Refindustry
REFRIGERATION INDUSTRY MAGAZINE

N 2025 / 1 (5)

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First 90 Days in Ammonia Refrigeration Systems

Magnetic Refrigeration: A Disruptive Cooling Technology

Introducing the magazine “Refrigeration Industry”

Welcome to the fifth issue of our magazine!

We started last year, and each issue of the publication already attracts an audience of 2,000 readers. Additionally, in December, we reached a milestone of 40,000 subscribers on our LinkedIn page.

We sincerely thank you for your continued interest and support!

Please feel free to email us if you would like to learn more, share feedback, or offer suggestions. You can also reach out to me directly on LinkedIn.

Warm regards, Editor-in-chief

Sergei Mukminov.

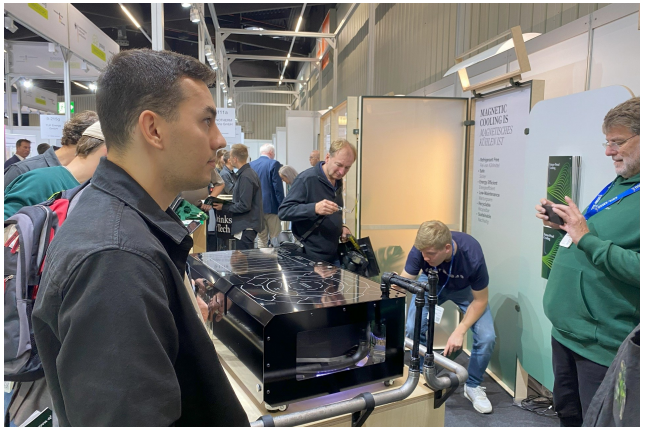
The concept of the new magazine:

1. In today’s fast-paced world, staying updated with the latest developments in the refrigeration industry can be challenging. Our mission is to simplify this by providing the most critical news and insights in a single quarterly issue.
2. The magazine is published exclusively in digital format, with pages designed in a landscape orientation for optimal readability on screens.
3. Our magazine is interactive, allowing you to follow internal content links, as well as external links to detailed articles on our website and advertisements.
4. All news featured in the magazine can also be easily found on our website by title.
5. The magazine is released once every quarter.

The magazine issue plan

- N 2025 / 2 — April
- N 2025 / 3 — July
- N 2025 / 4 — October

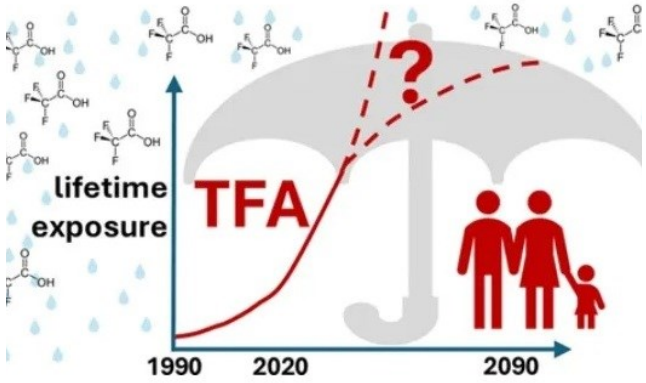
Learn more about the opportunities for refrigeration equipment suppliers in this magazine and on refindustry.com.



Magnetic Refrigeration: A Revolutionary, Disruptive Cooling Technology

Camfridge: Magnetic Refrigeration Technology is Ready to Scale

First 90 Days in Ammonia Refrigeration Systems: A Technical Guidebook



The Global Threat from the Irreversible Accumulation of Trifluoroacetic Acid (TFA)

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Links may not work in a browser.

News Products

ebm-papst introduced Compact Turbo Compressors Enhance Heat Pumps and Refrigeration

ebm□papst has introduced the CompaNamic turbo compressor, a compact and robust solution for oil-free gas compression, essential for heat pumps and refrigeration technology. Designed for motor power ranges from 1 kWe to 55 kWe, these compressors offer high efficiency and durability while accommodating various refrigerants with reduced volume, lowering the refrigerant requirement by up to 90%.

