



## **Specialty Insulating Oils Worldwide**

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## **Insulating Oil Products**

Product Specification

and Technical Guide

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# DSI Ventures

## A History of Developments in Specialty Insulating Fluids

**1992 Alpha-1 Fluid:** First in a New Generation of Insulating Fluids  
First Available Synthetic Hydrocarbon (PAO) Fluid  
Used in retrofit and OEM applications for fire resistant fluids  
Factory Mutual Listed

**1994 Alpha-2 Fluid:** The First Specialty Oil for High Operating Temperatures  
Non-Sludging  
Superior Equipment Protection

**1995 Beta Fluid:** Improved Fire Resistant Petroleum Oil  
Meets International Standards for Fire Resistant Fluids  
Factory Mutual Listed for use indoors  
UL Classified

**1996 ECO Fluids:** Super Biodegradable Synthetic Ester Fluids  
The Most Highly Biodegradable Insulating Fluids Made  
Applications in Transformers, Fire Resistant sites and in Oil-Filled Cables

**1997 OptiCool Fluid:** Allows your transformers to run cooler  
Reduce Operating Temperatures with OptiCool  
Upgrade transformer designs to higher KVA ratings

**2000 DSI Ventures receives ISO 9001 Certification**

**2008 DSI Ventures receives ISO 9001:2000 Certification**

## **DSI Ventures - AN INTRODUCTION**

DSI Ventures, Inc. is an [ISO 9001:2000](#) certified manufacturer and marketer of highly biodegradable and synthetic lubricants and electrical insulating products. Our product line includes lubricating products for all applications. We specialize in applications that require the best environmental, lubricating and heat transfer properties.

### **Our Tradition of Innovation and Commitment to the Future**

In 1992, DSI introduced the newest generation of functional fluids by developing synthetic oils to replace petroleum and silicone based fluids.

Since that time, DSI has continued to lead the industry in the development and application of new insulating oils. We now manufacture products for a wide variety of applications, including fire resistant and highly biodegradable oils; fluids that flow at extremely cold temperatures (down to - 80o C.); and fluids for equipment operating at high temperatures.

Our products combine excellent physical and heat transfer characteristics with environmental safety and stability. Working with customers and suppliers, DSI has developed products which surpass the world's highest safety requirements.

DSI products can be used by all equipment manufacturers with no change in manufacturing techniques or materials. Our insulating fluids have been widely specified and accepted by customers worldwide.

Meeting higher standards and more rigorous performance requirements without sacrificing ease of use and economy present new challenges. DSI Ventures is prepared to meet those challenges with our commitment to research and innovation, by developing new materials and expanding our selection of solutions for our customers' problems.

Mission Statement:

**Our core philosophy is to produce an overall outstanding experience with DSI by supplying the best performing, highest quality specialty fluids and lubricants on the market to meet your needs and demands 100% of the time.**

**DSI DIELECTRIC FLUID PRODUCTS  
TYPICAL CHARACTERISTICS**

	<b>Alpha-1 Fluid</b>	<b>Beta Fluid</b>	<b>Alpha-2 Fluid</b>	<b>OptiCool Fluid</b>
<b>Color, ASTM D1500:</b>	L0.5	1.5	L0.5	L1.0
<b>Kinematic Viscosity, ASTM D445, cSt: Temperature, °C.</b>				
<b>-40</b>	32,650	---	6506	20.4
<b>-20</b>	2980	---	661	11.1
<b>0</b>	510	1950	136	6.95
<b>20</b>	165	380	43.8	4.77
<b>40</b>	62.9	115	19.0	3.5
<b>60</b>	28.1	40.3	10.1	2.70
<b>80</b>	15.2	20.4	6.12	2.17
<b>100</b>	9.6	12.1	4.1	1.80
<b>Specific Gravity, ASTM D1298</b>	0.83	0.87	0.83	0.84
<b>Pour Point, ASTM D97, °C.</b>	-55	-21	-75	-65
<b>Flash Point, ASTM D92, °C..</b>	268	272	238	135
<b>Fire Point, ASTM D92, °C.</b>	308	308	250	150
<b>Coefficient of Expansion, @ 20 °C., volume/°C.</b>	0.0007	0.0007	0.0007	0.0007
<b>Moisture Content, ASTM D1533, ppm</b>	<10	<15	<15	<15
<b>Interfacial Tension, ASTM D971, mN/m</b>	50	45	50	52

