



Solutions for data center immersion cooling

Data centers face a thermal turning point

Data centers are critical infrastructure for the digital economy, supporting cloud computing, artificial intelligence, and high performance computing workloads. As computing intensity increases, modern CPUs and GPUs are operating at higher power levels, driving rack densities toward the practical limits of traditional air cooling approaches.

As a result, cooling has become an increasingly important consideration in data center design, influencing energy use, operational reliability, safety considerations, and environmental management across deployments.

Cooling fluid choice matters

To address rising thermal loads, data center operators are evaluating liquid cooling architectures, including single phase immersion cooling, where IT equipment is submerged in a dielectric fluid. In immersion cooled systems, the cooling fluid influences not only thermal management, but also factors such as: fire safety and handling, environmental exposure and spill management, fluid stability and maintenance, end of life handling and disposal.

Why Cargill™ Priolube™ synthetic esters*

Priolube™ synthetic esters enable dielectric cooling fluids with high flash points, low toxicity classifications, and biodegradability** while offering thermal and oxidative stability suitable for continuous operating conditions.

Safety and handling

- High flash points relative to viscosity range compared to traditional hydrocarbon based products
- Classified as non hazardous

Environmental and sustainability profile

- Readily biodegradable**
- Low aquatic and human toxicity classifications, no inhalation hazards common to low viscosity Group III and Group IV base oils

Performance and reliability

- Higher thermal conductivity and heat capacity compared to Group III and Group IV base oils
- Exceptional thermal and oxidative stability characteristics for extended coolant service life

*see related product portfolio in the following table

**according to OECD 301B/F

Designed for formulators. Built for the data center ecosystem.

Cargill supplies synthetic ester base stocks that can be used by customers in the formulation of single phase immersion cooling fluids, supporting flexibility across viscosity ranges and physical property targets.

Cargill™ synthetic ester portfolio

Property	Priolube™ EF 7010	Priolube™ EF 3221	Priolube™ 2728	Priolube™ 1976
Regional availability	Global	Global	China	Global
Kinematic viscosity at 100°C (cSt) (ASTM D7042)	2.9	2.4	1.3	5.4
Kinematic viscosity at 40°C (cSt) (ASTM D7042)	9.6	7.7	3.3	26
Pour Point (°C) (ASTM D7346)	-35	-81	-96	-35
Flash Point (°C) (ASTM D92)	205	202	150	>250
Biodegradability	Readily biodegradable (OECD 301F)	Readily biodegradable (OECD 301F)	Readily biodegradable (OECD 301B)	Readily biodegradable (OECD 301B)

Electrical and thermal suitability for immersion cooling

The following properties illustrate typical electrical, thermal, and environmental characteristics of selected Cargill synthetic esters that are relevant to immersion cooling fluid formulation.

Property	Priolube™ EF 7010	Priolube™ EF 3221	Priolube™ 2728	Priolube™ 1976
Dissipation factor, 25 °C, 50 Hz (%)	0.05	0.70	0.33	0.03
Dissipation factor, 100°C, 50 Hz (%)	1.00	5.26	2.82	0.13
Breakdown voltage (kV)	75	80	55	59
Dielectric constant - relative permittivity, 25°C, 100 kHz	3.0	4.2	3.5	2.8
Dielectric constant - relative permittivity, 100°C, 100 kHz	2.7	3.6	3.0	2.5
Specific resistance (insulation resistance), 25°C, 20 Hz (kΩm)	241	3.94	10	148
Specific resistance (insulation resistance), 100°C, 20 Hz (kΩm)	13	0.6	1.3	60
Thermal conductivity at 30°C (W/m.K)	0.152	0.146	0.141	0.158
Specific heat at 30°C (J/gK)	2.07	1.86	1.95	2.14

A partner for the long term

Cargill brings experience in synthetic ester chemistry and global supply capabilities to support customers developing formulations for technically demanding applications, including data center immersion cooling.



Learn more at
www.cargill.com/data-center-immersion-cooling
 or email energy_technologies@cargill.com



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