

Technical Data Sheet

Issue: 12/2022/v04

Product-Line: HTX-KM-PUR, HTX-KM-AIO
Material: Thermoplastic Polyether-Polyurethane
TEXTIT-Material-Code: TMC-1043

Material data:

Description
<p>Cable Markers in extruded from halogen free and flame retardant PUR (Thermoplastic Polyether-Polyurethane) material which is hydrolysis " No break down in water" and micro organism resistant. Its extremely strong with high tear strength, suitable for a variety of in and outdoor applications where durable mark permanence is de facto standard. The labels are fixed to the cable or wire using cable ties at both ends. The product is supplied as an all-in-one construction, where the extruded material also functions as the carrier. The markers are partially perforated for easy picking after printing and supplied on rolls for thermal transfer printing. Many colours available.</p> <p>UV stability data Results of accelerated ageing testing are as a result of artificial lighting/ illumination in a laboratory. Duration test is 500 hours, which equals 10 years of exposure.</p>
Material
HTX-KM is a halogen free, flame-retardant polyether based TPU
Standard colours
White / Yellow
Other colours (non standard)
orange / green / dark blue / black / light blue / red
Operating Temperature
-25°C up to +105°C (-13F to 176F)
Compliances
Mark permanence: SAE AS-5942 / Ribbon: FTI-Y black

Resistance to solvents
MIL-STD-202G / Test method 215 / Ribbon: FTI-Y black

Recommended black ribbon
FTI-Y

Flammability standard
Class V-2 – UL94 Not flammable

UV stability test
Test with UV lamp 340nm Light @ 60°C irradiation 0.76 W/m ² Duration 500 hours, which equals 10 years of exposure Spray duration 15 min Condensation 50°C Duration 3,45 hour
Test with XENON (340nm) Light 65 ° c irradiation 0.50 W/m ² Duration 1,42 hours Light + Spray duration 0.60 W/m ² Duration 18 min.

Storage
Cool and dry in original packaging. Recommended temperature at +10°C to +25°C and 45-55%

Applications
Developed to be used in normal Industry, Wind Power, Commercial, Construction, Electrical and Telecom installations, wire & cable bundling.

Physical Properties		
Properties	Test method	Typical value
Stress at 20 % strain	DIN 53504	13 MPa
Stress at 100 % elongation	DIN 53504	19 MPa
Stress at 300% elongation	DIN 53504	33 MPa
Density	DIN 53479	1,27 g/cm ³
Tensile Strength	DIN 53504	30 MPa
Elongation @ break	DIN 53504	400 %
Charpy notched impact strength, -30°C	DIN EN ISO 179	3 kJ/m ²
Charpy notched impact strength, 23°C	DIN EN ISO 179	50 kJ/m ²
Tensile Strength after storage in water at 80°C for 42 days	DIN 53504	20MPa
Compression set at room temperature, 24h	DIN EN ISO 815	30%
Compression set at 70°C, 24h	DIN EN ISO 815	45 %
Tear Strength	DIN 53515	110 N/mm
Abrasion resistance - loss	DIN 53516	30mm ³
Shore hardnessloss	DIN 53505	58 Shore D

Thermal properties		
Properties	Test method	Typical value
Glass transition temperature, 10°C/min	ISO 11357-1/-2	-44°C
Burning behaviour at 0.75 mm nom thickness	UL94	Class V-2
Oxygen Index	ISO 4589-1/-2	24%

Environmental – UV stability		
Properties	Test method	Typical value
UV-A 340 nm 500 hours Light 60 ° irradiation 0.76 W/m ² power duration 8 hours - Spray duration 15 min. - Condensation 50 ° duration 3,45hour.	Visual Inspection Mark Adherence	No creasing or cracking Good contrast and visibility
TEST with XENON lamp, 500 hours XENON (340nm) - Light 65 ° c irradiation 0.50 W/m ² duration 1,42 hours - Light + Spray duration 0.60 W/m ² duration 18 min	Visual Inspection Mark Adherence	No creasing or cracking Good contrast and visibility

