KRAIBURG TPE

Datasheet

FR1 Series

THERMOLAST® K

The FR1 Series is your material solution for applications requiring high flame retardance. The compounds come with UL94 V0 rating at 3.0mm, are halogen free and are available in natural and black colors.

Typical applications

- Cable holders
- Seals for in-wall outlets
- Seals for plugs
- Seals for switch boxes

Material advantages

- Easy coloring (compounds in natural colors)
- Excellent mechanical properties
- Halogen free flame retardant system
- Self-extinguishing, no dripping of flaming particles
- UL 94-V0 (3mm) listed

Processing Method: Extrusion, Injection Molding

	Color / RAL DESIGN	Hardness DIN ISO 7619-1 ShoreA	Density DIN EN ISO 1183-1 g/cm3	Tensile Strength [1] DIN 53504/ISO 37 MPa	Elongation at Break [1] DIN 53504/ISO 37 %	Tear Resistance ISO 34-1 Methode B (b)(Graves) N/mm	CS 72 h/23 °C DIN ISO 815-1 Method A %	CS 24 h/70 °C DIN ISO 815-1 Method A %	CS 24 h/100 °C DIN ISO 815-1 Method A %
TC4FRN	natural	37	1.130	2.0	550	13.0	9	29	84
TC4FRZ	black	37	1.130	2.0	500	13.0	8	29	83
TC5FRN	natural	48	1.120	2.5	600	14.0	10	34	84
TC5FRZ	black	49	1.130	2.5	550	13.0	10	30	79
TC6FRN	natural	57	1.100	3.5	600	16.0	10	40	80
TC6FRZ	black	60	1.130	3.5	600	17.0	13	35	80
TC7FRN	natural	65	1.100	4.0	650	18.0	15	34	84
TC7FRZ	black	67	1.100	4.0	600	20.0	16	33	80
TC8FRN	natural	76	1.100	5.0	650	22.0	17	47	82
TC8FRZ	black	79	1.100	5.0	600	24.0	25	45	84

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TC9FRN	natural	86	1.100	6.0	600	39.0	36	55	83
TC9FRZ	black	87	1.100	6.0	550	31.0	36	55	80

[1] Deviating from ISO 37 standard test piece S2 is tested with a traverse speed of 200 mm/min.

All values published in this data sheet are rounded average values.

Compression Set

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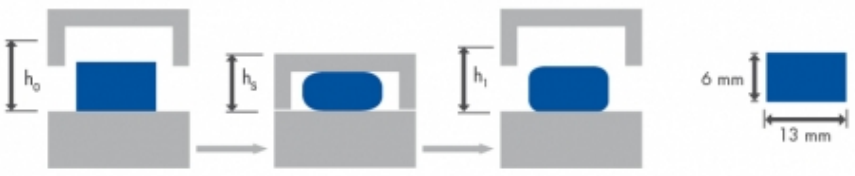
Compression Set (acc. DIN ISO 815)

For the compression set testing the following specimen is used:
The specimen is a cylindrical disk shaped 6 mm thick and 13 mm in diameter.



h_0 = initial thickness of the test piece (in mm)
h_1 = thickness after recovery (in mm)
h_s = height of the specimen (in mm)

$$\text{Compression Set} = \frac{h_0 - h_1}{h_0 - h_s} \times 100$$

The specimen is compressed by 25%. The compressed specimen is heated to the test temperature. DIN ISO 815 discribes two methods.

Method A: The specimen is allowed to recover immediately after its aging in the oven and then cooled down to room temperature. After 30 minutes the thickness of the specimen is measured and the compression set calculated.

Method B: The specimen is cooled down to room temperature after its aging in the oven and then allowed to recover.

Test results gained from method B are in general higher than from method A.

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Processing Guideline Injection Molding	
Cylinder temperature	170 - 190 - 210 °C, max. 220 °C (340 - 370 - 410 °F, max. 430 °F)
Hotrunner	Hot runner temperatures: 180 - 220 °C (356 - 428 °F). The runner should be empty after a maximum of 2 - 3 shots.
Injection pressure	200 - 1000 bar (2900 - 14504 psi) (depending on the size and weight of the part).
Injection rate	In general, the fill time should not be more than 1–2 seconds.
Hold pressure	We recommend to derive the optimum hold pressure from determining the solidification point, starting with 40 % - 60 % of the required injection pressure.
Back pressure	20 - 100 bar; if color batches are used, higher back pressure is necessary.
Screw retraction	If an open nozzle is used processing with screw retraction is advisable.
Mold temperature	25 - 40 °C (77 - 104 °F)
Predrying	To maintain a high level of mechanical properties the resin must be pre-dried. The use of a desiccant dehumidifying dryer is recommended. Drying conditions: 80 °C for 2-6 hrs; maximum dew point of the inlet air: -25 °C. The maximum residual moisture of the material should not exceed 0,02%.
Needle valve	With materials < 50 Shore A the use of a needle valve is advisable.
Screw geometry	Standard 3-zone polyolefine screw.
Residence time	The residence time is to be set as short as possible with a maximum of 10 minutes.
Cleaning recommendation	For cleaning and purging of the machine it is appropriate to use polypropylene or polyethylene. Machine must be PVC-free.

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Processing Guideline Extrusion	
Cylinder temperature	160 - 190 - 220 °C, max. 230 °C (320 - 370 - 425 °F, max. 450 °F)
Screw geometry	Standard three-zone screw (e.g. polyolefin screw). The screw must be able to provide sufficient shearing.
L/D ratio	At least 25
Compression ratio	At least 2,7 ... 3,5 : 1
Screens / breaker plate	A breaker plate and a screen pack are recommended in the extruder configuration in order to increase pressure. In minimum two screen packs of 100 mesh are recommended.
Die land	<= 3 mm (<= 0,12 in.)
Extruder Head	Ca. 190 - 210 °C (374 - 410 °F)
Die temperature	Ca. 180 - 190 °C (374 - 410 °F)
Predrying	Drying of the material for at least four hours at 80°C (175°F) is recommended. The moisture level of material has to be below 0.02 %. To avoid porosity in the profile a pre drying is recommended for wall thickness > 3mm.
Calibration	Generally not necessary; support elements may be required when extruding THERMOLAST® compounds with high hardness or when coextruding with standard thermoplastics.
Cleaning recommendation	For cleaning and purging of the machine it is appropriate to use polypropylene or polyethylene. Machine must be PVC-free.

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