ORISON

BioTherm Fluids®
HD-Glycerin

HEAVY DUTY, EXTENDED LIFE, PRE-DILUTED
Glycerin Coolant/Antifreeze

DESCRIPTION

BioTherm Fluids® HD is a patented biobased, ready-to-use, non-glycol antifreeze / heat transfer fluid which combines highly refined glycerin meeting ASTM D7640 and an industry proven corrosion inhibitor package.

ADVANTAGES

Biobased
Non-Toxic
Non-Glycol
No Molybdates
No Phosphates
Non-Hazardous
Non-Flammable
Lower BOD/COD

PERFORMANCE

BioTherm Fluids® HD meets the requirements of ASTM D7714 and ASTM D7715. Our state-of-the-art, industry proven corrosion package, provides outstanding extended protection against liner pitting and corrosion of steel, copper, brass, solder, cast aluminum, and cast iron. BioTherm Fluids™ HD lubricates pumps and valves, provides excellent scaling resistance, is fully compatible with gaskets, seals, elastomers and other non-metallic pump and engine parts, offers a freeze point of -31° F. BioTherm Fluids® HD provides extended life up to a 350,000 mile change interval in properly maintained engine systems and up to 3 years in static systems or low temperature systems.*

SAFETY/ENVIRONMENT

BioTherm Fluids® HD is the leader in quality, safety and environmental concerns. BioTherm Fluids® HD is biobased, readily biodegradable, non-toxic and non-hazardous. BioTherm Fluids® HD combines highly refined glycerin and an industry proven premier corrosion inhibitor package which does not include molybdates or phosphates. Glycerin is considered "GRAS", (Generally Recognized As Safe) by the FDA (Federal Food and Drug Administration).

APPLICATIONS

Designed for automotive, industrial and environmentally sensitive applications, BioTherm Fluids® HD can be used in virtually all gasoline, diesel and natural gas engines in applications such as:

- Fleet/Automotive
- Boiler Systems
- Solar Systems
- Heating Systems
- HVAC
- Hydrostatic/Pressure Testing

FLUID TESTING

BioTherm Fluids® HD is a glycerin based product. Freeze point range can quickly be determined by a tester available from Orison or more accurately by a refractometer (Brix). See page 2 for chart showing Brix readings and freeze point. Do not use glycol testers to determine freeze point protection.

WHAT ABOUT MIXING FLUIDS

Use only BioTherm Fluids® HD in the system. This product is designed for those who desire to implement a green alternative and have complete control of the cooling systems, including top off. Although no negative effects are expected, mixing coolants/antifreeze is not recommended due to varying physical properties of the freeze point depressants and corrosion inhibitor technologies which leads to difficulties determining actual freeze point protection and corrosion inhibition.

*(see maintenance directions on page 2)

NOTE:

The freeze point of the final coolant in the cooling system is determined by the extent of dilution of this product with any liquid remaining in the cooling system at the time of filling.

US Patents

One or more claims 5,876,621; 5,980,774; 6,506,318; 6,890,451; 7,270,768 and issued and pending continuations thereof.

Typical Properties

· Color	Yellow
· Odor	Mild
· pH	9 - 11
· Water Solubility	100%
· Specific Gravity	1.15
· Density	@ 9.65 lbs/gallon
· Viscosity @ 20°C (cSt)	11.0
· Freeze Point	-31° F (-35° C)
· Boiling Point	228.2° F (109° C)

HMIS	
HEALTH	1
FLAMMABILITY	0
INSTABILITY	0
SPECIFIC	0

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MAINTENANCE DIRECTIONS

1. Use straight, DO NOT DILUTE.
2. Drain cooling system completely and flush with water or HD COOLING SYSTEM CLEANER (HDCSC) to remove scale & rust build-up. Do not remove radiator cap when engine is hot. Flush and fill cooling system according to manufacturers instructions.
3. Use only BioTherm Fluids® HD in the system and fill only after system has been completely drained and flushed. Do not mix with other coolants / anti-freeze / heat transfer fluids or chemicals.
4. Use ONLY CHEMICAL FREE or NITRITED FILTERS. BioTherm Fluids® HD contains a nitrited inhibitor package.
5. Check fluid level on regular maintenance schedule. Top off with only undiluted BioTherm Fluids HD if system is low.
6. Test fluid for freeze point and inhibitor levels every 50,000 miles, 1500 hours or every 6 months, whichever comes first. Recommended drain and recharge with new BioTherm Fluids HD if test strip shows to replace or if Brix value is less than 37.0, as this indicates the product has been diluted more than 20%.
7. Add BioTherm Fluids HD Extender every 100,000 miles, 2500 hours, or if Orison test strip shows nitrite levels below 800ppm, whichever comes first. Test strips and lab analysis are available from Orison.

The chart below is supplied as a guide for diagnostic / maintenance purposes. The values are calculated values and are only approximations. BioTherm Fluids® HD is ready-to-use and not to be diluted as the result would weaken the corrosion inhibitor package. Custom blending is available to meet specific physical properties such as freeze point and/or heat transfer capabilities.

BioTherm HD % / Spec. Grav.	Brix Value (Refractometer)	Freeze Point ºF / ºC	Boiling Point ºF / ºC	Specific Heat @ 35º F	Viscosity cSt @ 68º F (20º C)
100 / 1.155	46.5	-31º / -35º	228º / 109º	.74	10.8
90 / 1.139	42.1	-17º / -27º	225º / 107º	.77	7.9
80 / 1.123	37.5	-6º / -21º	222º / 106º	.81	5.5
70 / 1.106	33.1	2º / -17º	219º / 104º	.83	4.1
60 / 1.09	28.7	9º / -13º	218º / 103.5º	.85	3.2
50 / 1.07	24.1	15º / -9.5º	217º / 102.8º	.87	2.5

ANALYTICAL FROM ASTM D7715

ASTM D7715 specification covers the requirements for fully formulated glycerin coolants for cooling systems of Heavy Duty Engines and includes ASTM D7714 as a pre-requisite. ASTM D7714 specification covers the requirements for Automobile and Light-Duty Service.

ASTM D1122
Relative Density

ASTM D1177
Freeze Point

ASTM D1120
Boiling Point

ASTM D1882
Auto Finish Effect

ASTM D1119
Ash Content

ASTM D1287
pH

ASTM D5827
Chloride

ASTM D1123
Water Mass Percent

ASTM D1121
Reserve Alkalinity

ASTM D1881
Foaming Tendencies

ASTM D2809
Cavitation Corrosion and Erosion-Corrosion Characteristics of Aluminum Pumps With Engine Coolants.

ASTM D4340
Corrosion of Cast Aluminum Alloys in Engine Coolants Under Heat-Rejecting Conditions

ASTM D1384
Corrosion Test for Engine Coolants in Glassware

ASTM D2570
Simulated Service Corrosion Testing of Engine Coolants

HSSR
Scaling Resistance of Engine Coolants on Hot Steel Surfaces