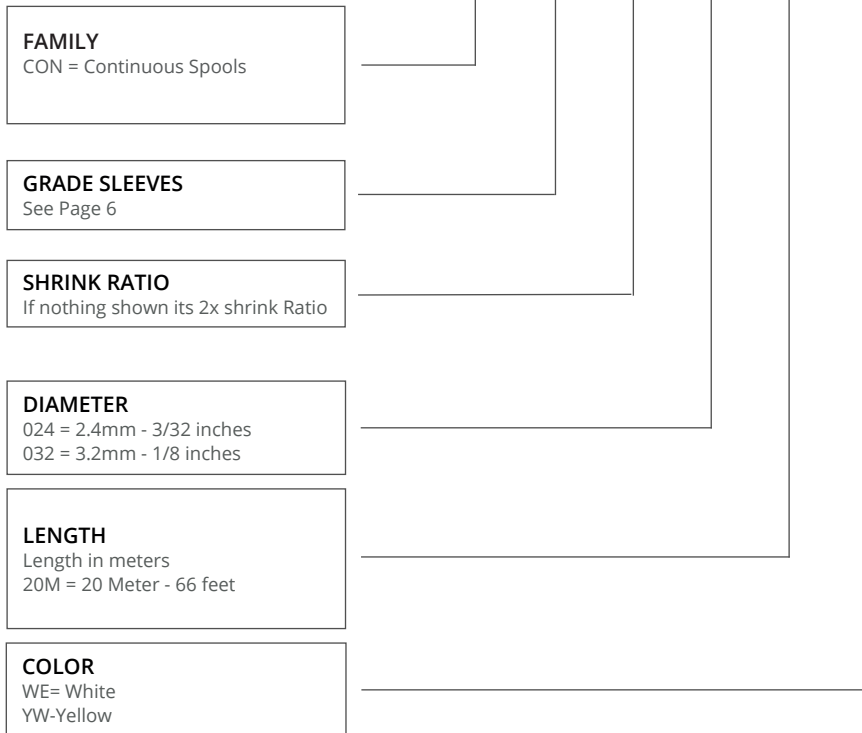
PROPERTIES	TEST METHOD	TYPICAL VALUE
UV-A	ASTM G154 - Machine setup Temp 50-60°C (140°F) Cycle 8 h light 4h condensation UV wavelength 280-400nm Test duration 1000 h of exposure.	Pass - No damage to the marker and print legible after 20 rubs in accordance with AS3349/SAE AS 8153.

# Available Formats



## Product code

**CON - C3 - 3X - 024 - 20M - YW**



## 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 A55942 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.	EN 45545-2 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 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 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 example mini spools c3 grade

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-024-20M-Colour	20 Meter - 66 feet	2,4 x 50mm	3/32-2.0	0.7	0.031	0.8-1.9	0.032-0.075
Family-Tube Grade-3X-032-20M-Colour	20 Meter - 66 feet	3,2 x 50mm	1/8-2.0	1.0	0.042	1.1-2.6	0.044-0.105
Family-Tube Grade-3X-048-20M-Colour	20 Meter - 66 feet	4,8 x 50mm	3/16-2.0	1,5	0.062	1.7-4.0	0.069-0.160
Family-Tube Grade-3X-064-20M-Colour	20 Meter - 66 feet	6,4 x 50mm	1/4-2.0	2.3	0,095	2.3-5.4	0.091-0.215
Family-Tube Grade-3X-095-15M-Colour	15 Meter - 49 feet	9,5 x 50mm	3/8-2.0	3.1	0.125	3.4-8.1	0.137-0.320
Family-Tube Grade-3X-127-15M-Colour	15 Meter - 49 feet	12,7 x 50mm	1/2-2.0	4.75	0,187	4.6-10.7	0.183-0.425
Family-Tube Grade-3X-190-15M-Colour	15 Meter - 49 feet	19,0 x 50mm	3/4-2.0	6.35	0.250	6.9-16.2	0.275-0.640
Family-Tube Grade-3X-254-15M-Colour	15 Meter - 49 feet	25,4 x 50mm	1-2.0	8.47	0.33	9.2-21.5	0.366-0.850
Family-Tube Grade-3X-381-10M-Colour	10 Meter -33 feet	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-508-10M-Colour	10 Meter - 33 feet	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
AMS-DTL-23053/5	Insulation Sleeving, Electrical, Heatshrinkable, Polyolefin, Flexible Crosslinked. Chemical resistance
ASTM D638	Tensile strength and ultimate elongation
ASTM D638	Heat aging 168 at 150°C
ASTM D2671 heat shock (section 26-30), procedure b	Flammability testing. Heat shock 4 hours at 175°C
ASTM D2671	Longitudinal change
ASTM D2671 (Section 79-80) ASTM D570	Water absorption. 2 Maximum
ASTM D2671 (Section 20-25)	Dielectric strength. 20 minimum
ASTM D2671B	Copper corrosion (Section 93 procedure A) damaged area of copper mirror,
AMS-DTL-23053/5	Chemical resistance - <b>good</b>
ASTM D257	Volume resistivity
ASTM D 635-HB -	Flammability resistance - Fire propagation
ASTM D E 662	Optical density of smoke (D <sub>m</sub> ) measured in flaming mode and non flaming mode in single smoke chamber test.
ASTM D792 Method A ?-	Specific gravity
ASTM G154	UV resistance test method
AIRBUS 937201	This standard specifies the dimensions, tolerances, required characteristics and the mass of an identification sleeve for electric cable.
BS EN ISO 4589-1: 1999 - Oxygen Index	Limited Oxygen Index- flammability hazard rating. Determination of burning behavior by oxygen index - part 2: ambient temperature test. 32% minimum
DIN 54837	DIN 54837 Testing of materials, small components and component sections for rail vehicles- determination of burning behaviour using a gas burner
IEC 60684-2	Low temperature flexibility
NF C 20-455	Fire hazard testing glowin/hot-wire based test methods. Glow-wire apparatus and common test procedure.c Replaced by EN ISO 60695-2-11
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 and CSA-C22.2	Extruded tubing, Insulation, Electrical, Flexible, Heat Shrinkable Poleolefin Tubing produced to flammability ratings