AKAFLEX® PENDF FW:
Coverlay films on a PEN-film basis for flexible printed circuits

The AKAFLEX® PENDF FW programme.

AKAFLEX PENDF FW is available from KREMPEL as a

✓ **Coverlay film coated on one side with adhesive**

for covering etched circuits. The polyethylene-naphthalate film (PEN) is coated with a modified, highly flexible epoxy resin which is subsequently covered by protective paper. Because of the high-grade starting materials used, this coverlay film is characterised by a **higher fatigue strength at elevated temperatures**. PEN-film coverlay films of **higher dimensional stability** are also available on request.

AKAFLEX PENDF FW is available both with different types of **PEN film and thickness grades** as well as with different **adhesive coatings**. The variants are identified in the product designation by letters and combinations of numbers.

Designation for coverlay films

AKAFLEX PENDF 0 / XX/XX FW 3

- PEN coverlay film
- Front side not coated
- Thickness of the PEN-film, in µm
- Thickness of coating on the reverse side, in µm
- Hydrolysis-resistant FW adhesive system
- High dimensional stability (class 3

e.g.: AKAFLEX PENDF 0 / 25 / 25 FW 3

Standard types of AKAFLEX® PENDF FW

Standard type designation	Thickness of PEN-film	Thickness of the coating
with PEN standard film		
PENDF 0 / 25 / 25 FW2 Regular dimensional stability (MD/TD ≤0.7%)	25 µm	25 µm
with PEN-film for higher dimensional stability		
PENDF 0 / 25 / 25 FW3 High dimensional stability (MD/TD ≤0.4%)	25 µm	25 µm

Other types on request

4.2.1

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Processing AKAFLEX® PENDF FW

The following pressing cycle is recommended for processing AKAFLEX PENDF FW in a heated-plate press:

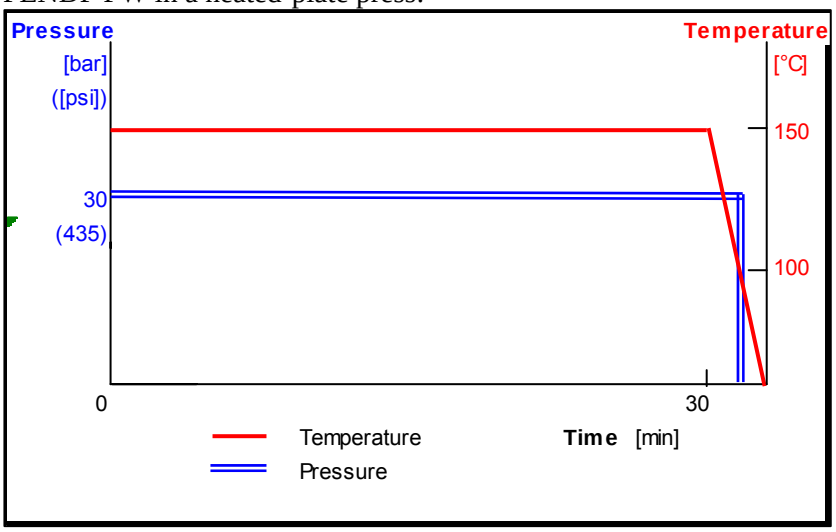

Plate temperature:
150 °C

Pressing pressure:
30 bar

Pressing duration:
30 minutes

Cooling:
< 100 °C under pressure

Pressing cushion:
e.g. silicone rubber

AKAFLEX PENDF FW can also be used in continuous laminating processes. A temperature of 170 °C and a speed of 2m/min recommended for this.

... or in the roller laminator

Quality assurance

All AKAFLEX products are subject to the procedures of on-going quality control as defined in the Quality Assurance Handbook of August Krempel Soehne. This quality assurance system is certified as meeting the requirements of ISO 9001 and ISO/TS 16949. For AKAFLEX PENDF FW, testing is performed on the master reels according to the methods given in IPC-TM 650.

Availability of AKAFLEX® PENDF FW

- ✓ **Standard reel width:**
  610 mm or 500 mm;
  other widths on request
- ✓ **Standard reel length:**
  100 m; other lengths on request
- ✓ **Format:**
  As requested by the customer
- ✓ **Packaging:**
  Reels suspended in robust corrugated-cardboard cartons
- ✓ **Standard cores:**
  Inside diameter 76 mm
- ✓ **Certificate:**
  Test certificate according to EN 10 204 - 2.2.

Storage

The shelf life of coverlay films is limited because of their application-specific properties. The epoxy adhesive systems used here can be stored for at least 3 months in a dry environment at room temperature (+25 °C).

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Technical data for AKAFLEX® PENDF 0/25/25 FW2 and FW3

25 µm PEN-film / coated with 25 µm polyester resin (thermosetting) on one side

Properties of the coverlay film	Dimension	Test method	Typical values	
		IPC-TM 650	PENDF FW2	PENDF FW3
Peeling strength	N/mm	2.4.9	> 1	> 1
Dimensional stability (after 30 min. at 150 °C)	%	2.2.4 Method C	≤ 0.7	≤ 0.4
Dimensional stability (after removing the protective paper)	%	company-internal test	≤ 0.7	≤ 0.4
Solder-bath stability	-	-	meets specified requirements	meets specified requirements

Properties of the PEN film	Dimension	Test method	Typical values	
			PEN-film FW2	PEN-film FW3
Dimensional stability, MD/TD (30 min. at 150°C)	%	ASTM D1204	0.5	0.1
Tensile strength MD	N/mm²	ASTM D882	> 140	> 140
TD	N/mm²	ASTM D882	> 140	> 140
Failure strain MD	%	ASTM D882	> 50	> 50
TD	%	ASTM D882	> 50	> 50
Volume resistivity	Ω · cm	ASTM D257	10^{18}	10^{18}
Surface resistivity	Ω / □	ASTM D257	10^{17}	10^{17}
Breakdown voltage	kV/mm	ASTM D149	> 220	> 220
Dielectric constant (23 °C; 1 kHz)	--	ASTM D150	2.9	2.9
Dielectric loss factor (tan δ) (23 °C; 1 kHz)	--	ASTM D150	0.005	0.005
Melting point	°C	-	266	266
Glass transition temperature	°C	DSC	120	120
Coefficient of linear thermal expansion (between 30 °C and 50 °C)	1/K	ASTM D696	1.3×10^{-5}	1.3×10^{-5}
Max. service temperature	°C	UL 746B	160	160
Dimensional stability MD/TD (150 °C, 30 min.)	%	ASTM D1204	0.5	0.1
Max. water absorption (immersion, 24 h at 23 °C)	%	ASTM D570	0.4	0.4

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