Chemical properties	
Chemical resistance	
Solvents resistance	<p>No degradation of the HTX-KM TPU products occurs, however, according to the solvent class a variable degree of swelling and consequent reduction in tensile strength (after evaporation of the solvents, the tensile strength recovers approx. its original value).</p> <p>Methanol should be considered more as a chemical reagent than as a solvent. TPU is soluble in some solvents. As test procedure, 5A test rods (DIN EN ISO 527-2) were immersed in the solvent for three weeks at 23° C, and tested for tensile strength are rounded values.</p>

Code	Test fluid	Swelling	Reduction of tensile strength %
Aliphatic Hydrocarbons	Pentan	10	20
	Cyclohexan	22	10
	Isooctan	7.5	none
HTX-KM PUR behave similarly in other aliphatic and cyclo-aliphatic hydrocarbons such as methane, ethane, propane, butane, hexane, octane, petroleum ether, paraffin oil, diesel oil and kerosine (although additives can present problems).			
Aromatic Hydrocarbons	Toulene	65	50
Other aromatic hydrocarbons such as benzene and xylene have a similar affect.			
Aliphatic Esters	Ethyl Acetate	70	75
Other short-chained esters such as butyl acetate and amyli acetate have a similar affect			

Code	Test fluid	Swelling	Reduction of tensile strength %
Aliphatic Ketones	Methyl Ethyl Ketone	130	90
Other short-chained aliphatic ketones such as acetone and methyl isobutyl ketone = MIBK have a similar affect.			
Aliphatic Halogenated Hydrocarbons, 1 C-atom	MethylEthyle Chloride Chloroform Tetrachloroethylene	190 75	95 Practically dissolved 54
1 C-atom and higher	Trichloroethane*		
*Other aliphatic halogenated hydrocarbons with 2 C-atoms and higher have a similar affect			
Aromatic Halogenated Hydrocarbons	Chlorobenzene	110	60
Other aromatic halogenated hydrocarbons have a similar affect			
ASTM-Oils acc. to ASTM D 471-06**	IRM 901 at 100 °C 500 h IRM 901 at 100 °C 1000 h IRM 902 at 100 °C 500 h IRM 902 at 100 °C 1000 h IRM 903 at 100 °C 500 h IRM 903 at 100 °C 1000 h	1 1 9 10 18 20	6 14 4 5 8 30
Agents Dissolving TPU	Tetrahydrofurane Dimethyl Formamide (DMF) Dimethyl Acetamide N-Methyl Pyrrolidone (NMP) Dimethyl Sulphoxide (DMSO) Pyridine	dissolved dissolved dissolved dissolved dissolved dissolved	dissolved dissolved dissolved dissolved dissolved dissolved
Alcohols and Fuels	Methanol Ethanol Iso-Propanol Benzyl Alcohol Ethylen Glycol Glycerine	38 33 30 not measura ble 4 none	6 14 4 partly dissolved 15 none
FAM Test Fluids acc. to DIN 51 604*	Test Fluid A Test Fluid B Test Fluid C	67 68 43	60 74 70
Diesel Fuel Biodiesel Fuel RME @ 60°C	Diesel Fuel Biodiesel Fuel	11 27	none 21

Code	Test fluid	Swelling	Reduction of tensile strength %
Fuel Types ASTM D 471	Fuel A = Iso-Octane	7.5	none
	Fuel B = Iso-Octane Touene 70% / 30%	25	36
	Fuel C=Iso-Octane Toluene 50% / 50%	38	44
	Fuel D=Iso-Octane Toluene 60% / 40%	31	44

- * DIN 51 604, 03.1984, is the standard, established by FAM to assess the resistance of plastic materials to automotive fuels.
- ** The IRM reference oils are mineral oils with different paraffin and aromatics contents. The formerly used ASTM oils 1, 2 and 3 were replaced by the IRM oils 1, 2 and 3 owing to health risks, and are no longer available. The IRM oils 1, 2 and 3 are very similar in terms of their characteristics, but not identical.
(FAM = Fachausschuß Mineral- und Brennstoffnormung-Professional committee for standardization of fuel stuffs)
(ASTM = American Society for Testing and Materials)

Test fluid A consists of:
50.0 % by volume toluene
30.0 % by volume iso-octane
15.0 % by volume di-isobutylene
5.0 % by volume ethanol

Test fluid B consists of:
42.0 % by volume toluene
25.5 % by volume iso-octane
13.0 % by volume di-isobutylene
15.0 % by volume methanol
4.0 % by volume ethanol
0.5 % by volume water