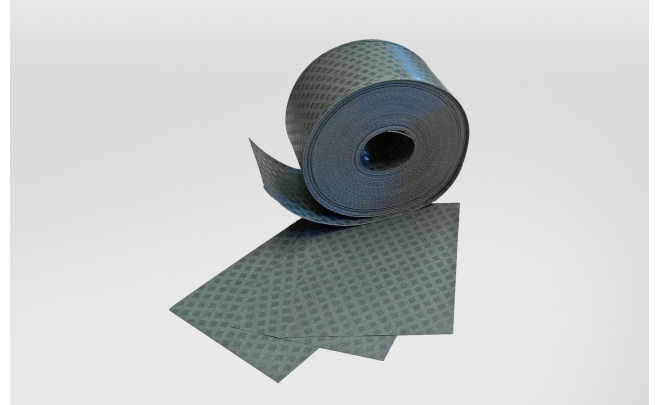


INSULutions® DPE

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 IEEE terminology:

Insulation System	Insulating material and liquid	Transformer average winding temperature rise (AWR), °C	Transformer hottest spot temperature (temperature index), °C	System thermal class, °C
DPE system	DPE in mineral oil	75	120	130
	DPE in ester liquid	85	130	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**

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

Thickness	inch	0.003	0.005	0.006	0.007	0.008	0.010	0.012	0.015	ASTM D374
	mm	0.077	0.127	0.152	0.178	0.201	0.255	0.301	0.382	
Grammage	lbs/3000 ft ²	46	77	93	109	124	155	186	232	ASTM D646
Density	g/cm ³	1	1	1	1	1	1	1	1	ISO 534
Moisture Content	%	4.9	4.7	4.8	4.7	4.6	4.7	4.7	4.5	ISO 287
Tear Strength - MD	Grams Force	65	125	145	180	220	305	390	585	TAPPI T414
Tensile Strength - MD	lbs/inch	40	88	106	130	144	180	215	260	ASTM D828
Elongation, MD	%	1.9	2.0	2.3	2.2	2.4	2.6	2.7	2.7	SO1924-2
PH of aqueous extract	pH	7.6	7.6	7.6	7.7	7.7	7.8	7.7	7.5	IEC 60554-2
Ash Content	%	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	ISO 2144
Nitrogen Content	%	3.5	3.5	3.4	3.1	3.2	3.1	3.1	3.1	Elemental Analyser
Bond Strength (Adhesive)	PSI	80	80	80	80	80	80	80	80	Weidmann Quality Test at 100° C
Dielectric Strength - Oil	kV/mil	2.0	1.9	1.9	1.9	1.8	1.7	1.6	1.4	ASTM D149

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

Thermal Class E (130°C) rated insulation in mineral oil.

Thermal Class B (140°C) rated insulation in ester fluid.

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