## ELECTRICAL CHARACTERISTICS

	Alpha-1 Fluid	Beta Fluid	Alpha-2 Fluid	OptiCool Fluid
<b>Dielectric Strength, kV, ASTM D877</b>	42	40	42	40
<b>Dielectric Strength, kV, ASTM 1816</b>	58	63	58	58
<b>Impulse Breakdown, ASTM D3300, kV</b>	>300	>300	>300	>300
<b>Dissipation Factor, 20°C., ASTM D924, %</b>	0.01	0.01	0.01	0.01
<b>Dissipation Factor, 100°C., ASTM D924, %</b>	0.01	0.10	0.01	0.01
<b>Dielectric Constant @ 20 °C., ASTM D924</b>	2.12	2.3	2.1	2.24
<b>Resistivity @ 20 °C., ASTM D1169, ohm-cm</b>	>4.0 x 10 <sup>13</sup>	2.3 x 10 <sup>13</sup>	>4.0 x 10 <sup>13</sup>	2.0 x 10 <sup>13</sup>

## OXIDATION RESISTANCE AND STABILITY

	Alpha-1 Fluid	Beta Fluid	Alpha-2 Fluid	OptiCool Fluid
<b>ASTM D2440 oxidation test</b>				
<b>72 Hours</b>				
<b>Sludge, Weight percent</b>	<0.01	<0.01	<0.01	<0.01
<b>Acid Value, mg KOH/g</b>	<0.01	0.14	<0.01	0.19
<b>164 Hours</b>				
<b>Sludge, Weight percent</b>	0.01	0.06	0.01	0.08
<b>Acid Value, mg KOH/g</b>	0.01	0.26	0.02	0.03
<b>Doble Engineering PFVO Test</b>	>88	>88	>88	>88
<b>Sludge-free life, hours:</b>				
<b>Rotary Bomb Test, ASTM D2112, minutes</b>	384	230	>350	220

## *THERMODYNAMIC PROPERTIES:*

For **Specific Heat Capacity** (kw-s/kg-k, also known as J/g/K), use the following equations:

Alpha-1:  $C_w = 2.046 + (.00363 T)$ , where T is the temperature in degrees C.  
Beta:  $C_w = 2.065 + (.00452 T)$ , where T is the temperature in degrees C.  
Alpha-2:  $C_w = 2.05 + (.00373 T)$ , where T is the temperature in degrees C.  
OptiCool:  $C_w = 2.055 + (.00377 T)$ , where T is the temperature in degrees C.

For **Thermal conductivity** in W/m/K:

Alpha-1:  $L = 0.160 - (.0000376 T)$ , where T is the temperature in degrees C.  
Beta:  $L = 0.153 - (.0000143 T)$ , where T is the temperature in degrees C.  
Alpha-2:  $L = 0.143 - (.000053 T)$ , where T is the temperature in degrees C.  
OptiCool  $L = 0.137 - (.000059 T)$ , where T is the temperature in degrees C.

**Products of Complete Combustion:**  $CO_2, H_2O$

**Products of Incomplete Combustion:**  $CO_2, H_2O, CO$

**Products of Arcing:**  $C_2H_2$

**Gassing Tendency, ASTM D2300b,  $\mu$ /min**

Alpha-1 Fluid:	31
Beta Fluid:	20
Alpha-2 Fluid:	26
OptiCool Fluid:	14

**Gas evolved with arcing:**

Beta Fluid has been tested and shown to evolve 50 cc per kw-sec of total arc energy (approx. 8.5% less than conventional transformer oil)

**Toxicity:** LD50 (oral) for rats: The LD50 for each of DSI's products is >50 mg/kg bodyweight

**Biodegradation:**

DSI's dielectric fluids contain no hazardous or toxic substances. They are saturated hydrocarbons, which is one of the simplest and fastest types of compounds to biodegrade. The fluids do not contain carcinogenic substances.

## **Elemental Analysis:**

All of DSI's products are 100% hydrocarbon. The only constituent elements are hydrogen and carbon.

### **Influence of Moisture**

Alpha-1, Alpha-2, Beta, and OptiCool fluids are 100% hydrocarbon, and are stable in the presence of moisture. All DSI dielectric fluids adsorb moisture from the air and paper insulation at about the same rate as conventional mineral oil. All DSI dielectric fluids hold about 80 ppm moisture at saturation, at 20°C., which is the same amount as mineral transformer oil.

