

Data Centres

MIVOLT[®]
IMMERSION COOLING LIQUIDS



Dielectric fluids
for safer, cooler, greener
high performance data centres.

RESPONSIBLE DATA STORAGE

In the next decade it is estimated that data centres will consume over 20% of the world's electricity.

Data centres use approximately 200 terawatt hours (TWh) each year - this exceeds the national energy consumption for some countries. At present, this contributes roughly 0.3% to overall carbon emissions. However, with technology moving at an incredible pace, from artificial intelligence to 5G, there will be greater demands placed on data centres. Large amounts of data will need to be created at a faster speed - more than ever seen before. This means that data centres will be using around three times as much power as they do now, increasing their contribution to global warming. Smarter, energy efficient data centres are crucial for a greener future.



To lower the world's carbon footprint, data centres need to adopt liquid immersion cooling.

Liquid immersion cooling removes the need for power-intensive air conditioning equipment, which is necessary for air cooling. For example, as data centres become more dense, air cooling requires additional fans. This extra equipment uses more electricity, yet doesn't cool surfaces effectively.

Submerging servers into a dielectric liquid reduces the environmental and financial costs associated with air cooling, yet improves performance and resilience. Once immersed, equipment is fully protected from contamination, vibration and noise. This can dramatically improve a data centres PUE (Power Usage Effectiveness).

Liquid immersion cooling will pave the way for the data centres of tomorrow. As power demands rise, immersive cooling will facilitate resilient data centres with high density and low latency.

DATA CENTRE COOLING WITH MIVOLT

Enabling the next generation of data centres.

The MIVOLT range of dielectric liquids are single-phase. This means that they don't require complex systems to facilitate efficient heat transfer. However, the benefits of the range don't end there.



Safer

Firstly, the K Class fluid within the range mitigates against fire risks. The dielectric properties of the whole range provide safe, electrical insulation whilst the oxidation stability, moisture resilience and natural robustness of the formulations fully protect IT equipment.



Cooler

Secondly, the low viscosity of the liquids, together with their extremely low pour point, ensure server racks are chilled efficiently and effectively - enabling rack densities to be increased. This enhances computing performance significantly, as servers can work harder without overheating.



Greener

Finally, MIVOLT liquids are readily biodegradable. This means that not only does the range cool high density data centres effectively, they do so with minimal environmental impact.



DIELECTRIC FLUIDS

The MIVOLT range:

- **Minimises outage risks**
- **Maximises PUE**
- **Enables greater power rack density**
- **Enhances computing performance**
- **Prolongs server life**

MIVOLT benefits:

- + **Low viscosity**
- + **Readily biodegradable**
- + **High flash point**
- + **Oxygen stable**
- + **High moisture tolerance**

MIVOLT PRODUCT SELECTOR

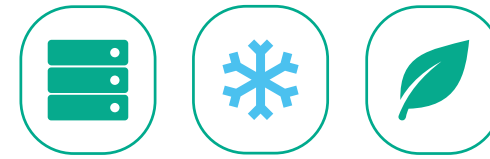
MIVOLT DF7 and DFK dielectric fluid properties.

The data presented in these tables are typical values.

MIVOLT[®] DF7

- + Low viscosity
- + Readily Biodegradable
- + Extremely low pour point -75°C
- + Non-volatile
- + Halogen free
- + Non-toxic

