

FR Series
THERMOLAST® K

The FR Series is your material solution for applications requiring high flame retardance. The compounds are halogen free and 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
- Excellent mechanical properties
- Halogen free (reduction of toxic fire gases)
- Self-extinguishing, no dripping of flaming particles
- UL 94-V0 (3mm) listed

Processing Method: Extrusion, Injection Molding

	Color	Hardness Shore A DIN ISO 7619 ShoreA	Density DIN EN ISO 1183-1 g/cm ³	Tensile Strength ¹ DIN 53504/ISO 37 MPa	Elong. at Break S ₂ ¹ DIN 53504 / ISO 37 %	Tear Resistance DIN ISO 34-1 N/mm	Compr. Set 72h/RT DIN ISO 815 %	Compr. Set 24h/70°C DIN ISO 815 %	Compr. Set 24h/100°C DIN ISO 815 %
TC4FRN	natural	36	1.130	2.0	550	12.0	7	34	81
TC4FRZ	black	37	1.130	2.0	500	9.0	7	31	78
TC5FRN	natural	44	1.120	2.5	600	15.0	8	37	80
TC5FRZ	black	49	1.130	2.5	550	13.5	9	33	80
TC6FRN	natural	57	1.100	3.5	600	16.0	10	40	80
TC6FRZ	black	60	1.130	3.5	600	17.0	12	36	80
TC7FRN	natural	65	1.100	4.0	650	18.0	14	41	81
TC7FRZ	black	67	1.100	4.0	600	22.0	14	36	83
TC8FRN	natural	76	1.100	5.0	650	22.0	17	47	82
TC8FRZ	black	79	1.100	5.0	600	27.0	18	46	79
TC9FRN	natural	85	1.100	6.0	600	30.0	26	53	79

This datasheet is an extract of the KRAIBURG TPE program. Please contact KRAIBURG TPE to select the compound suitable for the requirements.

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	Color	Hardness Shore A DIN ISO 7619 ShoreA	Density DIN EN ISO 1183-1 g/cm ³	Tensile Strength ¹ DIN 53504/ISO 37 MPa	Elong. at Break S2 ¹ DIN 53504 / ISO 37 %	Tear Resistance DIN ISO 34-1 N/mm	Compr. Set 72h/RT DIN ISO 815 %	Compr. Set 24h/70°C DIN ISO 815 %	Compr. Set 24h/100°C DIN ISO 815 %
TC9FRZ	black	87	1.100	6.0	550	30.0	27	55	77

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

Shelf life: 1 year from manufacturing date. Keep in cool, dry and well ventilated area, away from direct source of heat, sunlight and extreme humidity.

All values published in this data sheet are rounded average values.
Specification limits are based on three-fold standard deviation from the average value.

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Processing Guideline Extrusion

Cylinder temperature	180 - 200 - 220 °C; max. 220 °C (355 - 390 - 425 °F; max. 425 °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 3.5 : 1
Screens / breaker plate	A breaker plate and a screen pack are generally recommended in the extruder configuration in order to increase pressure.
Die land	3 - 5 mm (0,12 - 0,16 in.)
Extruder Head	Ca. 180 °C (355 °F)
Die temperature	Ca. 190 - 180 °C (374 - 410 °F)
Pre drying	To achieve optimum mechanical values the following procedures have to be kept: a. Material has to be predried efficiently. Air dryer - at least 4h/80 °C (4h/175 °F), residual moisture < 0,02%. b. Material has to be processed immediately after drying. Avoid moisture absorption in the funnel (funnel must be covered). c. Before opening the bag, material has to be at room temperature in order to avoid condensation due to cold material. d. Keep the filling level in the funnel low.
Calibration	Generally not necessary; support elements may be required when extruding THERMOLAST® compounds with high hardness or when coextruding with standard thermoplastics.

Processing Guideline Injection Molding

Cylinder temperature	220 - 200 - 180 °C, max. 220 °C (428 - 392 - 356 °F, max. 428 °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.

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Processing Guideline Injection Molding

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 - 50 bar (285 - 710 psi); if colour 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)
Pre drying	To achieve optimum mechanical values the following procedures have to be kept: a. Material has to be predried efficiently. Air dryer - at least 4h/80 °C (4h/175 °F), residual moisture < 0,02%. b. Material has to be processed immediately after drying. Avoid moisture absorption in the funnel (funnel must be covered). c. Before opening the bag, material has to be at room temperature in order to avoid condensation due to cold material. d. Keep the filling level in the funnel low.
Needle shut-off	With materials < 50 Shore the use of a needle seal nozzle 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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