### **Compatibility with Equipment Construction Materials**

Both Alpha and Beta fluids are compatible with all equipment construction materials that are used with conventional mineral oil. They are less aggressive to paints, varnishes, rubbers, and other materials than conventional oil. Both fluids are compatible with all gasket materials that are commonly used with conventional mineral transformer oil.

Some of these materials are:

Nitrile Rubber

Silicone Rubber

Buna-n Rubber

Viton

Cork

Fluorocarbon Rubber

Alpha and Beta fluids are compatible with a wide variety of transformer components, including several types of plastic and paper insulation. Alpha Fluid has been used with many types of phenolic, epoxy and formaldehyde resins. Both conventional and high-temperature application papers (Nomex) have been used in equipment filled with DSI Ventures. DSI Ventures recommends that any equipment construction materials chosen be tested for compatibility before use.

## **EQUIPMENT DESIGN FOR FIRE RESISTANT FLUIDS**

### *Heat Transfer Considerations*

DSI's dielectric fluids have proven their ability to perform effectively in thousands of applications. Although both Alpha-1 and Beta fluids cool transformers well, Alpha Fluid's synthetic base oil has superior heat transfer characteristics. Alpha fluid will typically operate at temperatures 2-5°C. lower than other fluids in identical equipment, under identical load.

### Specific Gravity:

The specific gravity of a material is a ratio of the weight of that material to the weight of an equal volume of water, measured at the same temperature. The specific gravity of Alpha fluid is 0.83. Beta fluid's specific gravity is 0.87.

### *Electrical Considerations*

#### Dielectric Strength:

DSI dielectric fluids have dielectric strength that exceeds all specifications for conventional transformer oil. They typically have a typical dielectric strength of 56 kV when measured by ASTM Method D1816 (0.08" gap) and 43 kV when measured by ASTM Method D877. Transformers using any of DSI's dielectric fluids are built with the same insulation levels that are used with conventional oil. Their dielectric strength changes very little in the temperature range encountered in electrical equipment use.

#### Dielectric Strength of Saturated Insulation:

The dielectric breakdown voltages of cellulose and Nomex insulation saturated with Alpha or Beta fluids are equal to or better than those for conventional transformer oil and silicone oil.

Because of their lower viscosity, DSI's dielectric fluids saturate and impregnate cellulose more easily than thicker fluids do. This enhanced saturation results in high dielectric strength of the oil-paper system.

#### Impulse Breakdown Voltage:

The impulse breakdown voltage (negative polarity needle electrode) of our fluids is excellent. All DSI dielectric fluids have typical values of >300kV (ASTM Method D3300). As a comparison, the typical minimum specification for conventional transformer oil is 145 kV.

## Lubricity:

Although the lubricity characteristics of all of DSI's dielectric oils are excellent, Alpha Fluid has the best lubricity characteristics of any less-flammable dielectric fluid. This is an important characteristic to consider when considering the use of a insulating oil fluid in switching or tapchanger operation. The following table compares the Falex Four-Ball Lubricity test values for several common dielectric fluids. The lower values indicated less wear on the ball bearings used in the test, and so indicate better lubricity properties.

### Four-Ball Wear Values (Falex Test)

<u>Fluid Tested</u>	<u>Scar Values</u>
Alpha Fluid	.54 mm
Beta Fluid	.66 mm
Alpha-2 Fluid	.69 mm
Conventional transformer oil	.73 mm
Silicone Fluid	1.43 mm

### *Equipment Design Factors for Fire Resistant Fluids*

Design changes are sometimes required when using a fire-resistant fluid. Alpha Fluid has the advantage of having lower viscosity than others. This means that fewer changes are required when using Alpha Fluid in transformers that were designed for conventional mineral oil. Both Alpha and Beta fluids are completely compatible with the materials used with conventional transformer oil.

These guidelines have been developed through the experience of equipment manufacturers in designing transformers for use with Alpha and Beta Fluids. They are intended only to act as guidelines. Final designs must be optimized for the particular equipment in question.

### Insulation Thickness and BIL

The BIL levels (thickness of solid insulation) that are used with Alpha or Beta Fluids are the same as those for conventional transformer oil. Extra insulation thickness is not necessary. The dielectric strength of Alpha and Beta fluid are equal to or greater than that of conventional transformer oil. The impulse dielectric strength of these fluids is greater than that of conventional transformer oil. Both fire resistant fluids have a dielectric constant of 2.2, the same as that of conventional transformer oil.

