

## Dielectric Insulating Fluid Overview

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### MIDEL 7131 Product Overview

MIDEL 7131 is a synthetic ester-based dielectric fluid that has been serving the global transformer market for over 30 years. MIDEL 7131 has been specifically formulated to provide a safe, superior alternative to traditional fluid and dry-type transformers and can be used in indoor or outdoor locations.

MIDEL 7131 is a high performance fluid that offers increased fire safety, greater environmental protection and superior moisture tolerance. Testing has also proven that MIDEL 7131 has excellent dielectric properties.

### IEC 61099 Conformity

MIDEL 7131 conforms to IEC 61099 "Specifications for Unused Synthetic Organic Esters for Electrical Purposes". It is classified as type T1, a halogen-free pentaerythritol ester.

### Areas of Application

MIDEL 7131 filled transformers are available from all major transformer manufacturers. MIDEL 7131 is suitable for a wide range of transformer applications, including sealed and breathing.

- ▶ Distribution transformers
- ▶ Power transformers
- ▶ Traction transformers
- ▶ Rectifier transformers
- ▶ Pole-type transformers
- ▶ Tapchangers
- ▶ Thyristor cooling

### Retrofilling

MIDEL 7131 has been used to retrofill thousands of distribution transformers to improve service life, reduce environmental hazards or increase fire safety.

### Corrosive Sulphur

MIDEL 7131 has been tested by independent laboratories to ASTM D1275 B and IEC 62535, it was found to be non-corrosive.

### Increased Fire Safety

MIDEL 7131 has a high fire point and a low net calorific value (<32 MJ/kg) and is therefore classified as a K3 class liquid.

- ▶ 100% fire safety record
- ▶ High fire point (>300°C)
- ▶ K-class to IEC 61100 / 61039
- ▶ FM Global® approved transformer fluid
- ▶ Reduced fire safeguarding costs

### Greater Environmental Protection

MIDEL 7131 is an environmentally friendly alternative to conventional transformer fluids because it is classified as readily biodegradable and non-water hazardous.

- ▶ Readily biodegradable (OECD 301)
- ▶ Fully biodegradable (IEC 61039)
- ▶ Classified as non-water hazardous by (UBA)
- ▶ Non-toxic
- ▶ Will not evaporate into the environment
- ▶ Not detrimental to activated sludge in biological treatment plants
- ▶ RoHS compliant

### High Performance

MIDEL 7131 is an extremely robust fluid that delivers long-term stability even when exposed to extreme temperature variations. MIDEL 7131 also has excellent oxygen stability allowing it to be used in breathing transformers.

- ▶ Robust and stable at high temperatures over long periods
- ▶ Suitable for compact transformer design
- ▶ Superior oxygen stability
- ▶ Excellent lubricant
- ▶ No sludge formation

### Moisture Tolerance

MIDEL 7131 is moisture tolerant and can absorb far more water than alternative fluids, without compromising the breakdown voltage.

- ▶ No reduction of breakdown voltage (up to 600ppm / 20°C)
- ▶ Allows moisture to migrate from cellulose into the fluid
- ▶ Potentially keeps the cellulose drier and slows the rate of ageing
- ▶ Very high saturation limit making condensation virtually impossible
- ▶ Reduced risk of bubble formation

### Delivery

MIDEL 7131 can be delivered in 24.5kg, 195kg or 1000kg sealed containers; bulk tanker deliveries available for >20 tonnes.

### Disposal

For disposal, it is recommended that used MIDEL 7131 or remains of the insulating fluid be burnt in a suitable installation.

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**Table 1 - Characterisation of Type T1 Transformer Ester According to IEC 61099 and DIN VDE 0375**

	Unit	Test Method	Requirement	MIDEL 7131
<b>Physical Properties According to IEC 61099</b>				
Colour	HU	ISO 2211	max. 200	125
Appearance	-	IEC 61099 7.1.2	clear, free from suspended matter and sediment	clear, free from suspended matter and sediment
Density at 20°C	kg/dm <sup>3</sup>	ISO 3675	max. 1.00	0.97
Kinematic Viscosity at 40°C	mm <sup>2</sup> /s	ISO 3104	max. 35.0	28
Kinematic Viscosity at -20°C	mm <sup>2</sup> /s		max. 3000	1400
Flash Point	°C	ISO 2719	min. 250	260
Fire Point	°C	ISO 2592	min. 300	316
Pour Point	°C	ISO 3016	max. -45	-60
Crystallisation	-	IEC 61099 (2010) Annex A	No crystals	No crystals
<b>Chemical Properties According to IEC 61099</b>				
Water Content	mg/kg	IEC 60814	max. 200	50
Neutralisation Value	mg KOH/g	IEC 62021-2	max. 0.03	<0.03
Oxidation Stability - Total Acid Content - Total Sludge Content	mg KOH/g % mass	IEC 61125	max. 0.3 max. 0.01	0.01 <0.01
Net Calorific Value	MJ/kg	ASTM D 240-02	<32	31.6
<b>Dielectric Properties According to IEC 61099</b>				
Breakdown Voltage	kV	IEC 60156	min. 45	>75
Dielectric Dissipation Factor Tan δ at 90°C and 50 Hz	-	IEC 60247	max. 0.03	<0.008
Volume Resistivity DC at 90°C	Gohm-m	IEC 60247	min. 2	>30

Data quoted above are typical values, may be altered without notice and do not constitute a specification