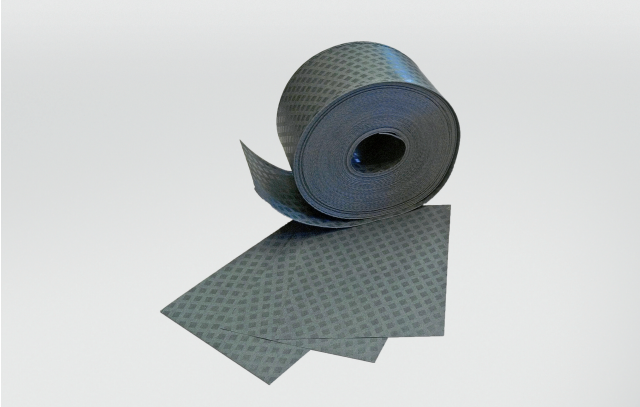
INSULutions® DPE

ADVANCED CELLULOSE BASED INSULATING PAPER FOR UP TO 140 °C THERMAL CLASS IN LIQUID-IMMERSED TRANSFORMERS

INSULutions® DPE (DPE - Diamond Printed Enhanced) is a new generation, cellulose based insulating paper from Weidmann, engineered to exceed the performance of traditional Kraft papers used for layer insulation in transformers: increased thermal rating; accelerated drying and liquid impregnation rates; better dielectric performance; and excellent mechanical strength. The cost of DPE paper is a fraction of the cost of non-cellulose papers making DPE the most cost effective option for insulation in standard and higher thermal rating liquid-immersed transformers, both in mineral oil and ester liquid.



SUMMARY OF FEATURES AND BENEFITS

- **100 % Cellulose**
  - Renewable and environmentally sustainable natural product
  - Industry proven reliability in liquid-immersed transformers
  - Most cost effective option for layer insulation
- **Higher Thermal Rating**
  - DPE paper is qualified in accordance with requirements of IEEE C57.100™-2011 Standard Test Procedure For Thermal Evaluation of Insulating Systems for Liquid-Immersed Distribution and Power Transformers (and similar IEC 62332-2 Standard on Electrical Insulation Systems (EIS)- Thermal Evaluation of Combined Liquid and Solid Components – Part 2: Simplified Test)
  - DPE has a Thermal Class of 130 °C in mineral oil systems and 140 °C in ester liquid systems
  - Table below summarizes DPE thermal rating parameters used in the transformer design based on IEC terminology:

Insulation System	Insulating material and liquid	Transformer average winding temperature rise (AWR), K	Transformer hot-spot temperature rise, K	System thermal class, °C
DPE system	DPE in mineral oil	85	100	130
	DPE in ester liquid	95	110	140

- **Faster Drying Rate**
  - Numerous tests in both full production and laboratory environment confirm that DPE paper and transformer coils utilizing this paper dry-out up to 30% faster when compared with standard Kraft papers.
- **Faster Liquid Impregnation Rate**
  - Up to 25% faster impregnation in both mineral oil and ester liquid compared with standard Kraft paper.
  - Faster impregnation combined with an increased thermal rating make DPE the paper of choice for applications in high viscosity ester liquid.
- **Superior Dielectric Characteristics**
  - Transformer insulation system can be optimized using DPE paper.
- **Excellent Mechanical Properties**
  - Trouble-free coil manufacturing.
  - Increased Tensile Energy Absorption (TEA) version is available for high speed strip insulation winding machines.
  - Wide range of paper thicknesses is available for optimum insulation design.
- **Proven Compatibility with Mineral Oil and Ester Liquid**
  - Compatibility verified with tests performed in accordance with ASTM D 3455-11 Standard Test Methods for Compatibility of Construction Materials with Electric Oil of Petroleum Origin.
- **Blue Color**
  - Easily distinguishable from other papers.
- **Printed With Epoxy Dots in a Diamond Pattern**

WEIDMANN

BONDING

The coated paper is designed to bond firmly and evenly to conductor or other insulation materials with adequate time, temperature and contact pressure.

SHELF LIFE

When stored in a controlled environment, "B stage" coated paper has an extended shelf life. For paper stored in normal warehouse conditions, out of direct sunlight and away from direct moisture, we recommend that it be used within 12 months.

PACKAGING

Coated paper is supplied in rolls or sheets. Rolls are wound on a 3-inch (76 mm) ID core and stretch wrapped in plastic which serves as a moisture barrier. Rolls can be packaged vertically or horizontally on pallets and banded. Each roll is labeled for traceability.

TYPICAL VALUES (metric)

Thickness	inch	0.003	0.005	0.006	0.007	0.008	0.010	0.012	0.015	Standard
	mm	0.076	0.127	0.152	0.178	0.203	0.254	0.305	0.381	
Grammage	g/m^2	84	127	149	177	203	253	302	377	ASTM D202 ASTM D646
Density	g/cm^3				0.9 – 1.1					ASTM D202
Moisture Content	%				3 – 5					ASTM D202 ASTM D644
Tear Strength - MD	mN	735	1275	1520	1764	2060	2940	3235	4900	ASTM D202
Tensile Strength - MD	kN/m	7.0	14.9	16.6	17	17.5	27.2	29.8	43.8	ASTM D202
Elongation - MD	%, min				1.5					ASTM D202
pH of aqueous extract	pH				6 - 8					TAPPI T435 ASTM E70
Ash Content	%, max				0.75					ASTM D586
Nitrogen Content	%, min				1.3					ASTM D982
Bond/Sheer Strength	N/cm^2, min				28					Weidmann Quality Test
Dielectric strength - Oil	kV/mm	73	68	64	61	58	56	54	51	ASTM D202 ASTM D149

All data shown in Table represents Typical Values only unless specifically stated differently.

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