

# Dielectric Fluids



Electrical Apparatus

900-15

## Envirotemp 200 Fluid

### DESCRIPTION

Envirotemp 200 (E200) fluid is an IEC Class K synthetic ester dielectric coolant for use as an alternative to mineral oil in electrical equipment. The product conforms to IEC 61099 Specifications for Unused Synthetic Organic Esters for Electrical Purposes; acceptance limits for new fluid are shown in Table 1.

The unique formulation of E200 fluid combines superior fire resistance (fire point above 300 °C), low viscosity (less than 3000 mm<sup>2</sup>/s at -20 °C) and low pour point (lower than -50 °C), establishing it as the 'best in class'

dielectric fluid suitable for essentially all transformer, on-load tap changer, and distribution switchgear applications. E200 fluid is compatible with standard transformer construction materials and components. It should be stored, handled, and processed in a similar fashion as mineral oil, see CPS document S900-15-1, Envirotemp 200 Fluid Storage and Handling Guide for additional information.

### ENVIRONMENTAL AND HEALTH

E200 fluid does not contain halogens, silicones, sulfur, or any other questionable material. It quickly

and thoroughly biodegrades<sup>1</sup> in the environment, and is non-toxic in aquatic and oral toxicity tests<sup>2</sup>.

### FLUID/PAPER INSULATION SYSTEM

The unique chemical structure of ester fluids provide superior insulation system performance compared to hydrocarbon based dielectric fluids. The thermal properties of E200 fluid make it a more efficient coolant than silicones and high molecular weight hydrocarbon dielectric coolants.

TABLE 1  
Envirotemp 200 Fluid Recommended Acceptance Limits

Property	Method	IEC 61099 Limit
Physical		
Color	ISO 2211	≤ 200
Appearance	IEC 61099 9.2	Clear, free from water and suspended matter and sediment
Density at 20 °C (kg/dm <sup>3</sup> )	ISO 3675 or ISO 12185	≤ 1.000
Kinematic Viscosity (mm <sup>2</sup> /s)	ISO 3104	
40 °C		≤ 35
-20 °C		≤ 3000
Flash Point (°C)	ISO 2719	≥ 250
Fire Point (°C)	ISO 2592	> 300
Pour Point (°C)	ISO 3016	≤ -45
Chemical		
Water Content (mg/kg)	IEC 60814	≤ 200 (a)
Acidity (mg KOH/g)	IEC 61021-1 or IEC 61021-2	≤ 0.03
Oxidation Stability (164 h)	IEC 61125 method C	
Total Acidity (mg KOH/g)		≤ 0.3
Total Sludge (% mass)		≤ 0.01
Electrical		
Breakdown Voltage (kV)	IEC 60156	≥ 45 (a)
Dissipation Factor at 90 °C, 50 Hz	IEC 60247 or IEC 61620	≥ 0.03 (a)
DC Resistivity at 90 °C (GΩ-m)	IEC 60247	≥ 2

(a) For untreated liquid as received

(1) Per GPPS 830.31-10

(2) Per GPPS 203 and 420

DESCRIPTION Envirotemp 200 (E200) fluid is an IEC Class K synthetic ester dielectric coolant for use as

an alternative to mineral oil in electrical equipment. The product conforms to IEC 61099 Specifications for Unused Synthetic Organic Esters for Electrical Purposes; acceptance limits for new fluid are shown in Table 1. The unique formulation of E200 fluid combines superior fire resistance (fire point above 300 °C), low viscosity (less than 3000 mm<sup>2</sup>/s at -20 °C) and low pour point (lower than -50 °C), establishing it as the 'best in class'

# Dielectric Fluids

## Envirotemp 200 Fluid

TABLE 1 Envirotemp 200 Fluid Recommended Acceptance Limits

Property	Method	IEC 61099 Limit	Physical
Color	ISO 2211	≤ 200	Appearance IEC 61099 9.2 suspended Clear, free matter from and water sediment and
Density at 20 °C	(kg/dm <sup>3</sup> ) ISO 3675 or ISO 12185	≤ 1.000	Kinematic Viscosity (mm <sup>2</sup> /s) ISO 3104
40 °C ≤ 35 -20 °C	≤ 3000	Flash Point (°C) ISO 2719 ≥ 250	Fire Point (°C) ISO 2592 > 300
			Pour Point (°C) ISO 3016 ≤ -45
Water Content (mg/kg)	IEC 60814	≤ 200 (a)	Acidity (mg KOH/g) IEC 61021-1 or IEC 61021-2 ≤ 0.03
Oxidation Stability (164 h)	IEC 61125 method C		
Total Acidity (mg KOH/g)		≤ 0.3	
		Total Sludge (% mass) ≤ 0.01	Electrical
Breakdown Voltage (kV)	IEC 60156	≥ 45 (a)	Dissipation Factor at 90 °C, 50 Hz IEC 60247 or IEC 61620 ≥ 0.03 (a)
DC Resistivity at 90 °C	(GΩ-m) IEC 60247	≥ 2	
(a) For untreated liquid as received			
(1)			
Per OPPTS 835.3110 (2)			
Per OECD 203 and 420			
August 2010 • Supersedes 1/90			

dielectric fluid suitable for essentially all transformer, on-load tap changer, and distribution switchgear applications. E200 fluid is compatible with standard transformer construction materials and components. It should be stored, handled, and processed in a similar fashion as mineral oil, see CPS document S900-15-1, Envirotemp 200 Fluid Storage and Handling Guide for additional information.

