



# MIDEL eN 1204

Natural Ester Transformer Fluid (Rapeseed)

Fire safe and Biodegradable



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a product of  M&I MATERIALS

## MIDEL eN 1204

Safety and performance from a natural source. MIDEL protects life, property and the environment. It saves money while enabling innovation. It's MIDEL. It's safety inside.

**MIDEL eN 1204** is our rapeseed oil based natural ester transformer fluid.

MIDEL is the acknowledged leading brand of ester transformer fluid. Since the 1970s MIDEL has been used in hundreds of thousands of installations worldwide, providing unrivalled fire safety, environmental protection, increased asset performance and real cost savings.

**MIDEL eN 1204's** thin film rate of oxidation is half that of soya-based fluids, thus offering greater tolerance if exposed to air.

**MIDEL eN 1204** is a natural ester dielectric fluid designed to provide an alternative to mineral oil, silicone liquid and dry-type transformers.

**MIDEL eN 1204** has a high fire point, significantly increasing the fire safety of your transformers and reducing the need for fire protection equipment.

**MIDEL eN 1204** is sustainably sourced and readily biodegradable, avoiding environmental damage should leakage occur and enabling reductions in containment measures.

**MIDEL eN 1204** is an effective solution for non free-breathing transformers.

**MIDEL eN 1204** has a pour point around 13°C lower than the soy-based natural ester making it a better choice in cooler climates.

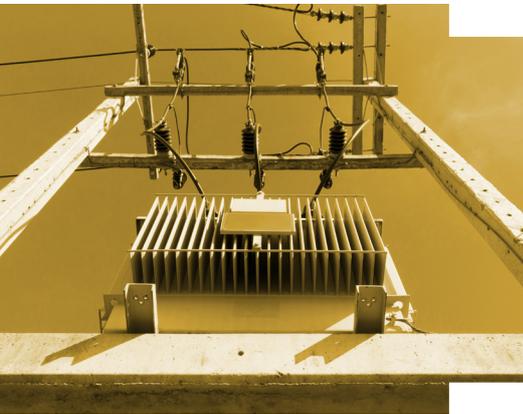
**MIDEL eN 1204** has a high moisture tolerance. This characteristic enables the extension of cellulose insulation life.

**MIDEL eN 1204** is currently used in a wide range of transformer applications and is ideal for non free-breathing transformers located indoors or outside.

**MIDEL eN 1204** offers the ability to safely increase transformer loading or reduce transformer size.

Transformer fires are a frequent occurrence in the world's power networks. Such fires are notoriously unforgiving, spreading very quickly and causing extensive damage, sometimes involving loss of life. MIDEL eN 1204 offers a proven solution in terms of fire risk mitigation.

MIDEL's engineers and chemists have built close working relationships with end users and the major transformer manufacturers. They are also active in IEEE, CIGRÉ and IEC working groups and regularly undertake extensive projects with industrial associations and academic bodies. Such depth of experience allows the MIDEL team to provide an unrivalled level of expert technical guidance.



**MIDEL eN 1204  
IS MANUFACTURED  
FROM RAPESEED OIL**

## MIDEL eN 1204 Fluid properties

Property	Standard Test Methods		Requirement		MIDEL eN 1204
	ASTM	ISO/IEC	ASTM D6871	IEC 62770	
<b>Physical</b>					
Colour	D1500		≤ 1.0		0.5
Flash Point PMCC (°C)	D93	ISO 2719		≥ 250	> 260
Flash Point COC (°C)	D92	ISO 2592	≥ 275		> 315
Fire Point (°C)	D92	ISO 2592	≥ 300	≥ 300	> 350
Pour Point (°C)	D97	ISO 3016	≤ -10	≤ -10	-31
Density at 20°C (g/cm <sup>3</sup> )		ISO 3675		≤ 1.0	0.92
Relative Density (specific gravity) (15°C/15°C)	D1298		≤ 0.96		0.92
Viscosity (mm <sup>2</sup> /sec)	D445	ISO 3104			
@100°C			≤ 15	≤ 15	8.3
@40°C			≤ 50	≤ 50	37
@0°C			≤ 500		232
Appearance	D1524		Bright and Clear		Bright and Clear
Visual examination		IEC 62770 4.2.1		Clear, free from water and suspended matter and sediment	Clear, free from water and suspended matter and sediment
Biodegradation - OECD 301				Readily Biodegradable	Readily Biodegradable
<b>Electrical</b>					
Dielectric Breakdown (kV)	D877		≥ 30		≥ 30
Dielectric Breakdown (kV)					
1 mm gap	D1816		≥ 20		45
2 mm gap	D1816		≥ 35		57
2.5 mm gap		IEC 60156		≥ 35	> 75
Gassing Tendency (µl/min)	D2300		≤ 0		-46.1
Power Factor at 25°C (%)	D924		≤ 0.2		≤ 0.20
Power Factor at 100°C (%)	D924		≤ 4.0		≤ 4.0
Dissipation Factor at 90°C (tan delta)		IEC 60247		≤ 0.05	< 0.03
<b>Chemical</b>					
Corrosive Sulfur	D1275	IEC 62535	Non-corrosive	Non-corrosive	Non-corrosive
Water Content (mg/kg)	D1533	IEC 60814	≤ 200	≤ 200	50
Acid Number (mg KOH/g)	D974	IEC 62021.3	≤ 0.06	≤ 0.06	≤ 0.04
PCB Content (mg/kg)	D4059		Not detectable		Not detectable
Oxidation Stability (48hr)	ASTM D 2440	IEC 61125C			
Total Acidity (mg KOH/g)		IEC 62021.3		≤ 0.6	< 0.1
Viscosity at 40°C (mm <sup>2</sup> /sec)		ISO 3104		≤ 30% over initial	8%
Dissipation Factor at 90°C (tan delta)		IEC 60247		≤ 0.5	< 0.1

The displayed typical values are not to be identified as acceptance values.

**MIDEL eN 1204 - manufactured using renewable vegetable oil, readily biodegradable, providing fire safety and environmental protection from a natural ester.**

## MIDEL eN 1204

Fire and environmental protection in a natural ester fluid

**MIDEL eN 1204** is an excellent dielectric fluid because it has a high fire point, making it demonstrably safer than mineral oil. It is also one of the most environmentally friendly dielectric fluids available; not only is MIDEL eN 1204 manufactured using renewable vegetable oil (rapeseed), it is also non-toxic and readily biodegradable. In addition, MIDEL eN 1204 offers superior moisture tolerance and has the potential to increase the lifetime of cellulose based solid insulation, which in turn can extend transformer life.

### INCREASED FIRE SAFETY

- 100% fire safety record
- High fire point (>300°C)
- K-class classification: Less flammable fluid
- Designed for indoor and outdoor installations

### GREATER ENVIRONMENTAL PROTECTION

- Renewable vegetable oil
- Lower carbon footprint than mineral oil
- Readily biodegradable
- Non-toxic
- No corrosive sulphur

### SUPERIOR MOISTURE TOLERANCE

- Absorbs large amounts of moisture with no reduction of breakdown voltage (up to 300ppm)
- High saturation limit (1100ppm @20°C) making precipitation of free water virtually impossible

### ASSET LIFE EXTENSION

- Slower rate of cellulose ageing than mineral oil
- Longer cellulose lifetime at standard temperatures
- Option to run at a higher temperature, for a standard lifetime
- Provides a higher power output, without the need for high temperature insulation

### ENABLES INNOVATION

- Allows for compact transformer design
- Permits greater flexibility and temporary overload resilience



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