

MFF-M Grade PFPE Ferrofluid

For Active gas

- Excellent Vapor Pressure Performance
- World Top ---High Heat Resistance
- Stable Vacuum, Even During Operation

MAGRON

FERROFLUID

For Gas & Dust sealing

- Feedthrough component
- Vacuum Seal component



1. High Heat Resistance

- This is a **summary** of the full attached data.
- Our product's **heat resistance is about 100 °C higher** than competitors.
- (TGA condition: heated at **10 °C/min**; temperature at **1% weight loss**.)
- The reason is that we use **higher-molecular-weight raw materials** than competitors.
- Therefore, our **heat resistance, chemical resistance, and durability** are **superior**.
- **Manufacturing PFPE** with high molecular weight **requires very advanced technology**.

Item	Saturation Magnetization	Viscosity	Vapor Pressure		Torr· L/s Helium gas leak	1 wt% loss Temp. (TGA)	Pour point	Density
Model	Gauss	mPa.sec (cP) at 27°C	Pa at 20°C	Torr mmHg. at 20°C	Less than 1E-11	°C	°C	g/cm ³
MFF-M5070	500	7,000	<1.5E-10	<1.2E-12	Ok	>280	<-40	2.240
MFF-M4251	420	5,100	<1.5E-10	<1.2E-12	Ok	>280	<-40	2.198

The world's best heat-resistant PFPE ferrofluid for active gases (World TOP)

A. Weight change rate & weight loss/% of the sample due to the temperature increase

(승온에 따른 시료의 무게 변화율 % 및 weight loss/ %)

***Measurement method: TGA measurement---Temperature rises by 10 degrees Celsius per minute (TGA측정, 1분당 10°C 승온)

Company	Model No	Ms(Gauss)	Viscosity cP /at 27°C	Carrier fluid	Usage environment	weight loss /% (°C)		
						-1%	-2%	-5%
MAGRON	MFF-M4251	420	5100	PFPE	Active gas	282°C	310°C	324°C
MAGRON	MFF-M5070	500	7000	PFPE		280°C	305°C	323°C

**Reference---Comparative data from other companies (참고 ---타사 비교자료)

L*** (England)	F9	450	5000	PFPE	Active gas	176°C	201°C	233°C
M*** (Japan)	MFF-03	550	6200	PFPE		185°C	210°C	237°C
S*** (Japan)	F-310	400	3500	PFPE		158°C	194°C	241°C

2. Excellent Vapor Pressure

Vapor pressure characteristics are significantly better than competitors

Comparative data of PFPE ferrofluid vapor pressure for each company

Company	Model	Unit	20°C	100°C
MAGRON	MFF-M4251	Pa	1.51×10^{-10}	7.57×10^{-5}
S company (Japan)	F-310	Pa	7×10^{-8}	Non Data
M company (Japan)	MFF-03	Pa	2×10^{-9}	5×10^{-3}
MAGRON	MFF-M4251	Torr	1.13×10^{-12}	5.68×10^{-7}
L company (England)	F-9	Torr	7×10^{-8}	1×10^{-3}

Semiconductor processes are typically carried out below 10^{-6} Pa to minimize contaminants (moisture, organic residues, oxygen, etc.), thereby preventing defect mechanisms such as particle growth, pattern contamination, and thin film non-uniformity.

At such ultra-high vacuum, the boiling point decreases, so thermal stability and vapor-pressure performance are extremely important.

We demonstrate quality reliability and process compatibility to customers with measured, empirical vapor-pressure data.

MAGRON: MFF-M4251 Ferrofluid

----This is a measurement of the finished ferrofluid product

Report (Unit: Torr) — Page 4



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Test report No.: 25-09458
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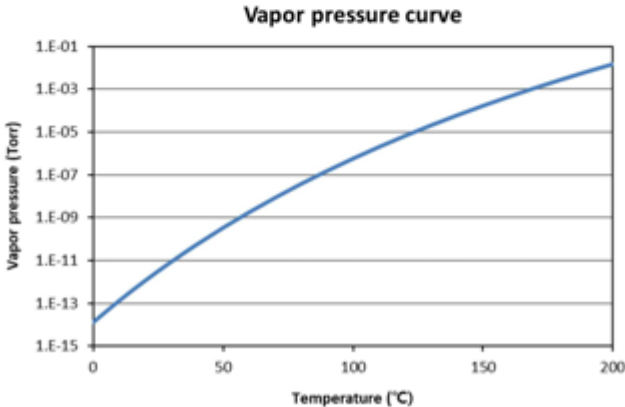
TEST REPORT

2. Test Result

Table 3. Estimated Vapor Pressure of Koptri-25-05-05314-1 at Various Temperatures

Temperature (°C)	Vapor Pressure (Torr)	Temperature (°C)	Vapor Pressure (Torr)	Temperature (°C)	Vapor Pressure (Torr)
0	1.28×10^{-14}	80	3.73×10^{-8}	160	4.44×10^{-4}
20	1.13×10^{-12}	100	5.68×10^{-7}	180	2.77×10^{-3}
40	5.65×10^{-11}	120	6.56×10^{-6}	200	1.48×10^{-2}
60	1.76×10^{-9}	140	5.98×10^{-5}	-	-

