

Forane® Refrigerants for **Data Center Efficiency**

Reliable thermal management across chiller, enclosure, and immersion systems

Data centers demand consistent uptime, high heat load management, and increasing sustainability performance. Arkema's Forane® portfolio supports modern cooling architectures by delivering low-GWP options, energy efficiency, and proven performance across critical applications.



Cooling Solutions

Arkema provides flexible refrigerant options aligned with evolving regulatory and performance requirements.

Forane® refrigerants support high-efficiency cooling across air and water-cooled systems:

- **Forane® 454B:** Lower-GWP replacement for R-410A, optimized for next-gen chiller and HVAC performance
- **Forane® 32:** High capacity and efficiency for compact systems
- **Forane® 513A:** Non-flammable alternative to R-134a with stable performance in retrofit and new systems
- **Forane® HTS 1233zd:** Ultra-low GWP solution for centrifugal chillers with strong thermodynamic efficiency

High-Performance Insulation for Thermal Control

Forane® Foam Blowing Agents can improve insulation efficiency, reducing cooling loads at the source.

Forane® FBA 1233zd:

- Advanced blowing agent for rigid foam insulation
- Delivers excellent thermal conductivity performance
- Supports reduced energy demand in building envelopes and cold chain structures

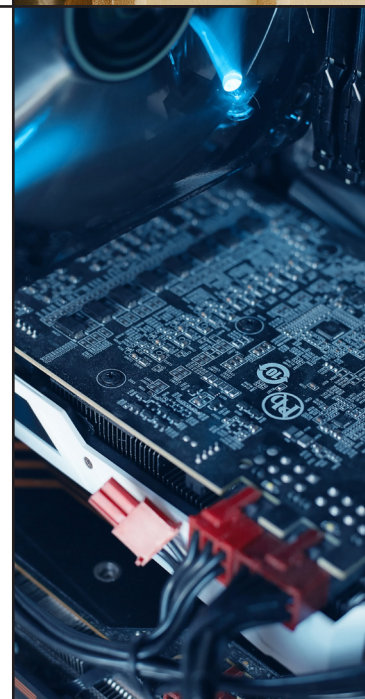


Next-Generation Cooling: Two-Phase Immersion

The Forane® Refrigerants brand offers a platform for emerging high-density compute environments.

Forane® HTS 1233zd:

- Engineered for dielectric two-phase immersion cooling systems
- Efficient heat transfer through boiling/condensation cycle
- Enables higher rack density and reduced energy consumption

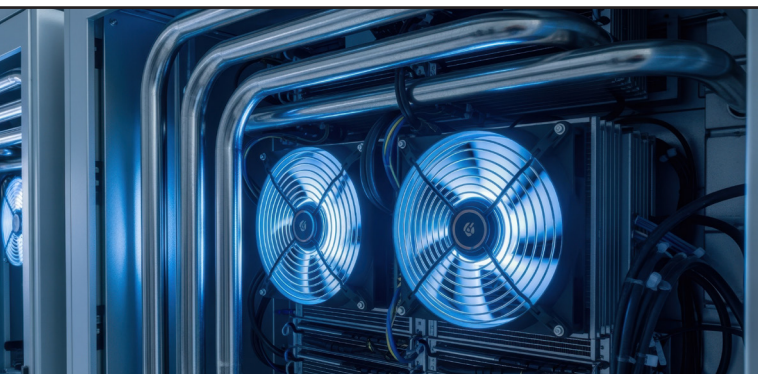


Materials for the **Data Center Ecosystem**

Arkema brings together fluorogases, advanced polymers, and specialty materials to support data center infrastructure - from cooling fluids and foam insulation to high-performance materials for electronics, cabling, and components. This integrated approach enables system-level optimization across thermal management, energy efficiency, and durability, helping operators and OEMs meet performance targets while navigating regulatory and sustainability priorities.

Why Forane® Refrigerants for Data Centers?

- Portfolio aligned with global GWP regulations
- Solutions for multiple cooling architectures (air, liquid, immersion)
- Backed by Arkema's expertise in fluorochemicals and materials science
- Designed for reliability in mission-critical environments



Applications

- Hyperscale and colocation data centers
- Edge computing facilities
- Mission-critical cooling systems
- High-density computing environments



Let's Build the Next Generation of Data Center Cooling

For more information, contact Arkema or visit: arkema.com

Arkema China Investment Co.,Ltd. - Shanghai Branch

10/F, Building H, Daning Music Plaza
777 Wanrong Road
Shanghai 200072
200072
China
(+86) 21 6147 6888

Arkema PTE Ltd

1 Gateway Drive #21-09
Westgate Tower
Singapore 608531
Singapore
(+65) 6419 9199

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