



KLJ GROUP

ZHFR COMPOUND



9001:2015



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October 2022, Ed1

TECHNICAL INFORMATION

KLJ ZHFR 403 H5

THERMOPLASTIC HALOGEN FREE, FLAME RETARDANT AND LOW SMOKE EMISSION COMPOUND FOR CABLE INSULATION AND SHEATHING

Description:

KLJ ZHFR 403 H5 is a thermoplastic flame retardant, UV resistant, crack resistance, halogen free compound, specially developed for insulation/sheathing of armored/unarmored power cables. It can be used for the production of energy, signal and control cables. It does not emit halogenic acid and produce very low gases and low smoke under fire condition.

Standard complying:

The properties of this compound comply with the requirement of BS EN 50363-0 Type M1 & TI7, VDE 0270 Part 24, Type HM2 & HM4, VDE 0250 Part 215 Type HM5, VDE 0207 Part 23 type HI2, IEC 60502 ST8, IEC 60092-359 type SHF1, IEC 332-1/2/3, BS 7655 LTS1, LTS2, LTS3 & LTS4

Operating temperature: - -40°C to 90°C

The standards referred above are a short selection of standards and does not cover all applicable standards. Contact KLJ representative for additional information.

Technical Characteristics:

Properties	Unit	Test Method	KLJ Specification	Typical Value
Density	gm/cm ³	ASTM D 792	1.46±0.02	1.45
Melt Flow Index (150°C, 21.6 Kg Load)	gm/10min	ASTM D 1238	5 ± 2	5.5
Hardness	Shore D	ASTM-D-2240	50±2	48
Tensile Strength at Break	MPa	IEC-811-1-1	≥ 13	14
Elongation at Break	%	IEC-811-1-1	≥ 180	250
Tear Strength	N/mm	BS 6469-99.1	> 10	13
Pressure Test at 80°C max indentation	%	IEC 811-3-1	<35	20
Pressure Test at 90°C max indentation	%	IEC 811-3-1	<35	25
Bending Test at Low Temperature (-30± 2°C for 16hrs)		BS EN 60811-504	No Crack	No Crack
Impact Test at Low Temperature (-30± 2°C for 16hrs)		BS EN 60811-506	No Crack	No Crack
Ozone Resistance Test		IEC 60811-403	No Crack	No Crack
Elongation at break @ -15°C	%	BS EN 60811-505	>50	100
Water absorption(@70C for 24 Hours)	mg/cm ²	IEC 60811	≤0.15	0.05



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Ageing

Mechanical Properties after Ageing in Air Oven (168H, 100°C)

Change of Tensile Properties	%	IEC-811-1-2	< 15	11
Change of Elongation Properties	%	IEC-811-1-2	< 20	14

Mechanical Properties after Ageing in Water Immersion (168H, 70°C)

Change of Tensile Properties	%	IEC-811-1-2	< 25	8
Change of Elongation Properties	%	IEC-811-1-2	< 25	10

Electrical Properties

Volume Resistivity at 20°C	Ohm-cm	ASTM D257	$\geq 5 \times 10^{14}$	2.2×10^{15}
Insulation Constant Ki @ 20°C	MΩkm	IEC 60502	>7	200

Burning Properties

Oxygen Index	%	ASTM D-2863	38±1	38
Temperature Index	°C	ASTM D 2843	>320	330
Smoke Density Rating	%	ASTM D-2843	≤20	2
Optical Density of Smoke, Transmittance	%	IEC 61034-1	≥90	91
Acid Gas Emission Test (% HCL Emission)	%	IEC-60754 Part-1	<0.3	ND
pH	-	IEC 60754-2	≥5.0	8.98
Conductivity	μS/mm	IEC 60754-2	≤2.5	2.2
Fluorine Content	%	BS EN 50525 -1	<0.1	ND
Toxicity Index		NES 713	< 1.5	1.1

After Exposure to UV radiation

Retention of Tensile strength	%	ASTM G 154-12a, G151		87
Retention of Elongation at break	%	ASTM G 154-12a, G151		83

* The typical values reported in the table have been obtained from measurements made on extruded samples or pressed plates

Processing Guidelines:

This thermoplastic Compound has been designed for easy processing, while maintaining good mechanical –thermal properties and stated LOI value. It can be processed using extruder with a low screw compression and low shear screw, with 22–25 L/D ratio of the extruder. Screw compression ratio is 1.15:1 or 1.25:1. There should not be any stagnant area in the die and cross-head. Recommended DDR is 2:1, or less than 2 with a temperature profile as that given below, which is however indicative, as it may depend on the equipment design adopted.

Zone 1	Zone 2	Zone 3	Zone 4	Flange	Head	Die
130 -150	130 -160	140 -160	140 -160	150 -160	150 -160	150 -170

Prior to extrusion, this compound is to be dried at 80°C for 2-3 hrs in drying oven.



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Application Chart:

Grade Name	Crack Resistance#	Insulation	Sheathing (inner & outer) (unarmoured)	Sheathing (inner & outer) (armoured)	Line Speed	Max. Extrusion Temp.
Max. Overall Diameter (mm)		up to 42 mm	up to 110 mm	up to 110 mm		
KLJ ZHFR 403 H5	Excellent	√	√	√	**	175°C
Symbol Reference Guide:						
√	Suitable					
X	Not Suitable					
*	Normal Line Speed					
**	High Line Speed					

Colouring:

This compound is natural compound. EVA or polyolefin based master batch can be added for colouring.

Storage:

- KLJ ZHFR 403 H5 can be stored for 180 Days from the date of manufacturing, however it is suggested to use within 90 days from the date of receipt. Shelf life is subject to storage in original intact packing, in cool and dry place, away from sunlight and weathering, storage temperature not generally exceeding 35°C.

Packaging:

KLJ ZHFR 403 H5

Form: Granules

Package: 25 Kg PP woven sack bag and 775 Kg Octabin/Jumbo bags with PE liner and Top & Bottom discharge as required by the customer.

Safety:

This compound is not classified as dangerous preparation.

The products are supplied in the form of free-flowing granules of approx. 2-3 mm size and can be readily handled with commercially available equipment. Handling and transport of the products may generate some dust and fines, which constitute a potential hazard for dust explosion. All metal parts in the system should, therefore, be properly grounded. Properly designed equipment and good housekeeping will reduce



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the risk. Inhalation of any type of dust should be avoided as it may cause irritation of the respiratory system.

The product is intended for industrial use only. MSDS is available on request.

For technical service & further information and assistance:

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Disclaimer: The data given above are for the guidelines purpose only. Above compound is suitable to run on different machines; however some adjustments may be required on individual machine. All properties are tested as per ASTM/IS/IEC standards. Any data may change without prior information. The customers are advised to check the quality, prior to commercial use. There is no guarantee and/or warrantee what so ever, after processing.