QLOE

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Advancing Safe & Sustainable High-Performance Liquid Cooling

Integrating AIRSYS Spray Technology with Oleon's QLOE Dielectric Coolant

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oleon
a natural chemistry
Avril

Introduction

AIRSYS offers a spray-based liquid cooling solution tailored for high-density IT infrastructures: "LiquidRack". This technology utilises targeted spray cooling directly onto intensive heat-generating server components.
Oleon, a provider of high-performance, sustainable, and safe oleochemical solutions, has recently introduced a new range of dielectric coolants under the brand name: "QLOE".
Together, AIRSYS and Oleon have partnered to overcome the challenges of liquid cooling in data centers, with a shared commitment to safety and sustainability.

Materials & methods

The **LiquidRack** features ten modular server cassettes, each supporting a 2U server (as standard) and equipped with its own heat exchanger and pump system. A 3D-printed spray head delivers the dielectric fluid directly to the servers, removing the heat, with the heat then transferred through a plate heat exchanger to the primary water circuit. The recovered heat can be rejected via a dry cooler or reused for hot water applications.

Each cassette provides cooling capacities up to 8 kW per server with a dry cooler (free cooling to 50 °C ambient) or up to 17.5 kW per server with a chiller.

QLOE 8313 is a bio-based, non-hazardous synthetic ester dielectric coolant. It exhibits the ideal balance between kinematic viscosity (heat transfer), flash point (fire safety) and material compatibility (reliability). Moreover, ester chemistry is known to have an outstanding safe and environmental-friendly profile. Product Data and Material Safety Data sheets are available upon request.

The LiquidRack was run with Dell R720 servers for 3 months using QLOE 8313 as a dielectric coolant.

Performance evaluation

LiquidRack

Server CPUs were run at 100% and their case temperatures were monitored and maintained below the allowed maximum case temperature, while the coolant oil operating temperature was 58°C on average.

QLOE 8313

The physical, thermal and dielectric/electrical properties of QLOE 8313 were monitored over time. Its stability upon operating the LiquidRack was assessed. A material compatibility with focus on functional errors of individual components was performed as well.

Physical properties

The acid value of QLOE 8313 complied with ASTM D8240 specifications. The flash point did not change over time, indicating that QLOE 8313 can guarantee long-term fire safety.

Thermal properties

QLOE 8313 met the three thermal performance metrics (FOM1-3) set by Intel. Furthermore, the thermal performance of QLOE 8313 was not impacted by operating the LiquidRack.

Dielectric/electrical properties

Both electrical resistivity and dielectric breakdown met OCP minimum specification guidelines, indicating that QLOE 8313 can guarantee long-term electrical safety and prevent short circuits upon operation.

Chemical stability

No oxidation/degradation products were found, clearly demonstrating the stability of this chemistry.

Material compatibility

No functional errors were observed during the evaluation period, as confirmed by the thermal performance data of the LiquidRack.

QLOE 8313, used	Description	Pass/fail
Physical	Acid value: ≤ 0.30 mg KOH/g	Pass
	Flash point: ≥ 150°C	Pass
Thermal	FOM1 (natural convection): >35, preferably >45	Pass
	FOM2 (forced convection): >19	Pass
	FOM3 (pressure drop): ≤ 0.015	Pass
Dielectric/Electrical	Electrical resistivity: ≥ 0.2 GOhm·m	Pass
	Dielectric breakdown: ≥ 15 kV	Pass
Chemical	Ester molecular structure/stability. No oxidation/degradation.	Pass
Material Compatibility	Reliability. No functional errors encountered.	Pass

Table 1: performance Evaluation of QLOE 8313 in a Spray Cooled LiquidRack System.

Conclusion

The integration of Oleon's QLOE 8313 with AIRSYS's LiquidRack system marks a significant step forward in delivering safe, sustainable, and high-performance liquid cooling for data centres. QLOE 8313 consistently met key performance metrics while maintaining an exceptional safety and environmental profile. The successful evaluation confirms its long-term reliability for demanding IT environments. The LiquidRack's award-winning technology delivers a low energy solution for high performance compute applications, removing reliance on refrigerants and water usage.

This partnership establishes a new foundation for eco-conscious thermal management and highlights the potential of bio-based dielectric coolants in next-generation cooling solutions.

We invite you to discover the full potential of QLOE dielectric coolants in a LiquidRack spray cooling system. Join us in shaping the future of green data centres.

Link to websites:
Server Immersion Cooling | Oleon
LiquidRack - Spray Liquid Cooling Solution by Airsys