

PU3501

ADC CABLE MARKERS – LOW SMOKE

Description

ADC Cable Markers are made of halogen-free, flame retardant and low smoke polyolefin extruded flatband 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 is excluded for halogens and offers excellent low fire hazard characteristics combined with minimal smoke emission. The material is classified with EN45545-2 Class HL3 requirement set R22 (interior) and R23 (exterior) and can be used without any restrictions for any mass transit application.

Material Polyolefin

Finishing Matt

Temperature -55°C up to +105°C (-67F to 221°F)

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

General Tests for Identification Products

Physical

Properties	Test method	Typical value
Tensile strength	ASTM D 638	10.0 N/mm ² .
Elongation at break	ASTM D 638	≥200%
Water absorption	ASTM D 570	≤ 0,15%
Specific gravity	ASTM D 792	1,40

Electrical

Properties	Test method	Typical value
Dielectric strength	ASTM D 149	20.0 kV/mm ²
Volume resistivity	ASTM D 257	≥ 10 ¹⁴ Ω/cm

Chemical

Properties	Test method	Typical value
Chemical resistance	ASTM D 638 (24h @ 23°C ±2K)	Good - Pass
Copper corrosion	ASTM D 2671 B - 24 Hours @ 90%RH	No corrosion

Copper stability	N-A	N-A
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Thermal

Properties	Test method	Typical value
Heat shock 4 hours at 175°C	ASTM D 2671 - Internal method	No dripping, cracking or flowing
Heat aging 168 hours at 150°C	ASTM D 638	Elongation $\geq$ 100%
Flammability	ASTM D 635-HB	Pass » flame retardant
Low temperature flexibility / Bending	1h at - 55°C EN 60684-2 - Internal Method	No cracking, no break, no detachment of coating
Optical density of smoke (Dm)	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
BS6853		BS 6853 appendix B1 or NF X-70-100	BS 6853 D8.3	ISO 4589-2
NF F-16 101	NF EN 60-695-2	NF X 70-100	NF X 10-702-1 & 2	ISO 4589-2
NFPA130	ASTM E 162	BSS 7239	ASTM E 662	
EN 45545-2		NF X 70-100 600°C	EN ISO 5659-2	ISO 4589-2
DIN 5510-2	DIN 54837	DIN ISO 5510-2	DIN 54837	
BS6853		BS 6853 appendix B1 or NF X-70-100	BS 6853 D8.3	ISO 4589-2

Environmental UV stability

Properties	Test method	Typical value
UV-A	ASTM G154 - Machine setup Temp 50-60°C (140°F) Cycle 8 hours light 4 hours condensation UV wavelength 280-400nm Test duration 1000 hours of exposure.	Pass - No damage to the marker and print legible after 20 rubs in accordance with SAE AS 81531.

Related Standard Test Methods And Documents

Document	Description
ASTM D638	Tensile strength and ultimate elongation
ASTM D638	Heat ageing 168 hours at 150°C
ASTM D2671 heat shock (section 26-30), procedure b	Heat shock 4 hours at 175°C
ASTM D2671	Longitudinal change
ASTM D2671 (Section 79-80) ASTM D570	Water absorption. 2 % maximum
ASTM D149	Dielectric strength. 20 minimum
ASTM D2671B	Copper corrosion (Section 93 procedure A) damaged area of copper mirror,
EN 60684-2-36	Chemical resistance to selected fluids
ASTM D257	Volume resistivity
ASTM D 635-HB -	Flammability resistance - Fire propagation
ASTM D E 662	Optical density of smoke (Dm) measured in flaming mode and non flaming mode in single smoke chamber test.
ASTM D792 Method A	Specific gravity
Boeing BS 7239	Toxic gas generation M7. Gases produced for analysis are generated in a specified, calibrated smoke chamber during standard rate of smoke generation testing (ASTM E 662), in both flaming combustion and non-flaming pyrolytic decomposition test modes

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
BS 6853 (1999) vehicle catagory 1a	Code of practice for fire precautions in the design and construction of passanger carrying trains
DIN 54837	DIN 54837 Testing of materials, small components and component sections for rail vehicles- determination of burning behaviour using a gas burner
DIN 5510-2	German railway normative related to fire protection on railway vehicles
ISO 5659-2: 2017	Optical density of smoke (Dm) measured in flaming mode and non flaming mode in single smoke chamber test.
EN45545-2	Railway applications. Rolling stock fire protection on railway vehicles. - Part 2 requirements for fire behavior of materials and components. Fire hazard class. 1,2 & 3 R22 (Interior) & R23 (exterior)
IEC 60684-2 - 14	Low temperature flexibility
London Underground Standard 1-085	Revision A3, Fire safety performance of materials
NF C 20-455	Fire hazard testing glowin/hot-wire based test methods. Glow-wire apparatus and common test procedure. Replaced by EN ISO 60695-2-11
NF F 16-101: 1988	Railway rolling stock fire behavior choice of materials rolling stock classification A1.
NF X 70-100: 1986	Fire tests analysis of pyrolysis and cumbustion gases tube furnace method
NF X 10-702-1/2	Determination of the opacity of smoke in a non-renewed atmosphere. The resulting density /time curve is used to calculate the smoke index
NF T 51-071: 1999	Oxygen index test. This test have been replaced by IEC 60695-2-11/EN 60965- 2-11
MIL 202 Method 215	Resistance to-of solvents. Test methods for electronic and electrical component parts
SAE AS5942;2014	Marking of insulation materials- Print permanence testing using the mechanical crockmeter
UNI CEI 11170-3 "Replaced"	Italian railway normative related to fire protection on railway vehicles. This standard has been replaced by EN 45545-2

Available grade material

PRODUCT GROUP	TUBE GRADE	CHARACTERISTICS	COMPLIANCES
ADC	ZH	The ZH material is 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-	ZH

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.

Compliances

Mark Permanence:

- SAE AS-5942

Print Resistance to solvents:

- MIL-STD-202
- Test method 215

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