Technical Data Sheet

HALOCARBON™
ENGINEERED FLUIDS

Manufactured in the U.S.A.

InfinX Calibration 0.8 Oil, crafted with Halocarbon's proprietary PCTFE Technology, is a high-performance specialty fluid designed for low-temperature calibration applications. This low molecular weight polymer of chlorotrifluoroethylene delivers excellent thermal heat transfer and maintains consistent fluidity in extreme cold, performing reliably around -100°C. Its non-flammability, chemical inertness, and compatibility with reactive gases, Lewis acids, and aggressive oxidizers make it ideal for demanding calibration environments. InfinX Calibration Fluid 0.8 also has comparable properties to 3M Fluorinert FC-3283 & Galden in many applications.

Typical Applications and Key Features

Low-Temperature Calibration Bath Fluid

Fluke Calibration Bath Systems Fluke
- Fluke 7380
- Fluke 7381
- Fluke 7081

-Kaye CTR-80 Ultra-Low Temperature Liquid Bath systems
-Isotech temperature calibrators
-Freezers & Refrigerators
-Cold Rooms
-Ultra-Low Freezers
-Freeze Dryers

Coal Industry Float Sink (Washability) Analysis

Non-toxic, Nonhazardous Alternative to PCE
-Accuracy in Testing
-Chemically Inert
-Nonreactive to Coal
-Metallurgical Coal Processing
-No Special Protective Equipment Required

With its broad operating range from -100°C to +70°C and a low pour point of -200°F (-129°C), it excels in **renowned low-temperature calibration systems** like Fluke 7380, Fluke 7381, Fluke 7081, and Kaye CTR-80, functioning as an inert low-temperature bath fluid. Additionally, InfinX Calibration Fluid 0.8 replaces perchloroethylene in metallurgical coal float sink testing, valued for its non-toxic, non-flammable, and chemically inert properties, ensuring accurate and safe coal quality assessments critical in steel production. Its adaptability as an inert process solvent and in avoiding solvent-induced reactions in coal testing underscores its role in enhancing safety, precision, and regulatory compliance across various sectors.

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		Halocarbon							Galden										
Properties	**Units**	**0.8 Oil**	**1.8 Oil**	**4.2 Oil**	**6.3 Oil**	**27 Oil**	**56 Oil**	**95 Oil**	**HT110**	**HT135**	**HT170**	**HT200**	**HT230**	**HT270**	**LS200**	**LS215**	**LS230**	**HS240**	**HS260**
Boiling Point	°C	130	200	220	230	260	290	315	110	135	170	200	230	270	200	215	230	240	260
Pour Point	°C	-129	-93	-73	-71	-57	-34	-26	-100	-100	-97	-85	-77	-66					
Density	g/cm^3	1.73	1.84	1.87	1.88	1.92	1.93	1.94	1.71	1.72	1.77	1.79	1.82	1.85	1.79	1.80	1.82	1.82	1.83
Kinematic Viscosity 25°C	cSt	0.9	2.5	6.4	10.6	59.1	135.4	301.6	0.77	1.00	1.80	2.40	4.40	14.00	2.50	3.80	4.40	5.30	7.00
Vapor Pressure	torr	7.3	1.2	0.7	0.3	0.08	0.02	0.01	17	5.8	0.8	0.2	0.03	< 0.01	21	12	3.4	1	1
Specific Heat	J/kg·K	1089	1089	1050	1139	1037	1070	1052	963	963	963	963	963	963	973	973	973	973	973
Heat of Vaporization	cal/g	28	26	22	22	20	18	14	17	16	16	15	15	15	15	15	15	15	15
Coefficient of Thermal Expansion	$cm^3/cm^3 \cdot °C$	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Surface Tension	dyne/cm	18.5	25.3	26.7	27.0	28.3	29.6	29.9	16	17	18	19	19	20	19	20	20	20	20
Thermal Conductivity	W/m·K	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
Dielectric Strength	kV (2.54 mm gap)	41	41	42	45	47	47	45	40	40	40	40	40	40	40	40	40	40	40
Dielectric Constant		2.63	2.72	2.82	2.85	2.94	2.96	2.97	1.92	1.92	1.94	1.94	1.94	1.94	2.1	2.1	2.1	2.1	2.1
Volume Resistivity	Ohm·cm	$3 \cdot 10^{11}$	$7 \cdot 10^{11}$	$1 \cdot 10^{12}$	$3 \cdot 10^{12}$	$3 \cdot 10^{12}$	$6 \cdot 10^{12}$	$1 \cdot 10^{13}$	$1.5 \cdot 10^{15}$	$1.5 \cdot 10^{15}$	$1.5 \cdot 10^{15}$	$6 \cdot 10^{15}$	$6 \cdot 10^{15}$	$6 \cdot 10^{15}$	1015*	1015*	1015*	1015*	1015*
Average Molecular Weight	amu	327	423	492	571	565	716	750	580	610	760	870	1020	1550	870	950	1020	1085	1210

Note: Reported as 1015 Ohm-cm by Syn

Low-Temperature Bath Fluids

Constant-temperature baths used for calibrating instruments over a wide temperature range use Halocarbon 0.8 oil, particularly at low temperatures. It is nonflammable, has a low pour point (-200°F/-130°C), is easily pumped at low-temperatures and is not miscible with water. Any ice formed in the bath will float on the oil and is easily removed.