### Oil Temperatures and Heat Transfer

Each different fire-resistant oil has a unique set of heat transfer characteristics. Because of their increased viscosity, top oil temperatures will be warmer when using

any fire resistant fluid in transformers designed for conventional transformer oil. The amount of the temperature rise will depend on the fluid's heat transfer effectiveness..

Although there are several material characteristics that help to determine the heat transfer effectiveness of a fluid, the one that makes the greatest contribution is its viscosity. The effect of viscosity overrides all of the other characteristics, such as thermal expansion coefficient, heat capacity and thermal conductivity.

The low viscosity of Alpha Fluid gives it excellent heat transfer characteristics. This is illustrated by the following table, which compares the viscosities and Nussult values for different fire-resistant dielectric oils. Nussult values are a measure of heat transfer effectiveness, derived using viscosity, heat capacity, density, coefficient of thermal expansion and thermal conductivity of the fluids, plus heat flux input from the transformer's windings. The more effective the fluid is as a heat transfer agent, the higher the Nussult value.

This chart shows the dominant influence that a fluid's viscosity has on the effectiveness of the material as a heat transfer agent. For further discussion of this subject, please request "A Study of The Relationship Between Insulating Fluid Viscosity and Transformer Cooling Performance", by Dr. David W. Sundin, available from DSI Ventures.

### Comparison of Heat Transfer Effectiveness of Fire Resistant Dielectric Fluids

<b>Fluid Type:</b>	<b>Viscosity, cSt @ 100 °C..</b>	<b>Nussult Value x <u>100</u></b>
Alpha Fluid	8.6	6.5
Beta Fluid	12.1	5.9
Silicone fluid	16.0	5.2

When using fire resistant fluids in transformers that were designed for use with mineral oil, they will run slightly warmer. The top oil temperatures in units up to 3500 kVA will be 1 - 3<sup>o</sup> C. higher when these designs are used with Alpha Fluid, and 3-6<sup>o</sup>C. warmer when using Beta Fluid. These temperatures will vary with different transformer designs.

## Design of Transformers for Fire Resistant Fluids

Only minor changes, if any, are required when substituting Alpha or Beta Fluids for conventional transformer oil. Because of the small additional temperature rise, transformers rated less than 500 kVA generally do not require changes in coil design in order to use these oils. In transformers over 500 kVA, it may be desirable to use 4mm (3/16") or 6 mm (1/4") cooling ducts to increase the cooling capacity of the transformer. Larger sizes may also require additional or larger ducts and lower duct watt/inch<sup>2</sup> heat density.

Compared to conventional mineral oil designs, some changes in cooling radiator surface area may be required with fire resistant fluids. It should be kept in mind that these guidelines are only approximate; different engineering designs will necessitate changes in these figures.

Many coil designs for transformer oil have insulating collars at the end of the coils, which restrict the flow of the dielectric liquid. The area for fluid flow into and out of the coils should have an opening approximately 12 mm high

The following rules of thumb have been used successfully for designing or modifying transformers for use with Alpha or Beta fluids:

- Change the internal ducts in each winding from 3.3 mm to 6 mm radial thickness. It is more efficient to add 2 or 3 mm to the thickness of the vertical coil ducts than it is to add radiator area to get the desired cooling.
- If the design engineer has a choice on coil height, use a coil design that is as short as feasible. The flowrate of dielectric fluids decreases as the coil height increases.
- Allow a minimum of 12 mm horizontal inlet and outlet space at the ends of the coil ducts.

For more information relating to your specific design, contact DSI Ventures, Inc.

## Transformers Designed for Other Fire Resistant Fluids

Transformers designed for use with other fire resistant fluids can be filled with Alpha or Beta Fluid and run without modification. The transformer will perform at rated temperature or cooler when filled with Alpha Fluid. In addition, Alpha or Beta fluid does not require extra insulation that is commonly used with silicone fluid.

## RECEIPT AND HANDLING OF INSULATING OILS:

Acceptance Values:

Fluids that exhibits the characteristics shown in the table below should be considered acceptable for use.

