TECHNICAL DATA SHEET

Engineered Fluid PFE-50

Description and Applications

PFE-50 Fluorinated Engineered Fluid, 3-ethoxyperfluoro(2-methylhexane), is a clear, colorless, and nonflammable liquid. PFE-50 Fluorinated Engineering Fluid is chemically inert and thermally stable. It is a direct drop-in replacement of 3M™ Novec™ 7500 in many industrial applications. PFE-50 is intended to replace ozone-depleting and high global warming potential chemicals for the following suggested industrial, electronics and semiconductor applications:

- Cooling fluid for semiconductors and electronic devise manufacture processes, such as cooling of ion implanters, dry etchers, cleaning & dry wafers, CVD machines
- Thermal shock and testing equipment and facilities
- Heat transfer fluid
- Direct contact cooling fluid for supercomputers, data centers, high voltage transformers and power electronics
- Cooling fluid, special solvent, and process aid for chemical manufacture process
- Pharmaceutical manufacture process cooling liquid and freezing dry fluid

Physical Properties

Properties	PFE-50 Value
Average Molecular Weight	414
Pour Point (°C)	-100
Boiling Point (°C)	128
Liquid Density (kg/m^3)	1620
Kinematic Viscosity (cSt)	0.85 @20°C
Absolute Viscosity (cP)	1.3 cP
Vapor Pressure (kPa)	2.1 @25°C
Solubility of Fluid in Water	<3 ppm
Dielectric Strength	>35 kV, 0.1" gap
Volume Resistivity	1×10^8 ohm-cm
Dielectric Constant	5.8
Heat of Vaporization (kJ/Kg)	89
Surface Tension (dynes/cm)	16.2
Coefficient Expansion K^{-1}	0.0013
Specific Heat (J/Kg-K)	1128
Thermal Conductivity W/m-K	0.065
Flammability	Nonflammable
Ozone Depletion Potential	0

Not for specification purposes. All values @ 25°C unless otherwise specified.

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PFE-50 Chemistry vs. Novec™ 7500

The chemical structure of PFE-50 is 3-ethoxyperfluoro(2-methylhexane) (CAS # 297730-93-9), which is the same as now discontinued Novec™ 7500. The ^{19}F and ^{1}H NMR spectra, and the FTIR spectra of PFE-50 and Novec™ 7500 demonstrated they are identical chemically and they have the same purity specification by GC. These NMR, FT-IR and GC analytical data are available from Xipu Customer Service Manager upon request.

As PFE-50 is chemically identical to Novec™ 7500, and their product purity specification is also the same (> 99.0%). Therefore PFE-50 can be used as the drop-in replacement to Novec™ 7500, and its properties and performance profiles, including the properties vs. temperature can be used as reference in the PFE-50 applications.

Calculation of PFE-50 Properties at a Given Temperature

To determine the viscosity at a given temperature T in Kelvin, calculate
Z =10^(10^(11.843-5.0874*Log(T[K]))).
Then, Viscosity [cSt] = (Z-0.7)– exp (-0.7487- 3.295(Z-0.7) + 0.6119(Z-0.7)2- 0.3193(Z-0.7)^3)

Liquid Density [kg/m^3] = -2.0845*T[°C] + 1665.8

Thermal Conductivity [W/m-K] = 0.069 - 1.798E-04*T[°C] + 4.24E-07*T[°C]^2

Liquid Specific Heat [J/kg-K] = 1.4982*T(°C) + 1091

Some of the PFE-50 properties vs. temperature curves are available upon request.

Vapor Pressure at Various Temperature

Temperature (°C)	20	25	60	80
Vapor Pressure (kPa)	0.85	2.1	8.7	16.9

Compatibility

PFE-50 is compatible with most metals (Stainless steel, Nickel, Copper, Aluminum, etc) and hard polymers (Polycarbonate, PMMA, ABS, Polypropylene, and Polyethylene). Soft and elastomeric materials should be limited to compounds that contain the least amount of extractable plasticizer such as EPDM, Natural Rubber, and Polyurethane. As with most fluorinated fluids, PFE-50 fluid will absorb into fluorinated plastics and elastomer over longer exposures. Please contact Xipu Customer Service Manager for additional information.

Packing

5 Kg/Bottle (Drum capacity: 4L)
20 Kg/Pail (Drum capacity: 15L)
250 Kg/Drum (Drum capacity: 200L)

Storage

Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances.