KREMPEL-DPP

Presspaper with partial resin coating P.4.1A according to IEC 60641-3-2

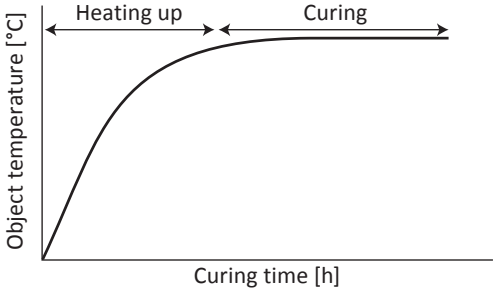


- **KREMPEL-DPP is a natural-coloured presspaper made of 100 % unbleached sulfate cellulose with double-sided diamond dotted, still reactive resin coating. The coating quadrats of KREMPEL-DPP have a lateral length of 9.5 mm and a spacing of 6.35 mm. Approx. 36 % of the total surface of each side is thus printed with epoxy resin. The quadrats are arranged so that their diagonals are parallel and perpendicular to the machine direction of the transformer presspaper.**
- **KREMPEL-DPP is primarily used as layer and winding insulation in the LV and HV coils of transformers. After curing, the partial resin coating bonds the electric conductors with the insulation, which brings about the mechanical consolidation of the coils. In this way the radial and axial forces that arise in the event of short circuit can be safely controlled.**
- **Coils manufactured with KREMPEL-DPP can be quickly and safely impregnated with insulating oil (transformer oil and silicon oil). This minimizes the risk of partial discharges following inadequate impregnation.**
- **Our specially developed resin composition for KREMPEL-DPP offers short curing times, high binding strength and excellent long-term storage stability.**
- **Upon request, KREMPEL-DPP can also be manufactured on two-layer bonded, thin presspaper. Extra compact coils are possible with this version.**
- **KREMPEL-DPP can also be supplied in the special "Thermally upgraded" version (name: DPP TU). Here the thermal ageing process of the presspaper is delayed by adding a small quantity of a nitrogenous additive.**
- **KREMPEL-DPP can be supplied as an original roll or narrow roll.**
- **For formats and tolerances, see Page 1.22**

Curing conditions for KREMPEL-DPP

- **The curing period varies depending on the temperature selected: 105 °C / 3 h or 120 °C / 1.5 h.**
- **The object temperature is the temperature being measured in the coil.**
- **The heat-up phase of the coils must be finished no later than after 4 hours.**
- **A curing temperature under 100 °C is not recommended.**

Temperature progression during curing



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Processing of KREMPEL-DPP

- **KREMPEL-DPP is dry and non-adhesive upon delivery and can be processed as winding and layer insulation according to all known processes. When winding, it is necessary to ensure adequate tensile strength of conductors and DPP so that coils can be produced as compact as possible.**
- **The curing of the coils wound with KREMPEL-DPP can be performed at either 105°C or 120°C. The curing must not be performed using a "vapour-phase drying" procedure as this will cause corrosion of DPP resin that has not yet cured. A vapour-phase drying method should only be performed on fully cured coils.**

Technical data for KREMPEL-DPP / Measured based on IEC 60641-2									
KREMPEL-DPP Type	---	DPP 0.04	DPP 0.05	DPP 0.06	DPP 0.075	DPP 0.10	DPP 0.125	DPP 0.175	DPP 0.20
Nominal thickness *) **Tolerance**	mm %	0.065 ± 15	0.075 ± 15	0.085 ± 15	0.10 ± 15	0.125 ± 12	0.15 ± 10	0.2 ± 10	0.225 ± 10
Resin layer **)	approx. µm	25	25	25	25	25	25	25	25
Area weight DPP*) **Tolerance**	g/m² %	50 ± 10	60 ± 10	70 ± 10	90 ± 10	120 ± 10	140 ± 10	195 ± 10	225 ± 10
Area yield approx.	m²/kg	20	16.7	14.3	11.8	8.7	7.1	5.1	4.4
Tensile strength MD	MPa	≥ 70	≥ 70	≥ 70	≥ 75	≥ 75	≥ 75	≥ 75	≥ 75
Tensile strength CMD	MPa	≥ 35	≥ 35	≥ 35	≥ 35	≥ 35	≥ 35	≥ 35	≥ 35
Shrinkage MD	%	≤ 1.0	≤ 1.0	≤ 1.0	≤ 1.0	≤ 1.0	≤ 1.0	≤ 1.0	≤ 1.0
Shrinkage CMD	%	≤ 1.5	≤ 1.5	≤ 1.5	≤ 1.5	≤ 1.5	≤ 1.5	≤ 1.5	≤ 1.5
Moisture content	%	≤ 8.0	≤ 8.0	≤ 8.0	≤ 8.0	≤ 8.0	≤ 8.0	≤ 8.0	≤ 8.0
Conductivity of the aqueous extract	mS/m	≤ 8.0	≤ 8.0	≤ 8.0	≤ 8.0	≤ 8.0	≤ 8.0	≤ 8.0	≤ 8.0
Breakdown voltage in air	kV	≥ 0.4	≥ 0.45	≥ 0.54	≥ 0.7	≥ 0.9	≥ 1.1	≥ 1.6	≥ 1.8
KREMPEL-DPP Type	---	DPP 0.25	DPP 0.30	DPP 0.38	DPP 0.50	DPP 0.10-2 two-layer bonded	DPP 0.12-2 two-layer bonded	DPP 0.15-2 two-layer bonded	DPP 0.25-2 two-layer bonded
Nominal thickness *) **Tolerance**	mm %	0.275 ± 10	0.325 ± 10	0.405 ± 10	0.525 ± 10	0.125 ± 12	0.145 ± 10	0.175 ± 10	0.275 ± 10
Resin layer **)	approx. µm	25	25	25	25	25	25	25	25
Area weight DPP*) **Tolerance**	g/m² %	280 ± 10	340 ± 10	420 ± 10	560 ± 10	115 ± 10	145 ± 10	170 ± 10	280 ± 10
Area yield approx.	m²/kg	3.6	2.9	2.4	1.8	8.7	6.9	5.9	3.6
Tensile strength MD	MPa	≥ 80	≥ 80	≥ 80	≥ 80	≥ 75	≥ 75	≥ 75	≥ 80
Tensile strength CMD	MPa	≥ 40	≥ 40	≥ 40	≥ 40	≥ 35	≥ 35	≥ 35	≥ 40
Shrinkage MD	%	≤ 1.0	≤ 1.0	≤ 1.0	≤ 1.0	≤ 1.0	≤ 1.0	≤ 1.0	≤ 1.0
Shrinkage CMD	%	≤ 1.5	≤ 1.5	≤ 1.5	≤ 1.5	≤ 1.5	≤ 1.5	≤ 1.5	≤ 1.5
Moisture content	%	≤ 8.0	≤ 8.0	≤ 8.0	≤ 8.0	≤ 8.0	≤ 8.0	≤ 8.0	≤ 8.0
Conductivity of the aqueous extract	mS/m	≤ 8.0	≤ 8.0	≤ 8.0	≤ 8.0	≤ 8.0	≤ 8.0	≤ 8.0	≤ 8.0
Breakdown voltage in air	kV	≥ 2.5	≥ 3.0	≥ 3.8	≥ 4.5	≥ 0.9	≥ 1.1	≥ 1.4	≥ 2.5

*) Nominal thickness and Area weight = presspaper + resin coating / **) Resin layer = double-sided total coating

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