### Recommended Acceptance Values for DSI Ventures' Insulating Oils

<u>Characteristic</u>	<u>Method</u>	<u>Value</u>
Dielectric Strength, kV, min:	ASTM D877	30
Dissipation Factor @ 25°C., %, max:	ASTM D924	0.05
Moisture Content, ppm, max:	ASTM D1533b	35

#### Shipping Containers

DSI Ventures' fluids are available in five gallon containers, 55 gallon drums, 275 gallon "tote" containers, or tank trailers. Each type of shipping container should be handled according to standard industry practice in order to ensure that the fluid will retain its original characteristics.

#### Receipt and Inspection of Shipments

The receipt and inspection of fire resistant fluids should follow similar procedures to those used for conventional transformer oil. For bulk shipments, test and inspect the fluid before the fluid is unloaded. For shipments received in drums, a representative sample should be taken from several of the drums and blended together. The sample should be taken in a clean, clear, dry glass jar. If the fluid does not meet the recommended acceptance values shown above, contact DSI Ventures, Inc. immediately.

For recommendations regarding types of hoses or pumps to be used with our insulating oils, please contact DSI Ventures, Inc.

#### Fluid Storage and Drum Handling:

When drums of insulating oils are to be stored for a long period of time, store them in a dry, heated building. Outdoors, drums should be stored horizontally, with the bungs below the internal oil level. A drip pan or curb around the storage area should be used to contain any fluid from a ruptured or leaking container.

Sometimes, it's necessary to heat the drum before emptying it. This can be done in a warm room, or an oven or with electric drum or pail heaters. Open flames should

never be used to warm drums. Before heating a drum, at least one of the bung plugs must be loosened to vent air pressure.

#### Contamination of Fire Resistant Fluids with Other Materials

The same equipment can be used for handling and processing Alpha or Beta Fluid as is used for conventional transformer oil. Although dedicated processing equipment is best, no foaming or adverse reactions will be experienced if equipment is shared between these oils.

Be sure to minimize the amount of conventional transformer oil that is mixed with any fire resistant fluid. The fire point of the Alpha or Beta fluid will be lowered if they are blended with conventional transformer oil. In order to minimize the amount of transformer oil contamination, flush the fluid handling system with Alpha or Beta fluid before use. The flush oil can be reserved for similar future application, blended into conventional transformer oil, or discarded in an appropriate manner.

## **PROCESSING FLUIDS INTO EQUIPMENT**

### Dissolved gases

Degassing a fluid removes gases and dissolved moisture. It increases the dielectric strength of the fluid and the effectiveness of the saturation of the fluid into the solid insulation of a transformer. The degassing process for a fire resistant fluid should be carried out at higher temperatures than those required for conventional oil. The processing temperature should be at least 175 °F. (80 °C.) at a vacuum of 0.5 to 1.5 torr (mm Hg). This will ensure complete degassing and dehydration of the fluid.

### Filling Equipment with DSI Dielectric Fluids

Whether equipment is to be filled under vacuum or atmospheric conditions, heating the fluid will enhance the efficiency of cellulose impregnation. All transfer lines should be flushed thoroughly with clean, processed Alpha or Beta Fluid. Transformers should be filled with insulating oil from the bottom. The filling rate should be limited to a few inches per minute. The temperature of the fluid during this operation should be 175 - 200 °F. (80 - 94 °C.) Blanket the equipment with dry nitrogen or dry air, if possible. The oil should be warm to prevent condensation of atmospheric moisture and to aid in solid insulation impregnation.

The transformer should not be tested or energized before it has cooled to ambient temperature. Allow at least one and a half times as much time for the insulation to become saturated as you would allow for conventional mineral oil. Higher voltage rated units will require longer impregnation and cooling time than low-voltage units.

If the equipment is being filled with fluid under vacuum, be sure that the vacuum held on the tank does not exceed the maximum tank wall strength.

### Painting

Alpha and Beta fluids will not interfere with painting operations. Either fluid can be easily cleaned from metal surfaces with the same solvents that are used with conventional transformer oil.

## **MAINTENANCE OF ALPHA-1 AND BETA FLUIDS IN EQUIPMENT**

### Maintenance Schedules

Periodic maintenance testing on equipment filled with fire resistant fluids should be performed on the same schedule as used for equipment in a similar application that is filled with conventional transformer oil. Refer to ASTM Standard Method D923 for the correct methods of sampling fluid from equipment. Contact DSI Ventures for recommendations regarding continued use of service-aged Alpha or Beta Fluid.

