

## ZH

# Low Smoke 0-Halogen Flame-retardant Identification Sleeves

### TECHNICAL DATA SHEET

Revision Number. 1  
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The ZH-2X 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.

Ideal for applications where limited fire hazard and low smoke characteristics are required.

The zero halogen material coupled with low smoke and low toxic fume emissions makes this product ideal in enclosed spaces such as mass transit, marine and industrial installations.

The compound of the tubing is excluded for halogens and offers excellent low fire hazard characteristics combined with minimal smoke emission.

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.

## Industry



Industry



Marine



Wind power



Commercial



Aerospace



Construction



Railway



Military



Electrical installations



Petrochemical



Telecom

### STANDARD TUBE COLOR



### TUBE COLORS ON REQUEST



### BACKING TAPE COLORS



### MATERIAL

Extruded, cross linked polyolefin.

### SHRINK RATIO

2:1

### OPERATING TEMPERATURE

-55°C up to +105°C

(-67°F to 221°F)

Shrink Temperature

≥90° (194°F)

### COMPLIANCES

Mark Permanence:

SAE AS-5942

LUL 3349

Print Resistance to solvents:

MIL-STD-202G

Test method 215K

### RECOMMENDED BLACK RIBBON

FTI-Y, FTI-X

### INDUSTRY STANDARDS

EN45545-2 Class HL3 R22-23

NF F 16-101

London Underground

1-085 A3

BOEING BSS 7239

UNI CEI 11170-3 (LR4)

DIN 5510-2

BS6853: 1999 vehicle category 1a

### 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.

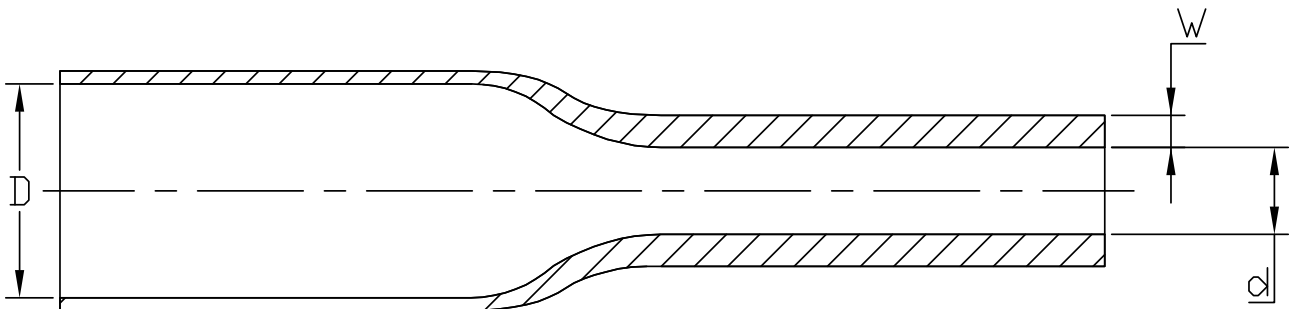
### APPLICATIONS

Specific developed to be used in Rail, Aerospace, Marine, Industrial 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	2.5 (0.098)	1.2 (0.047)	0.43 (0.017)
1/8	3.2	3.6 (0.142)	1.6 (0.063)	0.55 (0.022)
3/16	4.8	5.2 (0.189)	2.4 (0.094)	0.55 (0.022)
1/4	6.4	6.7 (0.263)	3.2 (0.126)	0.65 (0.025)
3/8	9.5	10.0 (0.393)	4.8 (0.189)	0.65 (0.025)
1/2	12.7	13.6 (0.53)	6.4 (0.250)	0.65 (0.025)
3/4	19.1	20.4 (0.80)	9.5 (0.374)	0.70 (0.027)
1	25.4	27.0 (1.06)	12.7 (0.500)	0.85(0.033)
1 ½	38.1	40.0 (1.57)	19.1 (0.750)	0.90(0.035)
2	50.8	50.8 (2)	25.4 (1.0)	0.90(0.035)



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 638	10.0 N/mm <sup>2</sup> .
Elongation at break	ASTM D 638	≥200%
Longitudinal change	ASTM D 2671	-10% to +5%
Water absorption	ASTM D 570	≤ 0,15%
Specific gravity	ASTM D 792	1,40

### 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	EN 60684-2-36	Good - Pass
Copper corrosion	ASTM D 2671 B	No corrosion
Copper stability	N-A	N-A

### THERMAL

PROPERTIES	TEST METHOD	TYPICAL VALUE
Heat shock 4 hours at 175°C	ASTM D 2671	No dripping, cracking or flowing
Heat aging 168 hours at 150°C	ASTM D 638	Elongation ≥ 100%
Flammability	ASTM D 635-HB	Pass » flame retardant
Low temperature flexibility / Bending	1h at - 55°C EN 60684-2	No cracking, no break, no detachment of coating
Optical density of smoke (D <sub>m</sub> )	ASTM E 662	Flaming mode 41 , non flaming mode 111
Smoke index	NF F 16-101	Smoke class F1

### FIRE PROPAGATION COMPARISON

NORMATIVES	TOXICITY	LOW OXYGEN INDEX (LOI)	SMOKE DENSITY	FLAMMABILITY INDEX	CAPACITY OF FORMING DROPS
EN45545-2	HL3	HL3	HL3	-	-
NF F 16 101	-	-	Class F1	Class I4	-
BS 6853	1a	1a	1a	-	-
DIN 5510-2	Pass	-	SR2	-	ST1
NFPA130	Pass	-	Pass	-	-
UNI CEI 11170-3	LR4	LR4	-	LR4	-

## Fire behavior Standard Classification for Identification Products

STANDARDS	CLASSIFICATION	USAGE
EN 45545-2 (R22:R23)	HL3	Unlimited Usage All Vehicles
BS6853	1a	Unlimited Usage All Vehicles
UNI CEI 11170-3	LR4	Unlimited Usage All Vehicles
DIN 5510-2	SR2, ST1	Usage Limited
NF F 16-101	F1 & I4	Usage Limited to External Vehicles
NFPA 130	-	Usage Permitted upon agreement with end user

## Compliance on fire behavior for Identification Products

### TEST METHOD

STANDARDS	FLAME PROPAGATION	TOXICITY	SMOKE DENSITY	LOW OXYGEN INDEX
<b>BS6853</b>		BS 6853 appendix B1 or NF X-70-100	BS 6853 D8.3	ISO 4589-2
<b>NF F-16 101</b>	NF EN 60-695-2	NF X 70-100	NF X 10-702-1 & 2	ISO 4589-2
<b>NFPA130</b>	ASTM E 162	BSS 7239	ASTM E 662	
<b>EN 45545-2</b>		NF X 70-100 600°C	EN ISO 5659-2	ISO 4589-2
<b>DIN 5510-2</b>	DIN 54837	DIN ISO 5510-2	DIN 54837	

## 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-ASAS3349/ SAE AS 81531.