

BecFluid®

Dielectric cooling and insulating fluid

Fluid comparisons

BecFluid® 9902 is used as a safer alternative to mineral oil in transformers where fire safety and protection of the environment are primary considerations.

In locations where environmental concerns and biodegradability are of paramount importance BecFluid® 9902 is specified in preference to silicone fluid.

The table below compares the main properties of BecFluid® 9902 with silicone fluid and mineral oil.

| | Units | BecFluid® 9902 | Silicone oil | Mineral oil |
|---|--------------------|----------------|-----------------|-------------|
| General Properties | | | | |
| Density at 20°C | g/ml | 0.97 | 0.96 | 0.88 |
| Specific heat at 20°C | J/kg K | 1816 | 1510 | 1860 |
| Thermal conductivity at 20°C | W/m K | 0.139 | 0.151 (@ 50 °C) | 0.126 |
| Kinematic viscosity at 20°C | mm ² /s | 61 | 50 (@ 25 °C) | 25 |
| Kinematic viscosity at 100°C | mm ² /s | 5 | 15 | 2.6 |
| Pour point | °C | < -50 | < -50 | -50 |
| Expansion coefficient | /°C | 0.00076 | 0.001 | 0.00075 |
| Flash point | °C | 265 | >300 | 160 |
| Fire point | °C | 315 | >350 | 170 |
| Autoignition temperature | °C | 445 | 435 | 280 |
| Fire hazard classification to IEC 61100 | | K3 | K3 | O |
| Toxicity | | non-toxic* | non-toxic | low |
| Biodegradability at 28 days | | | | |
| - OECD 301B | % | > 80 | N/A | N/A |
| - OECD 301D | % | N/A | <5 | <10 |
| Chemical Properties | | | | |
| Neutralisation value | mg KOH/g | < 0.03 | <0.01 | <0.03 |
| net calorie value | kJ/g | 30.1 | 28.0 | 46.0 |
| Electrical Properties | | | | |
| Breakdown Strength Voltage | kV | 80 | >50 | 60 |
| Dielectric dissipation factor at 90°C | | 0,005 | <0.002 | < 0.002 |
| DC Resistivity at 90°C | G m | 6 | 5 | 4 |
| Permittivity at 20°C | | 3.2 | 2.9 | 2.2 |

*Toxicological tests do not classify BecFluid® 9902 as a hazardous substance.

BecFluid®

Dielectric cooling and insulating fluid

BecFluid® 9902 versus cast resin

BecFluid® 9902 is used in indoor transformers as an alternative to Cast Resin transformers where proven fire safety or size and weight of the transformer are crucial concerns.

Since their introduction nearly 30 years ago Esters have worked trouble free in transformers without any reported incidents or fires.

The table below compares the main properties of BecFluid® 9902 with Cast Resin.

| Property | BecFluid® 9902 | Cast resin |
|--|------------------------------|--------------------------------------|
| Explosion risk | None | Reported |
| Fire in service | None | Reported |
| Breakdown in service | Very rare | Rare |
| Smoke density | Very low | High |
| Toxic smoke | No | Some types |
| Maintenance | *None on sealed transformers | Regular cleaning and crack detection |
| Early warning of electrical faults (DGA) | Yes | No |
| Repair possible | Yes | No |
| Noise in service | No | Yes |
| Outdoor service possible | Yes | Only in housing |
| Dimensions | Standard transformer | Larger volume |
| Standby power | Low | High |
| Transformer life | High | Low |
| Start-up losses | Low | High |

* Subject to transformer manufacturer's recommendations.