### Dissolved Gas Analysis

Solid and liquid insulation decompose when exposed to high temperatures. The types of gases produced in this decomposition depend upon the temperatures that are experienced. Analysis of the gases that are dissolved in the insulating oil can help the equipment operator detect and identify problems in the equipment. Hot spots in a transformer's windings, for example, produce different gases than arcing from a loose internal connection. The analysis of dissolved gases in Alpha and Beta Fluid uses the same procedures that are used with conventional mineral oil.

The application is described in ANSI-IEEE Guide C57.104, "Guide for the Detection and Determination of Generated Gases in Oil-Immersed Transformers and Their Relation to the Serviceability of the Equipment". Use C57.104 with Alpha or Beta Fluid. It is important to note that dissolved gas analysis provides only guidelines; it is only able to provide advice with respect to transformer problems and diagnostic direction.

### Reprocessing Alpha or Beta Fluid

Alpha or Beta Fluid can be reconditioned in the same manner as conventional transformer oil. This process cleans an oil that has been oxidized or contaminated with water, arc decomposition products or other matter. Use the same types of equipment and the same methods as with conventional transformer oil. The oil will flow more slowly through the equipment, because of its higher viscosity.

Water can be removed from insulating oils with a centrifuge, vacuum dehydrators or moisture absorbing filters. Particulate matter may be removed by filtration through a filter with a small pore size (0.5 micron). For specific recommendations regarding reclamation processes for hydrocarbon-based dielectric fluids, consult IEEE Standard 637-1985, "Guide for Reclamation of Insulating Oil and Criteria for Its Use".

## **SAFETY AND ENVIRONMENTAL INFORMATION**

### Environmental Fate

All DSI Alpha Fluids, Beta Fluid, ECO Fluids, and OptiCool Fluids are biodegradable. They do not accumulate in the environment. Microorganisms living in soil and water adapt to use these fluids as a part of their food chain. Their molecular composition is greater than 99% saturated hydrocarbon. This is one of the easiest types of hydrocarbon molecules for soil and water microbes to break down.

### Spill Control Information

Any spill cleanup should be done in accordance with local and federal regulations. Consult a qualified spill cleanup consultant in your jurisdiction.

If a spill of any fluid occurs on land, contain the spilled material with dikes of earth, sand or commercially available spill control pillows. Scoop up excess oil and dispose of it properly. (Put the saturated pillows or sand into drums and have them taken away by a firm licensed to dispose of them properly)

### Toxicity

DSI Fluids are virtually non-toxic. These types of oils are neither mutagenic or carcinogenic. Testing effects indicate that they pose little risk to personnel when handled with normal handling procedures. LD50 values are over 40 grams per kilogram of bodyweight.

Skin contact testing has shown that Alpha and Beta fluids have little effect on intact or abraded skin. Some people experience a slight allergic irritation to oils, which makes their skin redden.

Inhalation of oil mist can irritate your lungs. We advise you to take conventional industry precautions against inhalation of mist or vapors, just as you would be with any oil product.

of wastes.) Spills of Alpha or Beta fluid are not required to be reported to CERCLA.

A spill of any oil on water should be contained with floating dikes and removed with oil-skimmers and wringing equipment. If enough oil is spilled that is visible on the surface of a navigable waterway, the U.S. Coast Guard must be notified. Carbon-ingesting microbes can help to speed the cleaning of an oil spill site. To report a spill, call the National Response Center (a Federally funded office) at 1-800-424-8802.

# Material Safety Data Sheet

## Alpha-1 Fluid, Alpha-2 Fluid, OptiCool Fluid, ECO Fluid

### MANUFACTURER:

DSI Ventures, Incorporated  
1320 Commerce St.  
Tyler, TX 75702  
Emergency Number: 903-526-7577

### PRODUCT IDENTIFICATION

**Synonyms:** Hydrocarbon Dielectric Fluid  
**Chemical Family:** Polyalpha Olefin Hydrocarbon  
**Molecular Formula:** Mixture of synthetic hydrocarbons and additives

### INGREDIENTS

Carcinogen per

<u>CAS Registry No.</u>	<u>%W</u>	<u>%V</u>	<u>Identification</u>	<u>NTP, IARC, OSHA</u>
68037-01-4	>99	>99	Synthetic hydrocarbon	not listed
128-37-0	<1	<1	BHT oxidation retardant	not listed