The 3 kWe and 10 kWe models are optimized for refrigerants like R290 and R1234ze(E), making them ideal for heat pumps in larger buildings and industrial settings. The oil-free design enhances heat exchanger efficiency and pressure loss reduction, ensuring a service life of approximately 150,000 hours and over a million start-stop cycles.

Trane Launches High-Temperature Water-to-Water Heat Pump for Decarbonising Industrial Processes

Trane has introduced the RTSF HT, a water-to-water heat pump capable of producing hot water up to 110°C. This addition to the Trane CITY range aims to assist industries in electrifying process heating and reducing reliance on fossil fuels. The RTSF HT utilizes Trane's proprietary screw compressor technology and the low-GWP refrigerant R1233zd(E), achieving a coefficient of performance (COP) of up to 4.6. Its compact design, with a width of 930 mm, delivers capacities up to 380 kW, optimizing space and installation costs. Applications include industrial processes, district heating, and cascade heating systems.

Copeland to Launch Vilter Industrial Single-Skid Heat Pump to Accelerate Energy Transition

Copeland has unveiled the Vilter VQ95 industrial heat pump, designed to support decarbonization in district heating and

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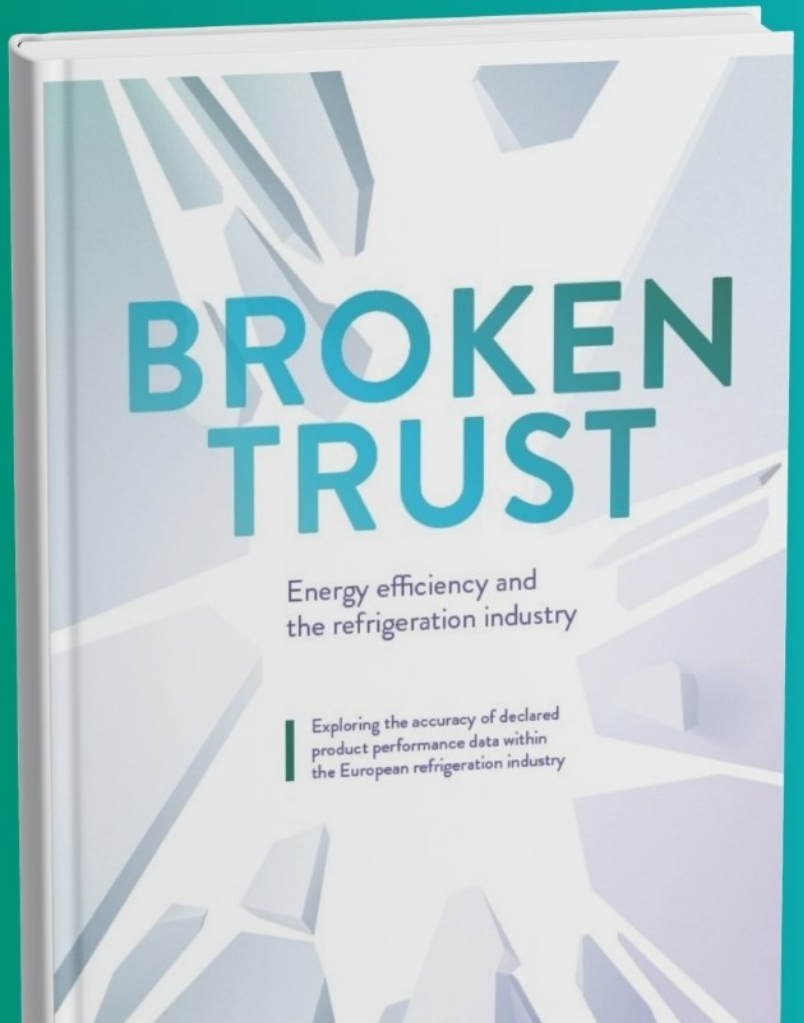
Are you playing refrigeration roulette?



Don’t take gamble on refrigeration equipment

Download the whitepaper

industrial processes, such as food and beverage production.

The single-stage system uses ammonia (NH3) as a natural refrigerant, offering capacities from 1 to 5 MW per unit. Its modular design facilitates integration into existing facilities, and the use of a single-screw compressor reduces maintenance costs.

