Opteon™ MZ

Heat Transfer Fluid

Technical Information

Introduction

In response to a growing need for high performance products with reduced environmental impact, Chemours has commercialized a new heat transfer fluid, Opteon™ MZ. Opteon™ MZ (HFO-1336mzz-Z) is a proprietary hydro-fluoroolefin (HFO) specialty fluid with zero ozone depletion potential (ODP) and very low global warming potential (GWP) of 2 (100-yr ITH). Opteon™ MZ provides excellent physical properties and performance characteristics as a heat transfer fluid—clear, colorless, nonflammable, thermally stable, low toxicity, and environmental friendly. The fluid has a boiling point of 33.4 °C (91.4 °F) and is appropriate for replacing PFCs, HCFCs, PFPEs, HFCs, and HFEs in heat transfer applications.

Typical Applications

- Evaporative Cooling
- High Temperature Heat Pumps
- Heat Transfer Fluid
- Organic Rankine Cycles

Physical, Environmental, and Safety Properties

Property	Units	Opteon™ MZ
Chemical Structure	-	Cis-$CF_3CH=CHCF_3$
Molecular Weight	g/mol	164
Boiling Point	°C (°F)	33.4 (92.1)
Freezing Point	°C (°F)	-107 (-160.6)
Density at 25 °C (77 °F)	g/cm^3	1.36
Viscosity at 25 °C (77 °F)	cP	0.38
Kb Value	-	11.3
Dipole Moment	D	2.9688
Hansen Solubility Parameters	$MPa^{1/2}$	∂_d 13.9 ∂_p 3.5 ∂_h 2.1
Vapor Pressure at 25 °C (77 °F)	MPa	0.07
Flash Point, CC, ASTM D56	°C (°F)	None
Flash Point, OC, ASTM D1310	°C (°F)	None
Vapor Flammability, ASTM E681	%vol	None
Water Solubility	ppm	560
Critical Temperature	°C (°F)	171.3 (340.3)
Critical Pressure	MPa	2.9
Critical Density	g/cm^3	0.471
Heat of Vaporization at BP	kJ/kg	166
Liquid Thermal Conductivity at 25 °C (77 °F)	W/m-k	0.077
Liquid Specific Heat at 25 °C (77 °F)	kJ/kg-k	1.2
Surface Tension	N/m	0.013
Dielectric Constant	-	32
Resistivity	ohm-cm	10^8
Break Down Voltage	kV	10
Global Warming Potential (GWP)	100-yr ITH	2
Ozone Depletion Potential (ODP)	-	0
Occupational Exposure Limit (OEL)	ppm	500

Chemours™

LOW GWP ©

Material Compatibility

Metals

Opteon™ MZ is compatible with most metals. Exposures to stainless steel, copper, brass, and aluminum at 100 °C (212 °F) for 2 weeks showed good stability as summarized below. Opteon™ MZ is not compatible with strong bases; therefore, contact with highly basic process materials is not recommended. Contact with strong Lewis acids, such as aluminum trichloride, alkali and alkaline earth metals, powdered metals, and powdered metal salts, is also not recommended.

Metal	Weight Loss	Surface Appearance	Solvent Appearance	Fluoride IC
Aluminum	None	No Change	Clear, Colorless	<0.5 ppm
Copper	None	No Change	Clear, Colorless	<0.5 ppm
Brass	None	No Change	Clear, Colorless	<0.5 ppm
Stainless Steel	None	No Change	Clear, Colorless	<0.5 ppm
Carbon Steel	None	No Change	Clear, Colorless	<0.5 ppm

Plastics

Opteon™ MZ is compatible with most plastics. Exposures to most plastics at room temperature for 2 weeks showed good compatibility. Consult with your local Chemours specialty fluids representative to help answer questions about specific materials compatibility in your application.

Symbol	Material	% Weight Change	% Volume Change	% Hardness Change
ABS	Acrylonitrile-Butadiene-Styrene	-0.1	-0.6	0.0
HIPS	High Impact Polystyrene	0.3	-0.4	-2.9
PET	Poly (Ethylene Terephthalate)	0.0	0.7	-1.2
PS	Polystyrene	-0.4	0.9	0.0
PVC	Polyvinyl Chloride	0.0	0.0	0.0
CPVC	Chlorinated Polyvinyl Chloride	0.0	-0.3	0.0
PTFE	Fluorocarbon	1.1	0.3	-17.2
ETFE	Fluorocarbon	0.7	0.0	12.9
POM	Acetal	0.1	-1.2	-1.3
PEEK	Polyetheretherketone	0.0	0.2	0.0
LCP	Polyester	0.0	-0.4	-1.5
PEI	Polyetherimide	-0.1	0.0	0.0
PVDF	Polyvinylidene Fluoride	0.0	-0.3	0.0
PP	Polypropylene	0.3	-0.5	0.0
HDPE	High Density Polyethylene	0.0	0.3	3.3

Elastomers

Exposures to most elastomers at room temperature for 2 weeks show compatibility. Some reversible swelling is expected with partially fluorinated elastomers. Consult with your local Chemours specialty fluids representative to help answer questions about specific materials compatibility in your application.