### PHYSICAL DATA

<b>Boiling Point:</b>	wide range	<b>Specific Gravity:</b>	0.83
<b>Vapor Pressure:</b>	<0.001 psi @ 20 C.	<b>Percent Solid by wt.:</b>	0.0
<b>Vapor Density (air= 1):</b>	18	<b>pH:</b>	7.0
<b>Solubility in water:</b>	very low	<b>Percent Volatile (v/v):</b>	nil
<b>Appearance and odor:</b>	Odorless, translucent clear liquid		

### FIRE AND EXPLOSION DATA

ASTM D-92 Flash/Fire points (Typical)

**Alpha-1 Fluid** 285/308 °C , **Alpha-2 Fluid** 230/250 C. **OptiCool Fluid** 135/150 C  
**ECO Fluid** 135/150 C.

**Recommended fire extinguishing medium:** Dry chemical or CO<sub>2</sub> foam. Use similar precautions to those encountered with any fire involving oil-based materials. Firefighters should wear apparatus with full face mask and full protective equipment.

### REACTIVITY DATA

These fluids are stable under normal conditions of use. Products of complete combustion of are carbon dioxide and water. Products of incomplete combustion of any hydrocarbon product include these compounds plus volatile hydrocarbons and carbon monoxide.

## HEALTH HAZARD DATA

Routes of Exposure:

ORAL: Rat oral LD50 >40 grams/Kg. Ingestion may cause gastrointestinal distress. Symptoms may include nausea, vomiting and diarrhea.

SKIN: Estimated rabbit dermal LD50 >50 grams/Kg. Repeated or prolonged contact may result in localized irritation of the skin. May cause allergic reactions in some individuals.

EYES: Slightly irritating. Avoid contact.

INHALATION: Inhalation of oil mist may cause respiratory tract irritation. Prolonged exposure may lead to respiratory problems.

SPECIAL TOXIC EFFECTS: None

CARCINOGENIC/MUTAGENIC POTENTIAL: Essentially none.

## FIRST AID

**INGESTION:** Do not induce vomiting. Get immediate medical attention.

**SKIN CONTACT:** Remove contaminated clothing. Wash area of contact thoroughly with soap and water. If irritation is present, get medical attention.

**EYE CONTACT:** Flush the eyes immediately with large amounts of water to ensure thorough rinsing. If irritation persists, get medical attention.

**INHALATION:** Remove affected person from source of exposure. Get medical attention if irritation persists.

## PERSONAL PROTECTION INFORMATION

**EYE PROTECTION:** Wear safety glasses or goggles to prevent eye contact. Eye baths should be readily available in the area of handling DSI Fluid products.

**SKIN PROTECTION:** As with any hydrocarbon product, wear oil-impervious clothing to prevent skin contact.

**RESPIRATORY PROTECTION:** Use MSHA/NIOSH approved equipment when working in areas of heavy oil mist. Ventilation can be used to control or reduce airborne concentrations of oil.

## ENVIRONMENTAL AND DISPOSAL INFORMATION

**SPILL OR RELEASE TO THE ENVIRONMENT:** Combine and recover any free liquid. There is no CERCLA reportable quantity of any of the fluids listed here. For technical advice, and assistance related to the spill, contact CHEMTREC (800-424-9300) and your local fire department. With small spills, absorb the oil with sand or clay absorbent, then flush the area with water. With large spills, dike the area of the spill to contain its flow. A spill or release of any hydrocarbon to navigable waters of a quantity sufficient to cause a sheen upon the water's surface must be reported immediately to the Coast Guard National Response Center (800-424-8802). Failure to report may result in civil or criminal penalties.

**WASTE DISPOSAL:** These fluids, when discarded or disposed, are not listed as a hazardous waste per 40 CFR 261.33.

**HANDLING AND STORAGE:** Avoid extremes of temperature in storage. Store in tightly closed containers in cool, dry, isolated and well ventilated areas, away from sources of ignition or heat. Do not store in unlabeled containers.