Daikin Unveils Altherma 4 H Heat Pump with Propane Refrigerant

Daikin Europe has launched the Daikin Altherma 4 H, its first residential air-to-water heat pump operating on R-290 (propane) refrigerant. Designed for single-family homes, it operates in temperatures as low as -28°C and provides hot water up to 75° C. Rated A+++ for space heating and up to A+ for domestic hot water, the system integrates with existing radiator systems, offering a low-carbon alternative to gas boilers. The heat pump operates at a low noise level of 28 dBA at 3 meters and features smart controls via the Daikin Onecta app.

Fujitsu General Unveils Next-Generation Wearable Air Conditioner

Fujitsu General has developed a new-generation Wearable Air Conditioner, offering significant cooling within seconds. More compact than its predecessor, the device cools up to 20°C below ambient air temperature and features an integrated tubeless design, eliminating the need for a waist-worn heat exchanger.

Ideal for sectors like construction and logistics, it uses a Peltier element to manage heat effectively, even beyond 40°C. Pre-orders begin today, with the official release slated for spring 2025.

Daikin Unveils CO2 VRV System for the European Market

Daikin has announced the launch of its new VRV system utilizing R-744 refrigerant (CO□) for the European market. This system offers an ultra-low GWP of 1 and is classified as a non-flammable refrigerant (A1). Retaining all benefits of Daikin's VRV technology, it provides ease of design and installation, precise climate zone control, and quick response times.

The CO2 VRV system is designed for applications such as supermarkets and retail establishments and will be available starting in April 2025.

RefPlus Introduces ONS Series of Outdoor CO2 Condensing Units

RefPlus has unveiled its ONS Series, a line of outdoor CO condensing units featuring air-cooled, vertical discharge designs with ultra-quiet, high-efficiency fans. T

hese units include an air-cooled gas cooler and a choice of semi-hermetic, heavy-duty compressors from Bitzer, Copeland, or Dorin, complete with frequency variators and interconnecting pipework.

Designed for easy incorporation into commercial and industrial walk-in coolers and freezers, they offer superior energy efficiency and reliability.

Thermo King Unveils Sustainable Cold Chain Solutions at Intermodal Europe 2024

Thermo King is set to present its latest advancements in refrigerated container technology at Intermodal Europe 2024 in Rotterdam.

Key innovations include the MP-5000 controller, featuring a user-friendly interface and Bluetooth-enabled communication; the TK Active Fresh system, tailored for high-respiration cargo; and the E-COOLPAC, a flexible, battery-powered solution for refrigerated containers without grid access.

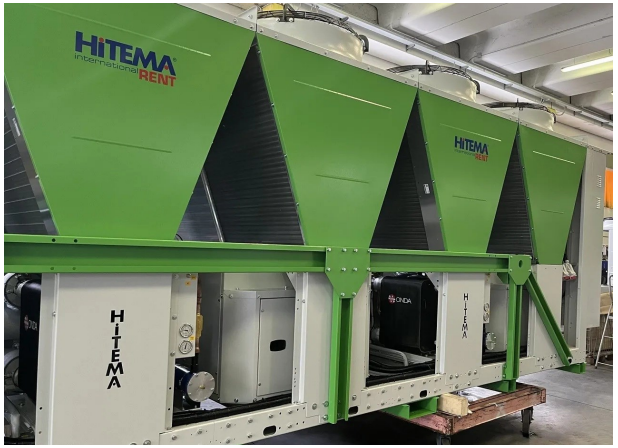
These solutions aim to increase efficiency, sustainability, and reliability in cold chain transport.

Rivacold Unveils ICO2NA R744 Mini-Booster

At Chillventa 2024, held in Nuremberg from October 8-10, Rivacold showcased a suite of new products and updates, with the highlight being the ICO2NA, a CO2 mini-booster unit. The ICO2NA features a compact design with a power range of 7kW to 43.4kW for medium temperatures, making it ideal for minimarkets and local shops. It offers easy accessibility with a complete housing and a 130-bar design pressure for improved efficiency in warm climates.

