

# APPROVAL REPORT

## LESS FLAMMABLE TRANSFORMER FLUIDS

### PREPARED FOR:

Dielectric Systems Inc.  
Office 106, 12021 Bluemound, Road  
Milwaukee, WI. 53226

.I 1 077AR AF  
Class 6933  
January 30, 1986



### **Factory Mutual Research**

1151 Boston-Providence Turnpike  
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Norwood, Massachusetts 02062



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Class 6933

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## LESS FLAMMABLE TRANSFORMER FLUIDS from

Dielectric Systems Inc.  
Office 106,12021 Bluemound Road  
Milwaukee, WI. 53226

### I INTRODUCTION

1.1 Dielectric Systems Inc. requested an Approval examination of their Beta Fluid less flammable transformer fluid. This fluid is for insulating and cooling of liquid filled transformers; it has a fire point of at least 572°F (300°C).

1.2 A less flammable transformer fluid is one whose combustibility has been reduced to an acceptable degree consistent with the installation and protection requirements of Factory Mutual Research Corporation (FMRC).

1.3 This fluid will be listed in the Electrical Equipment Section of the FMRC Approval Guide under Less Flammable Transformer Fluids.

#### Beta Fluid.

	Heat Release Rates Btu/ft <sup>2</sup> /min (kW/m <sup>2</sup> )	
	Convective	Radiative
Non-boiling	952 (180)	475 (90)
Boiling	3331 (630)	1592 (320)

### II DESCRIPTION

This less flammable transformer fluid is described in the attached manufacturer's "Typical Properties of Dielectric Fluids".

### III MARKINGS

Dielectric Systems Inc. Beta Fluid is packaged in 55 gal (208 L) steel drums, and IBC containers. The drums and containers are labeled with the following information: product designation, batch number, weight, fire point 308°C, manufacturers name and address, and the FMRC Approval Mark.

### IV EXAMINATION and TESTS

4.1 A one gal (3.8 L) sample of Beta Fluid was submitted as representative of the product line. Laboratory analysis of the sample yielded the following results:

Dielectric breakdown voltage, (ASTM D-877),kV.....	37.0
Water content, PPM (ASTM D 1533B)	15
Viscosity, 100°C Kinematic, cSt (ASTM D-445).....	11.6

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**ATTACHMENTS:** Appendix I Heat Release Rate Graph  
Typical Properties of Beta Fluid

**TESTS BY:** Lawrence Orloff

**EXAMINATION AND REPORT:**

**REVIEWED BY:**

  
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### Typical Properties of Dielectric Fluids

Characteristic	Beta Fluid	Synthetic Hydrocarbon Alpha-1	Conventional Transformer Oil	Silicone Fluid
Viscosity, D445, cSt. @ 100°C.	11.8	8.5	3.1	16
Density @ 20 °C. g/cc	0.87	0.83	0.87	0.91
Four Point, D97, °C.	-21	-54	-40	-55
Color, 1500	L1.5	L0.5	L1.0	L0.5
Dielectric Breakdown, D1816, 0.08", kV	56	58	55	55
Dissipation Factor, % 100 °C., D924	0.001	0.001	0.007	0.001
Dielectric Constant	2.2	2.1	2.2	2.7
Moisture Content, ppm	15	8	25	22
Neutralization Number, D974, mg KOH/g	0.01	0.01	0.01	0.01
Fire Point, D92, °C.	308	308	165	320
Biodegradability (per BOD tests)	good	good	fair	poor