Envirotemp™ 200

Product Guide

reference information

R1500

Envirotemp 200 is a fire-resistant liquid dielectric coolant developed for applications requiring high performance under extreme temperature conditions. Its unique formulation provides very low freezing and melting points, well under -50°C. Envirotemp 200 is a biodegradable synthetic ester whose performance has been augmented by a proprietary additive package. The resulting product is a low viscosity fluid with excellent dielectric, thermal, and mechanical properties which make it particularly suitable for forced cooled applications. Similar ester fluids have been used for years as jet engine lubricants which demand thermal, hydrolytic, and oxidation stability under extreme conditions as well as excellent lubricating performance.

APPLICATIONS

The primary consideration for use in traction transformer applications is safety. Because of its fire-resistant and non-flame propagating characteristics, Envirotemp 200 can be used where there is concern for electrical failures generating dielectric fluid fires. Since the temperature necessary to maintain a fire is significantly higher than with traditional transformer mineral oils, Envirotemp 200 is extremely unlikely to sustain a fire after an electrical failure has occurred. The end result is that fire risks are minimal when Envirotemp 200 is used. In addition, in the event of thermal decomposition, unlike chlorinated fluids, no unusually hazardous by-products are produced.

In traction transformers, the pumps which circulate the dielectric coolant through the transformer's heat exchanger must be capable of function at cold start temperatures. Envirotemp 200 offers an excellent combination of pour point, melt point, and viscosity, relative to other commercially available, environmentally acceptable, askarel replacement fluids.

At normal operating temperatures, transformer operation is optimized by the fluid's excellent combination of low viscosity, good thermal properties, and excellent lubricity.

PROPERTIES

Physical, Chemical, and Thermal: The low viscosity of Envirotemp 200 compares favorably with ordinary transformer oils, and its low pour point and excellent lubricating properties make it an excellent fluid for transformers with forced circulated coolant pumps. The fluid's combination of specific heat and thermal conductivity are superior for these applications, and other properties such as the coefficient of expansion make the fluid a good candidate for askarel replacement.

Flammability: The high fire point and excellent heat transfer characteristic of the fluid make it an inherently ignition-resistant material.

Federal Railway Administration testing has further concluded that this class of fluid is satisfactory from the standpoint of flammability and fire extinguishment capability.

Environmental & Health: Two sets of universally accepted tests have been run to assess the environmental acceptability of a similar RTE ester fluid. In the LD_{50} Oral Toxicity test, no signs of toxicity were observed in any of the test animals. In the AMES test, which has been validated extensively through the testing of known carcinogens and non-carcinogens, similar ester fluids have been determined to be non-mutagenic. These two tests are widely used to measure the environmental and health effects of chemicals.

Tests have shown that the biodegradability of an ester-based fluid is superior even to that of mineral oil, hence the environmental acceptability of Envirotemp 200 fluid is superior among other candidate transformer fluids.

No unusual handling precautions need be observed when working with Envirotemp 200 fluid, and no odor or vapor problems are encountered under normal conditions.

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PRODUCT INFORMATION
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TYPICAL ENVIROTEMP 200 PROPERTIES

ELECTRICAL PROPERTIES:		**TYPICAL VALUE**
Dielectric Strength	(ASTM D877, 0.100" gap) (kV)	43
	(ASTM D1816, 0.04" gap) (kV)	30
	(ASTM D1816, 0.08" gap) (kV)	56
Dissipation Factor	(ASTM D924, 25°C) (%)	0.04
	(100°C) (%)	1.1
Dielectric Constant	(ASTM D924, 25°C)	3.2
PHYSICAL PROPERTIES:		
Appearance	(ASTM D1524)	Bright & Clear
Color	(ASTM D1500)	<1.0
Specific Gravity	(ASTM D1298, 15.6°C)	0.97
Kinematic Viscosity	(ASTM D445, -20°C) (cSt)	1400
	(ASTM D445, -10°C) (cSt)	500
	(ASTM D445, 0°C) (cSt)	240
	(ASTM D445, 25°C) (cSt)	60
	(ASTM D445, 40°C) (cSt)	29
	(ASTM D445, 100°C) (cSt)	5.6
	(ASTM D445, 150°C) (cSt)	2.6
Pour Point	(ASTM D97) (°C)	-50
Decrystallization Point	(RTE Method) (°C)	-50
Lubricity	(ASTM D2264, 4-ball wear) (mm)	0.75
THERMAL PROPERTIES:		
Flash Point	(ASTM D92, COC) (°C)	270
Fire Point	(ASTM D92, COC) (°C)	306
Thermal Conductivity	(ASTM D2717 (25°C) (Cal/[sec.cm$_2$°C/cm])	.36x10^{-3}
Specific Heat	(ASTM D2766 (25°C) (cal/gm/°C)	0.45
Coefficient of Expansion	(RTE Method TMA) (cc/cc°C)	.73x10^{-3}
CHEMICAL PROPERTIES:		
Interfacial Tension	(ASTM D971, 25°C) (mN/m)	29
Corrosive Sulfur Content	(ASTM D1275)	passes
Moisture Content	(ASTM D1533B) (ppm)	60
Neutralization Number	(ASTM D974) (mgKOH/g)	.02
Oxidation Stability 72 hr.	(ASTM D2440)	
Acid No. (KOH/g)		.03
Sludge (% wt.)		.01

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