Increased Fire Safety

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Increased Fire Safety

Transformer fires are particularly unforgiving, spreading very quickly and causing extensive damage, often with the tragic loss of human life. In short, transformer fires are an everyday occurrence in power networks worldwide.

MIDEL 7131 offers the perfect solution in terms of fire risk mitigation. Used and respected globally, MIDEL 7131 has an impeccable 100% fire safety record since its introduction in the 1970s.

FM Global® and Underwriters Laboratory, two internationally recognised insurance companies, have listed MIDEL 7131 as a less flammable fluid for dielectric purposes. This means it requires lower fire safety measures than mineral oil. In addition MIDEL 7131's fire safe properties allow for use in transformers inside buildings and other critical areas where mineral oil would not be acceptable.

Flash and Fire Point

MIDEL 7131 has been specifically formulated to give a high flash and fire point, in excess of those required for K-class rating (IEC 61039) and far superior to mineral oil (Table 1).

Table 1 - Flash and Fire Points - IEC 61039 Class K3

Parameter	Test Method	Required	MIDEL 7131	Mineral Oil
Flash Point	ISO 2719 / ASTM D93	min. 250°C	260°C	150°C
Fire Point	ISO 2592 / ASTM D92	min. 300°C	316°C	170°C
Net Calorific Value	ASTM D240-02	<32	30.8MJ/kg	46.0MJ/kg

Data quoted above are typical values

Ignition Resistance

Method

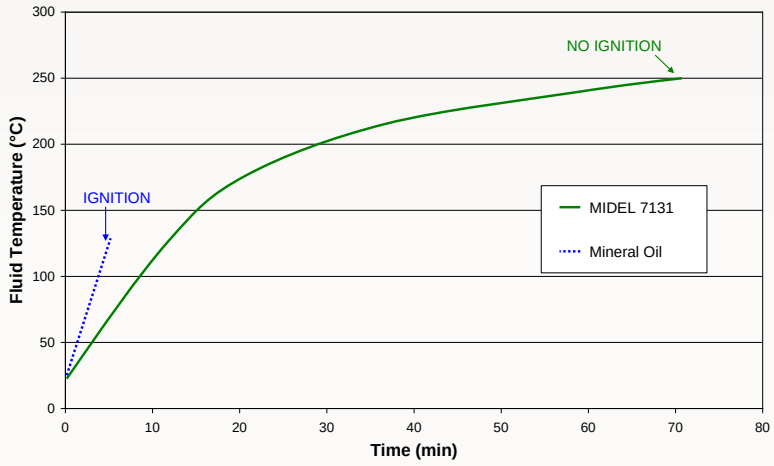
The flame from an oxy-acetylene torch (>2000°C) is directed onto the surface of a shallow pool of liquid in a metal pan. A thermocouple close to the base of the pan measures the temperature of the bulk liquid away from the surface of the pool. Once the torch has been ignited, the temperature of the liquid is recorded. A comparison of the results for mineral oil and MIDEL 7131 are shown in Figure 1.

Results

The temperature of the mineral oil increased quickly and ignited after only 4 minutes. The mineral oil continued to burn even after the ignition source was removed, emitting thick black smoke.

In comparison, the temperature of the MIDEL 7131 rose at a much slower rate. After 70 minutes and a temperature of >260°C, the fluid still did not ignite. MIDEL 7131's low heating rate is due to its high specific heat and thermal conductivity, which combines with the high fire point to give MIDEL 7131 an excellent resistance to ignition.

Figure 1 - Ignition Resistance Comparison between MIDEL 7131 and Mineral Oil



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Smoke and Combustion Products

In the extremely unlikely event of MIDEL 7131 igniting it would produce a non-toxic, much lighter smoke in comparison to that of burning mineral oil. MIDEL 7131's smoke is also not as dense as the white silica smoke produced by silicone liquid fires. This is very pertinent when considering evacuation and rescue procedures.

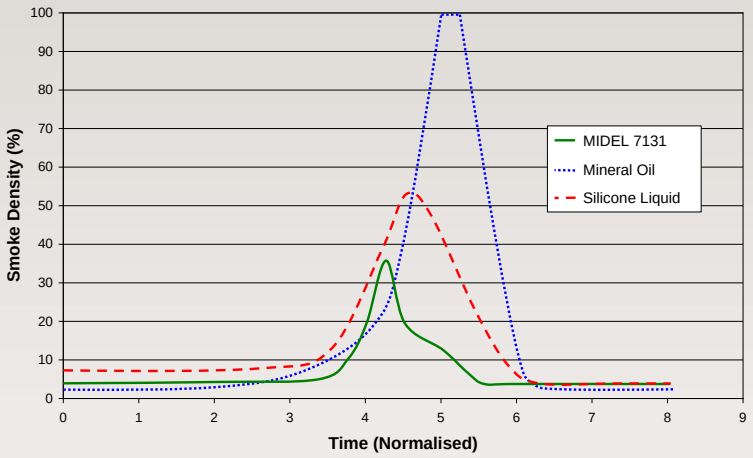
Method

The quantity of smoke produced by transformer fluids is measured using Tewarson apparatus fitted with a light source and a photocell. This is designed to have response characteristics similar to those of the human eye.

Results

The results in Figure 2 clearly demonstrate the low smoke properties of MIDEL 7131. The time axis is normalised to the start of ignition to provide an easy comparison of the smoke density figures. Predictably, mineral oil produced thick black smoke, silicone liquid produced a grey smoke and both were denser than the thin white smoke produced by MIDEL 7131. It should also be noted that in the test, MIDEL 7131 took over twice as long as mineral oil to ignite.

Figure 2 - Smoke Density Comparison for MIDEL 7131, Silicone Liquid and Mineral Oil



The results of the tests summarised in this data sheet confirm MIDEL 7131 is a fire safe alternative to mineral oil. Further fire testing has been conducted by M&I Materials and external laboratories and details are available on request. In terms of protection of personnel and property MIDEL 7131 is the obvious choice when specifying a fire safe fluid.

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