Halocarbon 0.8 oil can be used as a substitute in a number of low temperature applications where fluids currently used include ethylene glycol mixtures, methyl alcohol, isopentane and chlorinated solvents.

Material Compatibility

Elastomers and Plastics

The major portion of any elastomer is a specific cross-linked polymer, but its properties depend in large part upon fillers, plasticizers and other additives. In fact, the composition of the final item such as an O-ring or gasket is usually proprietary. Therefore, predictions about compatibility for a named elastomer must be viewed with caution. Plastics may also have additives in the finished product. A prudent approach would involve bench tests with the specific product under operating conditions.

Keeping these cautions in mind, we can report that Halocarbon oils have been found compatible with specific formulations of the following elastomers and plastics:

Ethylene propylene rubber

Polyvinyl alcohol

Neoprene

Teflon and other fluorinated plastics

Chlorinated polyethylene

Rigid PVC

Rigid CPVC

Viton, Fluorel

Polyimides

Polycarbonates

Fluorosilicone

Cured epoxies

Urethanes

EPDM (ethylene propylene diene rubber)

Most solvent-resistant elastomers and plastics are unaffected by Halocarbon fluids. However, within certain temperature ranges the fluids may dissolve in and seriously weaken the following materials:

Buna-N (butadiene/acrylonitrile)
Buna-S (butadiene/styrene) rubber
Silicone rubbers
Natural rubber
Polymers or copolymers of chlorotrifluoroethylenePVC (polyvinyl chloride)

Metals

Halocarbon materials wet metallic surfaces readily and form lubricating films as do the more common lubricants.

Steel parts that have been lubricated with Halocarbon oils and then disassembled for inspection appear to have benefited from the lubrication even in severe service. However, it has been reported that the cleaned, disassembled parts rust rapidly on exposure to air. Rusting can be inhibited by keeping a thin film of oil on the part and where necessary using Halocarbon oil with rust inhibitor.

Halocarbon oils and greases are noncorrosive toward metals at temperatures up to about 350°F (177°C). However, copper and some of its alloys will discolor at temperatures over 120°F (49°C). Prior testing should be done on all metals for applications above 350°F (177°C) and on copper for applications above 120°F (49°C).

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Vacuum Pump Fluids

Halocarbon oils are often used in applications where the reactivity of conventional oils presents severe safety and maintenance problems. For example, if a conventional vacuum pump oil is used in a pump evacuating a chlorine-containing system, the oil will sludge so badly that even one effective evacuation may not be possible. Explosive reactions can also occur. Halocarbon has developed the HaloVac® line of oils to meet the needs of industry for inert, nonflammable, reliable vacuum pump oils. HaloVac oils are carefully tailored to specifications which combine low vapor pressures with viscosity characteristics suitable for mechanical pump systems. They are widely used in the semiconductor and printed wiring board industries where plasma etching, low pressure chemical vapor deposition and low temperature oxidation processes require inert vacuum pump oils. HaloVac oils are especially useful for aluminum etching processes where the aluminum chloride produced reacts with and decomposes perfluoropolyether vacuum pump oils. In some processes, particulates, acids and other reactive materials end up in the pump oil. While none of these will affect HaloVac oils, filtration systems are available to remove them to keep the pump functioning.

Typical vacuum pump applications include:

_ Plasma etching of semiconductors, printed wiring boards and photovoltaic devices
_ Plasma etching of aluminum with chlorine producing aluminum chloride
_ Chemical vapor deposition and low temperature oxidation processes in the semiconductor industry
_ Sampling of effluent gases for EPA testing
_ Laser systems
_ Plasma cleaning of electronic and medical devices
_ Vacuum metallizing
_ Surface treatment of plastics
_ High purity graphite production
_ Fluorination processes used for blow-molded plastic bottles

Quality Assurance

Halocarbon oils are inert because the carbon chain, the backbone of the molecule, is completely halogenated. On the other hand, hydrocarbon oils and silicone oils contain a significant number of hydrogen atoms which react readily with aggressive chemicals. To be sure there are no hydrocarbon impurities in our lubricants, we rigorously exclude them in our processing. Our finished oils are analyzed by a method which can detect less than 10 ppm of hydrocarbon.

As rigorous as our control on hydrocarbon content is, we do have to recognize an exception. When a rust inhibitor is needed, 0.1% of a hydrogen-containing inhibitor is deliberately added. However, careful studies have shown that our rust-inhibited oils have the same oxygen compatibility as pure oils.

Another possible reactive site is what chemists call “unsaturation” (carbon-carbon double bonds). If unsaturation is present, it will react, in time, with air and moisture to form strong acids which are corrosive to metals. The oil processing is carefully controlled to eliminate any unsaturation. Our specification involves a very sensitive permanganate oxidation test for unsaturation in our oils.

Recycling Halocarbon Oils

With proper usage and maintenance, Halocarbon fluids can be restored to almost their original properties. They may not have to be disposed of or incinerated. In the long run this reduces your waste costs. Contact us about recycling your fluids.

Halocarbon’s production facility is in North Augusta, South Carolina.

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