# Material Safety Data Sheet

## Beta Fluid

### MANUFACTURER:

DSI Ventures, Incorporated

1320 Commerce St.

Tyler, TX 75702

Emergency Number: 903-526-7577

### PRODUCT IDENTIFICATION

#### Synonyms:

Fire-Resistant Hydrocarbon Fluid

#### Chemical Family:

Petroleum Hydrocarbon Oil

### INGREDIENTS

Carcinogen per

<u>CAS Registry No.</u>	<u>%W</u>	<u>%V</u>	<u>Identification</u>	<u>NTP, IARC, OSHA</u>
68037-01-4	>99	>99	paraffinic hydrocarbon	not listed
128-37-0	<1	<1	BHT oxidation retardant	not listed

### PHYSICAL DATA

<b>Boiling Point:</b>	wide range	<b>Specific Gravity:</b>	0.87
<b>Vapor Pressure:</b>	<0.001 psi @ 20 C.	<b>Percent Solid by wt.:</b>	0.0
<b>Vapor Density (air = 1):</b>	18	<b>pH:</b>	7.0
<b>Solubility in water:</b>	very low	<b>Percent Volatile (v/v):</b>	nil
<b>Appearance and odor:</b>	Viscous, odorless, translucent, straw-colored liquid		

### FIRE AND EXPLOSION DATA

**ASTM D-92 Flash/Fire points:** Typically, 285/308°C (545/586°F)

**Recommended fire extinguishing medium:** Dry chemical or CO<sub>2</sub> foam. Use similar precautions to those encountered with any fire involving petroleum-based materials. Firefighters should wear apparatus with full face mask and full protective equipment.

### REACTIVITY DATA

Beta fluid is stable under normal conditions of use. Products of complete combustion of Beta fluid are carbon dioxide and water. Products of incomplete combustion of any hydrocarbon product include these compounds plus volatile hydrocarbons and carbon monoxide.

### HEALTH HAZARD DATA

Routes of Exposure:

**ORAL:** Rat oral LD50 >40 grams/Kg. Ingestion may cause gastrointestinal distress. Symptoms may include nausea, vomiting and diarrhea.

**SKIN** Estimated rabbit dermal LD50 >50 grams/Kg. Repeated or prolonged contact may result in localized irritation of the skin. May cause allergic reactions in some individuals.

**EYES:** Slightly irritating. Avoid contact.

**INHALATION:** Inhalation of oil mist may cause respiratory tract irritation. Prolonged exposure may lead to respiratory problems.

**SPECIAL TOXIC EFFECTS:** None

**CARCINOGENIC/MUTAGENIC POTENTIAL:** Essentially none.

**FIRST AID**

**INGESTION:** Do not induce vomiting. Get immediate medical attention.

**SKIN CONTACT:** Remove contaminated clothing. Wash area of contact thoroughly with soap and water. If irritation is present, get medical attention.

**EYE CONTACT:** Flush the eyes immediately with large amounts of water to ensure thorough rinsing. If irritation persists, get medical attention.

**INHALATION:** Remove affected person from source of exposure. Get medical attention if irritation persists.

**PERSONAL PROTECTION INFORMATION**

**EYE PROTECTION:** Wear safety glasses or goggles to prevent eye contact. Eye baths should be readily available in the area of handling Beta fluid.

**SKIN PROTECTION:** As with any hydrocarbon product, oil-impervious clothing is recommended to prevent skin contact.

**RESPIRATORY PROTECTION:** Use MSHA/NIOSH approved equipment when working in areas of heavy oil mist. Ventilation can be used to control or reduce airborne concentrations of oil.

**ENVIRONMENTAL AND DISPOSAL INFORMATION**

**SPILL OR RELEASE TO THE ENVIRONMENT:** Combine and recover any free liquid. There is no CERCLA reportable quantity of Beta fluid. For technical advice, and assistance related to the spill, contact CHEMTREC (800-424-9300) and your local fire department. With small spills, absorb the fluid with sand or clay absorbent, then flush the area with water. With large spills, dike the area ahead of the spill to contain its flow. A spill or release of any hydrocarbon fluid to navigable waters of a quantity sufficient to cause a sheen upon the water's surface must be reported immediately to the Coast Guard National Response Center (800-424-8802). Failure to report may result in civil or criminal penalties.

**WASTE DISPOSAL:** Beta fluid, when discarded or disposed, is not listed as a hazardous waste per 40 CFR 261.33.

**HANDLING AND STORAGE:** Avoid extremes of temperature in storage. Store Beta fluid in tightly closed containers in cool, dry, isolated and well ventilated areas, away from sources of ignition or heat. Store drums on their sides so that bungs are below internal liquid level. Do not store in unlabeled containers.

This Material Safety Data Sheet has been prepared in order to help the users of Beta fluid. The data contained herein is believed to be accurate, but no guarantees are given with regard to fitness of use.