**ENVIRONMENTAL AND HEALTH** E200 fluid does not contain halogens, silicones, sulfur, or any other questionable material. It quickly

Electrical 900-15 Apparatus

and thoroughly biodegrades<sup>1</sup> in the environment, and is non-toxic in aquatic and oral toxicity tests<sup>2</sup>.  
**FLUID/PAPER INSULATION SYSTEM** The unique chemical structure of ester fluids provide superior insulation system performance compared to hydrocarbon based dielectric fluids. The thermal properties of E200 fluid make it a more efficient coolant than silicones and high molecular weight hydrocarbon dielectric coolants.

## **f GOOPER Power Systems**

## APPLICATIONS

**NOTE:** *The suitability of each application of Envirotemp 200 fluid is the responsibility of the user. Contact CPS Dielectric Fluids group for application guidelines.*

### New Switchgear and Transformers

E200 fluid offers excellent combination of pour point, melt point, and viscosity relative to other commercially available, environmentally acceptable dielectric coolants, and is miscible with natural esters.

With excellent dielectric strength retention, lubricity, clarity, and high fire point, E200 fluid is an excellent switching medium. Switchgear filled with E200 can be applied in climates reaching temperatures well below -40 °C.

Distribution and Power class transformers filled with E200 fluid for indoor, submersible and outdoor applications are available from manufacturers worldwide.

For indoor applications, E200 fluid-filled transformers provide the proven technical and performance advantages of liquid-filled designs over dry types as well as a lower total life cycle cost when compared to all other transformer types.

For outdoor applications, E200 fluid-filled transformers are an excellent choice for installations requiring additional fire safety including those with close proximity to people, buildings, and valuable equipment.

Proven applications include sectionalizing switchgear, voltage regulators, and transformers containing components such as Bay-O-Net and current-limiting fusing, on-off and four position switches and Vacuum Fault Interruption protection devices).

Additionally, E200 fluid is an excellent dielectric coolant when applied

in traction transformers. These transformers typically have pumps which circulate dielectric coolant through the transformers heat exchanger and must be capable of functioning at cold start temperatures. At normally operating temperatures, traction transformer operation is optimized by the fluid's good thermal properties and excellent lubricity.

### Retrofilling Switchgear

E200 fluid is especially suited for upgrading the environmental and fire safety of mineral oil-filled switchgear. It is miscible with conventional transformer oil, high molecular weight hydrocarbons, PCB (Askarel) and most PCB substitutes except silicone oil. E200 fluid is not miscible with silicone oil and should not be applied in equipment previously containing silicone oil.

### STORAGE AND HANDLING

The same basic procedures for storing and handling conventional transformer oil should be followed with E200 fluid. To help maintain the extremely low percent moisture saturation at time of fluid manufacture, exposure time to air should be minimized. Drum and tote storage should be indoors or outdoors protected from the elements. Refer to the CPS Bulletin S800-15-1, Envirotemp 200 Fluid Storage and Handling Guide.



© 2010 Cooper Power Systems or its affiliates.

Envirotemp<sup>®</sup> is a registered trademark of Cooper Power Systems or its affiliates.  
IEC Standard 61099 Edition 2.0 (2010) Insulating liquids - Specifications for unused synthetic organic esters for electrical purposes

1045 Hickory Street  
Pewaukee, WI 53072 USA  
[www.cooperpower.com](http://www.cooperpower.com)

APPLICATIONS NOTE: The suitability of each application of Envirotemp 200 fluid is the responsibility of the user. Contact CPS Dielectric Fluids group for application guidelines. New Switchgear and Transformers E200 fluid offers excellent combination of pour point, melt point, and viscosity relative to other commercially available, environmentally acceptable dielectric coolants, and is miscible with natural esters. With excellent dielectric strength retention, lubricity, clarity, and high fire point, E200 fluid is an excellent switching medium. Switchgear filled with E200 can be applied in climates reaching temperatures well below -40 °C. Distribution and Power class transformers filled with E200 fluid for indoor, submersible and outdoor applications are available from manufacturers worldwide. For indoor applications, E200 fluid-filled transformers provide the proven technical and performance advantages of liquid-filled designs over dry types as well as a lower total life cycle cost when compared to all other transformer types. For outdoor applications, E200 fluid-filled transformers are an excellent choice for installations requiring additional fire safety including those with close proximity to people, buildings, and valuable equipment. Proven applications include sectionalizing switchgear, voltage regulators, and transformers containing components such as Bay-O-Net and current-limiting fusing, on-off and four position switches and Vacuum Fault Interruption protection devices). Additionally, E200 fluid is an excellent dielectric coolant when applied

in traction transformers. These transformers typically have pumps which circulate dielectric coolant through the transformers heat exchanger and must be capable of functioning at cold start temperatures. At normally operating temperatures, traction transformer operation is optimized by the fluid's good thermal properties and excellent lubricity. Retrofilling Switchgear E200 fluid is especially suited for upgrading the environmental and fire safety of mineral oil-filled switchgear. It is miscible with conventional transformer oil, high molecular weight hydrocarbons, PCB (Askarel) and most PCB substitutes except silicone oil. E200 fluid is not miscible with silicone oil and should not be applied in equipment previously containing silicone oil. STORAGE AND HANDLING The same basic procedures for storing and handling conventional transformer oil should be followed with E200 fluid. To help maintain the extremely low percent moisture saturation at time of fluid manufacture, exposure time to air should be minimized. Drum and tote storage should be indoors or outdoors protected from the elements. Refer to the CPS Bulletin S900-15-1, Envirotemp 200 Fluid Storage and Handling Guide.

© Envirotemp

2010 Cooper ®

is a Power registered Systems trademarks or its affiliates.

of Cooper Power Systems or its affiliates. IEC Standard 61099 Edition 2.0 (2010)

Insulating liquids - Specifications for unused synthetic organic esters for electrical purposes

1045 Hickory Street Pewaukee, WI 53072 USA [www.cooperpower.com](http://www.cooperpower.com)

## f COOPER Power Systems