



333 Fingert Road
Northbrook, Illinois 60062-2096
United States Country Code (1)
(847) 272-8800
FAX No. (847) 272-8129
<http://www.ul.com>

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REPORT

on

DIELECTRIC MEDIUMS

Under The

CLASSIFICATION PROGRAM

Dielectric Systems, Inc.
Tyler, TX

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DESCRIPTION

PRODUCT COVERED:

Dielectric medium, "BETA FLUID".

GENERAL CHARACTER AND USE:

This product is a paraffinic hydrocarbon intended for use as a dielectric and cooling medium in electrical apparatus such as transformers, capacitors, etc. designed for its use.

This product is Classified as to fire hazard only. The Classification relates to an arbitrary scale, which provides a numerical relationship to the flammability characteristics of certain liquids in common use.

MARKING:

Classified company name and product trade names, "BETA FLUID".

TEST RECORD NO. 1

GENERAL:

Test results relate only to the items tested.

SAMPLES:

The manufacturer submitted a sample of the product "BETA FLUID" for the purpose of tests.

FLASH POINT:

METHOD

The product was tested using ASTM Method D93 for Flash Point by Pensky - Martens Closed Cup Tester.

RESULTS

The flash point was 244°C (471°F).

FIRE POINT:

METHOD

The product was tested using ASTM Method D 92 for Flash and Fire Points by Cleveland Open Cup.

RESULTS

The fire point was 308°C (586°F).

IGNITION TEMPERATURE:

METHOD

The product was tested according UL340 in a combustion vessel mounted in a fluidized bath (Techne BSF), which consists of a sand bath containing zirconium and aluminum oxide, heated by an electric furnace equipped with a thermostatic control system. The temperature of the bath was measured by a calibrated thermocouple type S covered with a quartz tube. The thermocouple was held in the sand bath in such position that its end was about even with bottom of the combustion vessel. The thermocouple was connected to a potentiometer. Millivolt readings on the potentiometer were converted to temperature (°C). The combustion vessel is a glass tube 1.5 inch (3.8 cm) in diameter and 11.5 inch (29 cm) in length, having capacity of approximately 250 ml, positioned vertically, so that the lower 1.5 inch (3.8 cm) is immersed in the fluidized bath.

In conducting the test, a measured amount of the test sample was introduced into the heated combustion vessel with a glass pipette. Different amounts of the sample were admitted to the vessel in successive trials at progressively lower temperatures in order to determine the minimum temperature at which its vapor in any proportion with air would ignite. Residual gases and vapors in the combustion vessel were purged with a slow stream of air after each trial.

RESULTS

The ignition temperature was 388°C (730.4°F).

SPONTANEOUS HEATING:

METHOD

The product was tested according UL 340. The apparatus used for the spontaneous heating test consists of a covered test chamber, 7 inch (17.8 cm) in height and 4 inch (10.2 cm) in diameter, surrounded at the side and the bottom by an electrically heated water bath. The cover has two vertical tubes of unequal height, one terminating near top of the test chamber, and the other extending to a point near the bottom of the interior of the test chamber, to provide a thermally induced circulation of air through the chamber.

The sample is placed into the test chamber in a cylinder constructed from a wire mesh, 6 inch (15.2 cm) in height and 1.5 inch (3.8 cm) in diameter. This cylinder is placed in a position concentric with the axis of the chamber, with an annular space through air of 1.25 inch (3.2 cm) between the cylinder and the wall of the chamber.

In conducting the test, 14 g of the product was evenly distributed over 7 g of cotton fiber (commercial absorbent cotton) and placed in the wire mesh cylinder within the test chamber. A thermocouple was inserted in the cotton bearing the test sample, to measure the temperature at the approximate center of the cylinder. The cover was placed on the test chamber, and the water bath surrounding the chamber maintained at boiling for 24 hours.

RESULTS

No tendency to heat spontaneously was indicated.

BURNING CHARACTERIZATION:

METHOD

The product was tested according to UL 340. A small sample of the product at room temperature was placed in a small porcelain evaporation dish, and a small gas test flame was applied to the vapors evolved, with observations as to whether the vapors ignite and continue to burn after removal of the test flame. If the vapors do not ignite at room temperature, the dish is gently heated and the vapors tested again with a small gas flame.

RESULTS

The vapors did not ignite at room temperature. Heated sample produced white vapors, which ignited after longer heating, and continued to burn after the removal of the test flame.

WICK TEST:

METHOD

A wick of Marinite board, 1/2 inch thick, 1 inch wide and 3 inch long was suspended vertically on a wire with the bottom 1-1/2 inch immersed in the sample of the fluid at room temperature. (Marinite Board® is a calcium silicate material manufactured by the Manville Corp.) After the upper 1-1/2 in. of the wick became saturated, the flame, approximately 1 inch high from a gas burner, was applied to the upper tip of the wick until ignition occurred. The flame was then removed and the burning characteristics observed.

