

INSULutions® DPE – DIAMOND PATTERN ENHANCED INSULATING PAPER

ADVANTAGES, VALUE, AND BENEFITS

INSULutions® DPE paper is Diamond Pattern Enhanced insulating paper engineered by Weidmann to provide significant advantages and value for the design of distribution transformers to the benefit of transformer OEMs and end users.

DPE paper, as a layer insulating paper in distribution transformers, has the following technical advantages compared to the “regular” thermally upgraded cellulose (kraft) insulating papers:

1 Higher Thermal Class

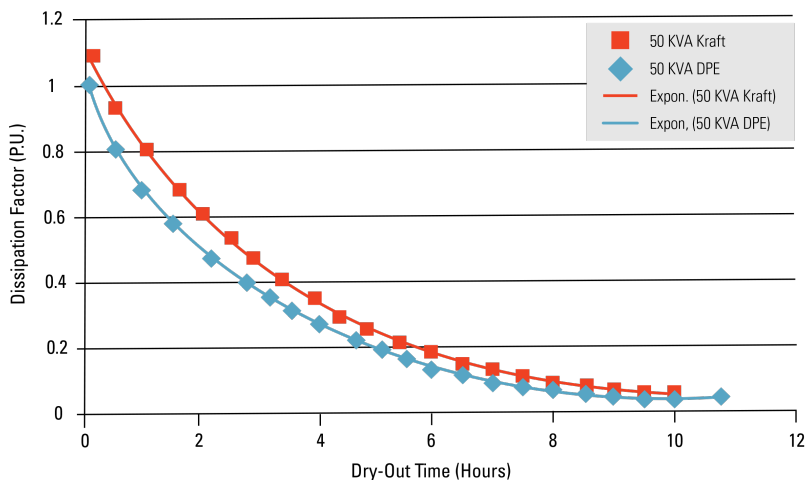


Thermal rating of DPE paper (based on IEEE standard requirements)

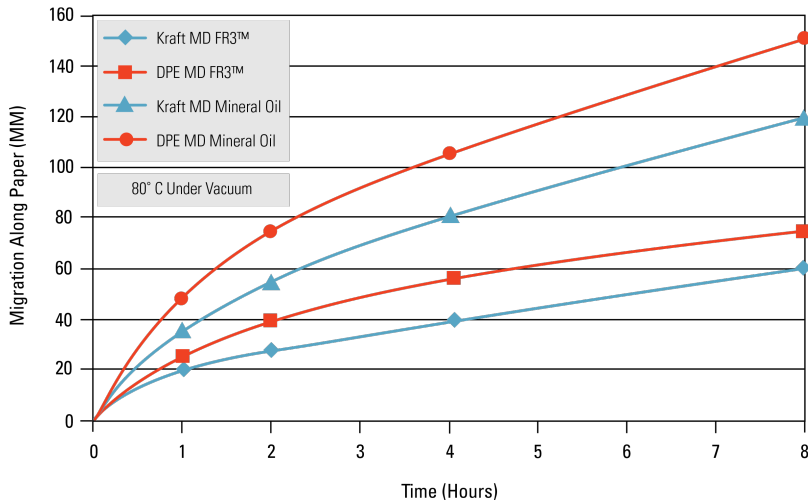
Insulation Systems	Insulating Material and Liquid	Transformer Average Winding Temperature Rise (AWR), °C	Transformer Hottest Spot (Temperature Index), °C	System Thermal Class, °C
Industry Proven System	Kraft in mineral oil	55	95	105
	TUK in mineral oil	65	110	120
DPE System	DPE in mineral oil	75	120	130
	DPE in ester liquid	85	130	140

2 Faster moisture drying rate – up to 30% faster

Factory Transformer Dry-Out Test Results



③ Faster liquid impregnation rate, especially for the transformers with high viscosity ester liquids



④ Better overall dielectric performance based on the paper composition, less moisture, and better / fuller liquid impregnation

Value and Benefits		DPE Paper Technical Advantages			
		Higher Thermal Class	Faster Drying Rate	Faster Impregnation Rate	Better Overall Dielectric Performance
End User (Utility and Industrial)	*Longer life (respectively, better assets amortization and lower capital investments)	+	+	+	+
	*Higher reliability and resiliency (including to the emergency events)	+	+	+	+
	*Higher overload capability	+	-	-	-
	**More compact transformer	+	-	-	+
	**Reduced weight transformer	+	-	-	+
Transformer OEM	Reduced dry-out time	-	+	-	-
	***Reduced liquid impregnation time	-	-	+	-
	***Process energy savings	-	+	+	-
	***Increased product throughput, cost reduction	-	+	+	-
	****Improve overall product quality and reduced factory test failure rate	-	+	+	+
*Especially beneficial for the application in high ambient temperature zones.					
**Assuming equal or increased transformer efficiency.					
***Very beneficial and increasingly important for transformers with ester liquids.					
****Very beneficial and increasingly important for larger kVA and higher voltage class transformers like transformers for the solar and wind power energy generation.					

Proven cost savings for transformers

The development of Weidmann DPE paper fulfills the market need in the advancement of 100% cellulose insulating materials for transformers. At a fraction of the cost of non-cellulose materials, DPE improves both standard thermal rating and higher thermal rating transformers in both mineral oil and ester liquids.

The unique combination of higher thermal rating, faster drying and faster liquid impregnation rate, advanced dielectric performance, and excellent mechanical properties have been proven to provide a spectrum of opportunities for transformer cost savings.

DPE delivers substantial benefits to transformer OEMs and End Users:

- Cost-effective
- Longer transformer life
- Higher overload capability
- Quality improvement
- Lower failure rates
- Faster dryout

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