Figure 1. Vapor Pressure Curve of Koptri-25-05-05314-1 by Temperature



Report (Unit: Pascal) — Page 5



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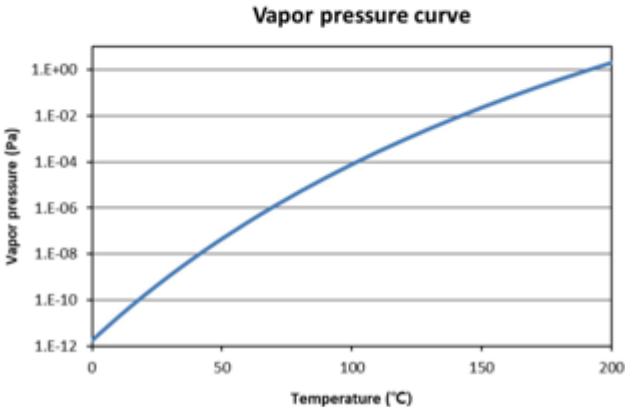
TEST REPORT

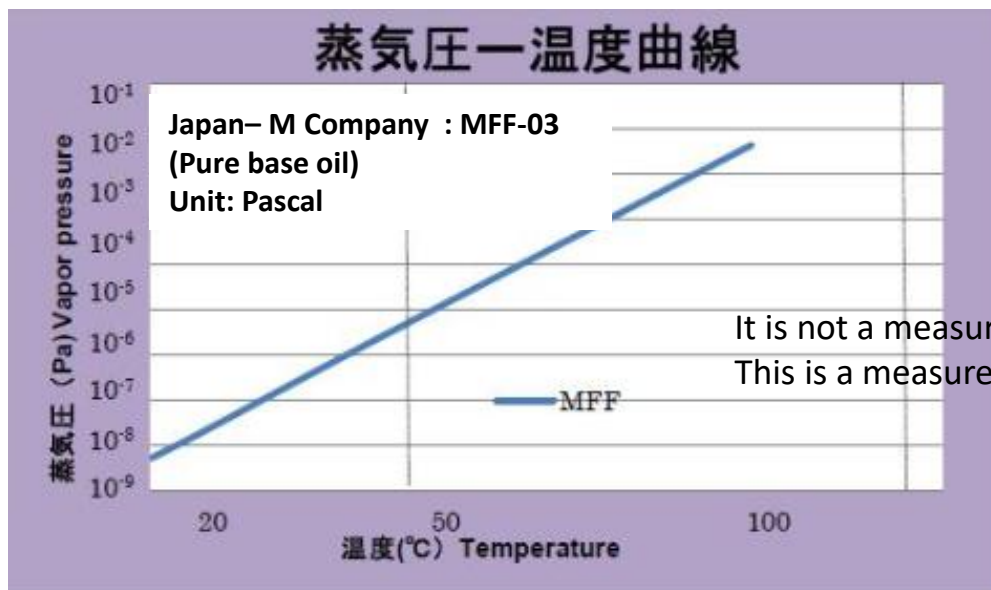
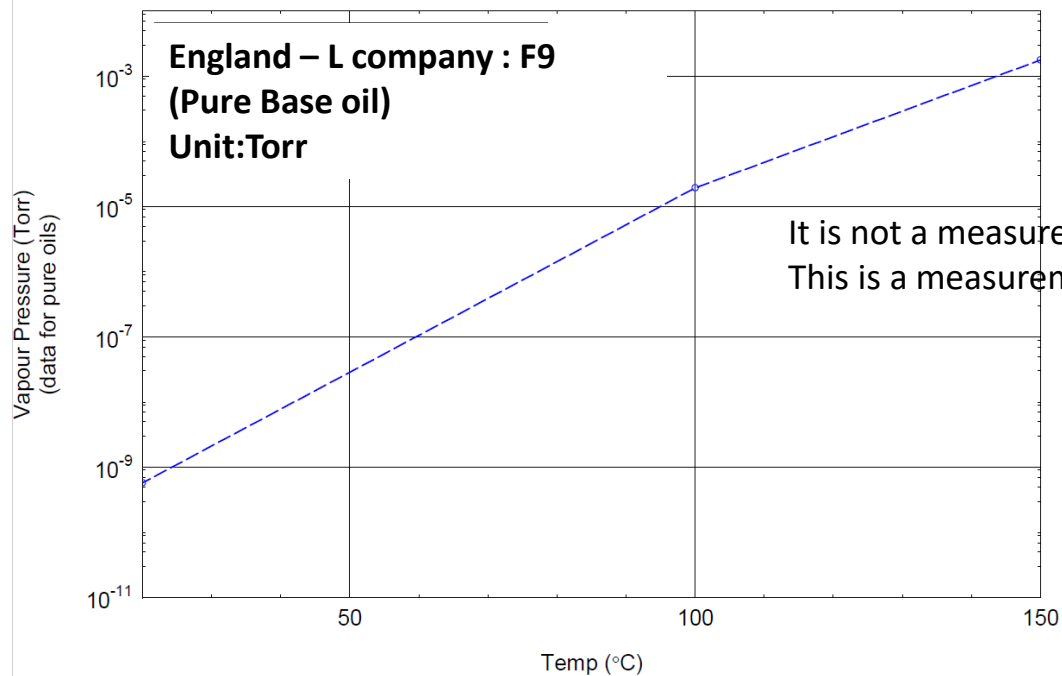
2. Test Result