Symbol	Material	% Weight Change	% Volume Change	% Hardness Change
NR	Natural Rubber	4.4	1.9	0.0
CR	Polychloroprene	0.8	0.1	0.0
NBR	Acrylonitrile Butadiene	15.3	2.6	-13.6
FKM	Fluoroelastomer	7.9	-3.4	-2.9
T	Thiokol	0.3	6.7	-6.1
IIR	Isobutylene Isoprene	0.3	13.1	-13.3
EPDM	Ethylene Propylene Terpolymer	1.4	5.5	-7.1
CSM	Chlorosulfonated Polyethylene	0.2	0.8	-1.3

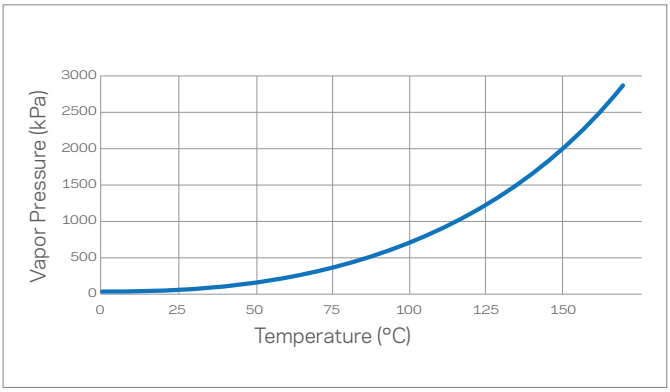
Storage and Handling

Opteon™ MZ is thermally stable and does not oxidize or degrade during storage. It exhibits no closed or open cup flash point and is not classified as a flammable liquid by NFPA or DOT. Store in a clean, dry area; protect from freezing temperatures; and don't allow stored product to exceed 52 °C (126 °F) to prevent leakage or potential rupture from pressure and expansion. Refer to Safety Data Sheet (SDS) for additional safety information.

Temperature-Dependent Properties

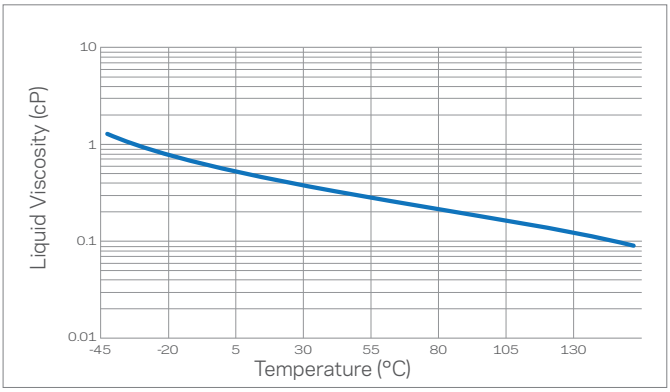
Vapor Pressure

The temperature dependence of vapor pressure for Opteon™ MZ heat transfer fluid



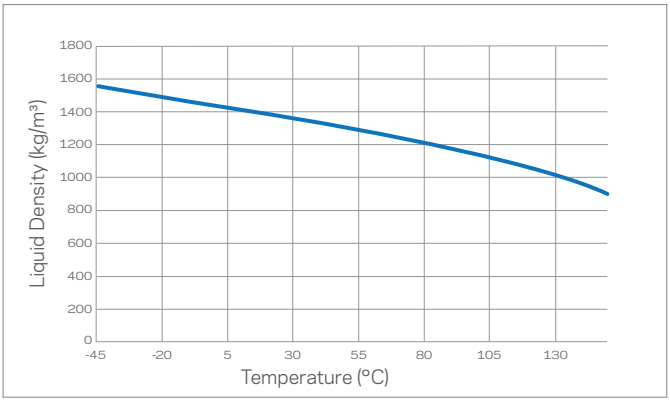
Liquid Viscosity

The temperature dependence of liquid viscosity for Opteon™ MZ heat transfer fluid



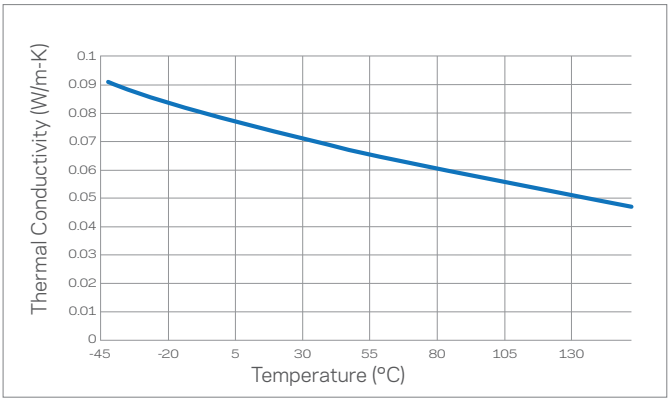
Liquid Density

The temperature dependence of liquid density for Opteon™ MZ heat transfer fluid



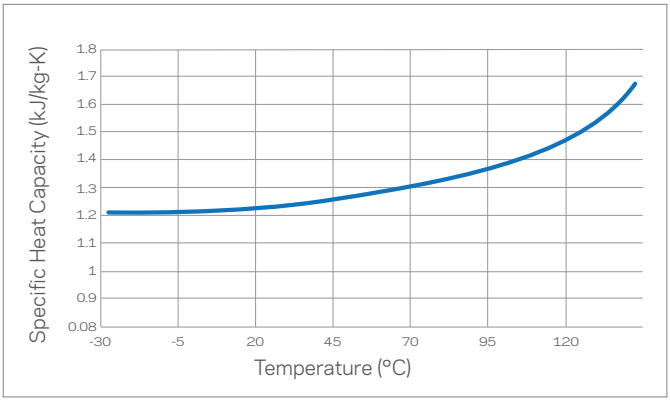
Liquid Thermal Conductivity

The temperature dependence of liquid thermal conductivity for Opteon™ MZ heat transfer fluid



Liquid Specific Heat

The temperature dependence of liquid specific heat for Opteon™ MZ heat transfer fluid



For more information on the Opteon™ family of refrigerants, or other refrigerants products, visit opteon.com or call (800) 235-7882.

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