Thermal Properties	Units	Method	MIVOLT DF7
Density at 20°C	kg/m ³	ISO 3675	916
Specific Heat at 20°C	J/kg-K	ASTM E1269	1907
Kinematic Viscosity at 20°C	mm ² /s	ISO 3104	16.4
Thermal Conductivity at 20°C	W/m-K	ASTM D7896	0.129
Coefficient of Expansion at 20°C	1/K	ASTM D1903	0.00080
Cold Behaviour			
Kinematic Viscosity at -10°C	mm ² /s	ISO 3104	87.4
Kinematic Viscosity at -30°C	mm ² /s	ISO 3104	534
Pour Point	°C	ISO 3016	-75
Fire Safety			
Flash Point	°C	ISO 2719	194
Fire Point	°C	ISO 2592	218
Auto-Ignition Temperature	°C	ASTM E659	385
Environmental Impact			
Biodegradability		OECD 301	Readily Biodegradable
Global Warming Potential	GWP		<1
Ozone Depleting Potential	ODP		0
Chemical Properties			
Neutralisation Value	mg KOH/g	IEC 62021-2	<0.03
Net Calorific Value	MJ/kg	ASTM D 240-02	33.5
Dielectric Properties			
AC Breakdown Voltage	kV	IEC 60156	>75
Volume Resistivity at 20°C	GΩ.m	IEC 60247	>90



Readily biodegradable dielectric fluids for the direct immersion cooling of IT equipment.

MIVOLT[®] DFK

- + High fire point (>300°C)
- + Readily biodegradable
- + Low pour point
- + Non-volatile
- + Halogen free
- + Non-toxic

Thermal Properties	Units	Method	MIVOLT DFK
Density at 20°C	kg/m ³	ISO 3675	968
Specific Heat at 20°C	J/kg-K	ASTM E1269	1902
Kinematic Viscosity at 20°C	mm ² /s	ISO 3104	75
Thermal Conductivity at 20°C	W/m-K	ASTM D7896	0.147
Coefficient of Expansion at 20°C	1/K	ASTM D1903	0.00075
Cold Behaviour			
Kinematic Viscosity at -10°C	mm ² /s	ISO 3104	572
Kinematic Viscosity at -30°C	mm ² /s	ISO 3104	4362
Pour Point	°C	ISO 3016	<-50
Fire Safety			
Flash Point	°C	ISO 2719	>250
Fire Point	°C	ISO 2592	>300
Auto-Ignition Temperature	°C	ASTM E659	>400
Environmental Impact			
Biodegradability		OECD 301	Readily Biodegradable
Global Warming Potential	GWP		<1
Ozone Depleting Potential	ODP		0
Chemical Properties			
Neutralisation Value	mg KOH/g	IEC 62021-2	<0.03
Net Calorific Value	MJ/kg	ASTM D 240-02	30.8
Dielectric Properties			
AC Breakdown Voltage	kV	IEC 60156	>75
Volume Resistivity at 20°C	GΩ.m	IEC 60247	>90

MIVOLT®



**LIQUID
IMMERSION
COOLING**

**FOR RESILIENT,
HIGH DENSITY
DATA CENTRES**

A HERITAGE IN MATERIALS SCIENCE

MIVOLT is liquid
engineered by
M&I Materials Ltd.

M&I Materials is an independent, privately owned British company committed to developing specialised materials for challenging applications, and whose roots can be traced back to 1901.

Having started out manufacturing 'Micanite' products for electrical insulation, the company has reinvested in its capabilities throughout its history, having engineered its first dielectric fluid range over 40 years ago.

With the MIVOLT range of immersion cooling fluids, M&I Materials continues to grow its portfolio, building on a reputation for innovative products and superior technical knowledge.



TRUSTED BY LEADING ORGANISATIONS

Material innovations
for demanding
applications.

Globally, M&I Materials supplies to a wide range of sectors, from power and aerospace, to nuclear medicine and high-performance motorsports.

From its Trafford Park headquarters in the UK, M&I Materials exports its specialist products to 60+ countries around the globe.

This is made possible by the company's growing network of production facilities and commercial premises across the Americas, Africa, Middle East, Europe and Asia Pacific.

Offices

- UK
- USA
- India
- China
- South Africa

Manufacturing Locations

- UK
- USA
- India
- South Africa



MIVOLT®

IMMERSION COOLING LIQUIDS

a product of  **M&I MATERIALS**

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