Table 3. Estimated Vapor Pressure of Koptri-25-05-05314-1 at Various Temperatures

Temperature (°C)	Vapor Pressure (Pa)	Temperature (°C)	Vapor Pressure (Pa)	Temperature (°C)	Vapor Pressure (Pa)
0	1.70×10^{-12}	80	4.97×10^{-6}	160	5.92×10^{-2}
20	1.51×10^{-10}	100	7.57×10^{-5}	180	3.69×10^{-1}
40	7.53×10^{-9}	120	8.74×10^{-4}	200	1.97×10^0
60	2.35×10^{-7}	140	7.97×10^{-3}	-	-

Figure 1. Vapor Pressure Curve of Koptri-25-05-05314-1 by Temperature





3. Vacuum Stability & Non Leak Hunting

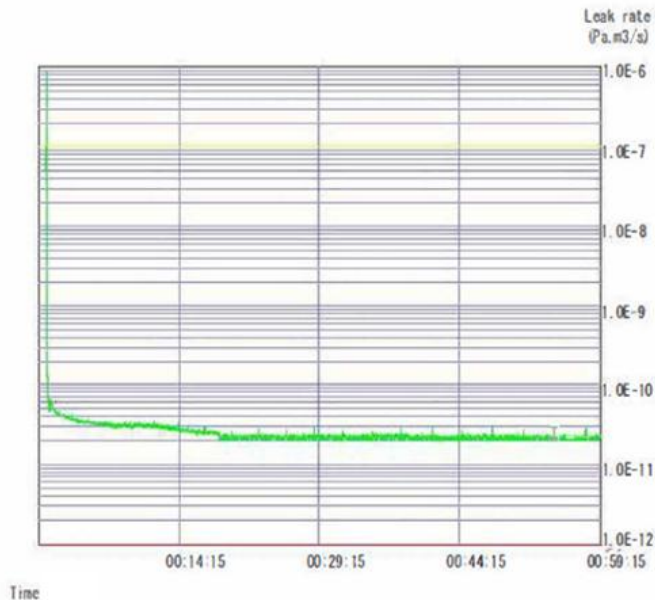
No leak hunting is observed, and a stable vacuum level is maintained.
The time to reach vacuum is very short.

MFF-M4251 Leak test data

Storing Datetime : 2024/07/03 14:59:49
Output Datetime : 2024/07/03 15:59:05

Setpoint1 : 1.0E-07 Setpoint2 : 1.0E-12

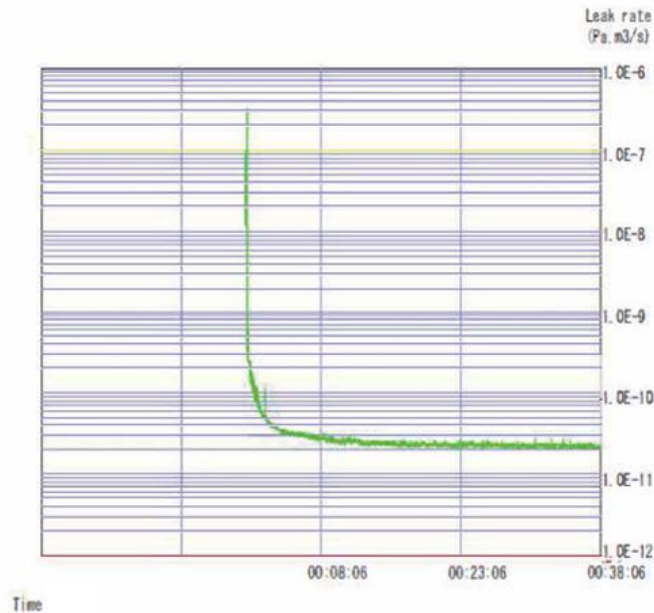
Initial residual gas release (Degassing)



Storing Datetime : 2024/07/03 14:20:50
Output Datetime : 2024/07/03 14:58:56

Setpoint1 : 1.0E-07 Setpoint2 : 1.0E-12

Main leak test data



Contact

The **MFF-M series** is **world-top** in every aspect.
You will be **highly satisfied** with its performance.

MAGRON CO., LTD.

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(For reference, the website of our complex <http://www.gtp.or.kr/>)