RESULTS

The wick ignited in approximately 8 sec. At 30 sec the flame was 1.5 in. high. At 180 sec the sample was fully engulfed in the flame and continued to burn for a total of 714 sec.

BURNING WHEN DISSEMINATED ON MARINITE BOARD:

METHOD

A 3 by 40 in. section was cut from 1/2 inch thick Marinite Board®. The section was weighed, then saturated with the product and again weighed. The original weight of the section, before saturation, was 725.7 g. The weight of the product retained on the section was 635.0 g.

In conducting the Burning Test, the saturated section was suspended with its long edge vertical in a location free from drafts. An 11 inch flame produced by a Bunsen burner, having a 3/8 inch diameter tube, was used as the source of ignition. The Bunsen Burner flame was applied vertically to the lower end of the section in a manner that the flame overlapped the section approximately 7 inch.

RESULTS

The product ignited in approximately 45 sec and burned for 660 sec at which time the wire suspending the sample broke, and the sample fell to the floor. It continued to burn an additional 705 sec with a flame height of 60 inch.

DIELECTRIC STRENGTH:

METHOD

The dielectric breakdown voltage of the product was determined in accordance with ASTM Method D877 using the referee test procedure.

RESULTS

The dielectric breakdown voltage was 38.1 kV. This result meets the 30 kV minimum specified in ASTM D3487 "Standard Specification for Mineral Insulating Oil Used In Electrical Apparatus".

CORROSION:

METHOD

The metals used in the Corrosion Tests were copper, yellow brass, steel, tin lead solder, aluminum, copper and tin lead solder coupled, copper and aluminum coupled and copper and steel coupled. Test samples, 1/2 in. wide and 6 in. long, were cut from sheets of the metals. The samples were buffed, measured, cleansed with soap and water, washed with ethyl alcohol and ethyl ether, dried and weighed.

Each metal sample was immersed separately for half its length in a "as received" product contained in a glass tube covered with a cork stopper. The tubes and contents were maintained at a temperature of 90°C (194°F) in a thermostatically controlled electrically heated oven.

The metal samples were examined visually at weekly intervals for corrosion. At the conclusion of the test, the metal samples were cleaned, dried, again weighed, and the change in weight per square centimeter of surface area calculated.

RESULTS

When heated in glass tubes containing the product at 90°C for 720 h, the metal samples showed little visible evidence of corrosion. The change in weight of all samples was very small.

TEST WITH WATER:

METHOD

A 20 ml sample of the product was shaken with an equal volume of water in a graduated separation funnel.

RESULTS

No generation of heat was observed.

SPECIFIC GRAVITY:

METHOD

The specific gravity of the product was determined by a hydrometer.

RESULTS

The specific gravity was 0.870 g/ccm.

INFRARED ANALYSIS:

METHOD

An infrared spectrum was obtained using an infrared spectrophotometer. Sampling methods and instrument settings used in obtaining the spectrum are recorded in the appropriate sections of the spectrum.

RESULTS

The infrared spectrum obtained is considered representative of the sample tested and is being made a part of the permanent record of this product. The spectrum is dated N10-31-99.

CONCLUSION

The following conclusions represent the judgment of Underwriters Laboratories Inc. based upon the results of the examination and tests presented in this Report as they relate to established principles and previously recorded data.

FIRE HAZARD CLASSIFICATION:

The fire hazard of this product is judged to be less than that of paraffin oil, as determined by the Standard of Underwriters Laboratories Inc., for the Classification of liquids, the rate of hazard being 4 to 5, in accordance with the following schedule, in which:

Diethyl Ether Rates	100
Gasoline Rates	90-100
Alcohol (Ethyl) Rates	60-70
Kerosene (100 F Flash) Rates	30-40
Paraffin Oil Rates	10-20
Water Rates	0

The product is nonflammable at ordinary temperatures.

CLASSIFICATION AND FOLLOW-UP SERVICE:

The product as described herein is judged to be eligible for Classification and Follow-Up Service of Underwriters Laboratories Inc. Under the Service, the manufacturer is authorized to use the Laboratories' Classification Marking on such products which comply with the Follow-Up Service Procedure and any other applicable requirements of the Underwriters Laboratories Inc. Only those products which properly bear the Laboratories' Classification Marking are considered as Classified by Underwriters Laboratories Inc.

The Classification Marking to be used on the produce "BETA FLUID" is illustrated below:



AS TO FIRE HAZARDS ONLY. BETA FLUID. CLASSED 4 OR 5 LESS HAZARDOUS THAN PARAFFIN OIL IN RESPECT TO FIRE HAZARD. 87HM

Report by:

Olga Spaldon _{mjj}

OLGA SPALDON
Project Chemist

Reviewed by:

Richard Winton _{mjj}

RICHARD WINTON
Engineering Group Leader

OS/RW:mjj

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