Rivacold also introduced the UNICA CO2, a versatile soundproof condensing unit based on BLDC compressors, suitable for smaller installations. With refrigerating capacities ranging from 3.7kW to 14.4kW, UNICA CO2 retains the benefits of the multigas range.

Hitema International Introduces SBS-R32.1030 Chiller for Sustainable Cooling



Hitema International has unveiled the SBS-R32.1030, an air-cooled chiller designed to meet high-performance standards while adhering to environmental regulations.

Utilizing R32 refrigerant, a low GWP gas compliant with F-Gas regulations, the chiller includes five independent circuits with a tandem of scroll compressors, enabling multiple regulation steps and improved energy efficiency.

With a cooling capacity of 1130 kW, it caters to large-scale applications demanding reliable, sustainable cooling.

Frascold Brings Innovation to Chillventa 2024 for Every Need

Frascold introduced four new compressor series for natural refrigerants at Chillventa 2024, highlighting its commitment to sustainability and efficiency.

Key innovations included the Magnetic screw compressor with 2Vi technology, ATEX-certified HT compressors for high-temperature heat pumps, and the FVR screw compressor for low-temperature refrigeration.

Designed for diverse applications, these solutions promote energy efficiency and low-GWP refrigerant use. Frascold's exhibit emphasized its focus on meeting market demands for eco-friendly cooling and heating technologies.

Danfoss Unveils Two Cutting-Edge Solutions for Enhanced Cooling and Industrial Efficiency

Danfoss has introduced the EKE 100 series of superheat controllers and valve drivers, offering precise superheat control with advanced algorithms and robust performance across various applications. Additionally, the enhanced VLT AutomationDrive EZ FC 321 now features integrated condition-based monitoring, enabling predictive maintenance and improved diagnostics for industrial processes.

These innovations underscore Danfoss' commitment to energy efficiency and operational excellence in cooling and industrial sectors.

artisan soul, innovative personality

ARNEG CO_2 SYSTEMS

Alberto
Refrigeration system mechanical designer

We take the time we need to build a new refrigeration system

YOU CAN RELAX IN THE KNOWLEDGE
THAT OUR SYSTEMS COMBINE
MAXIMUM PERFORMANCE
WITH MINIMUM DIMENSIONS.

GLOBO and **MINI BOOSTER** are the creations of Arneg's R&D department. Thanks to their extended power range, these two innovative technical solutions combine NT and LT refrigeration in the same unit to deliver maximum efficiency in a minimum of space.

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Product Showcase

The partner's materials

Enex Technologies Introduces SENNA XS and KUBE CO2 Refrigeration Solutions

Enex Technologies has launched two new refrigeration systems, the SENNA XS and the KUBE CO2 Subcritical Rack, aimed at enhancing efficiency and sustainability in the HVAC and industrial refrigeration sectors. The announcement comes after their successful showcases at the Chillventa and SIFA trade shows.

The SENNA XS – XtraSmart CO2 Transcritical Booster is designed for medium to large supermarket applications, with capacities ranging from 50 to 400 kW.

The KUBE CO2 Subcritical Rack, designed for industrial applications with capacities of 10–270 kW, emphasizes reliability and adaptability.

Both solutions utilize natural refrigerants like CO2, aligning with global environmental goals.

Know more

Arneg Introduced The Refrigerated Display That Generates Heat

Compact, versatile, and equipped with Arneg's revolutionary Hot & Cold technology, Andorra is a vertical wall display that combines both hot and cold sections without the need for heating elements. Thanks to its compact dimensions, Andorra adapts easily to all retail contexts.

Hot & Cold is an exclusive new technology developed and patented by Arneg. This unique solution combines hot and cold sections in one display without needing heating elements in the heated part. Available in the Andorra cabinet, Hot & Cold technology recovers thermal energy that would normally be lost to the environment from the high-pressure side of a transcritical CO2 cycle and uses it to heat the products in the upper section of the display to a

core temperature of 65°C or above.

Thanks to a compact design that maximizes transparency and enhances product presentation, this wall display is ideal for use in a wide variety of stores, including supermarkets, corner stores, service stations, delis, airports, convenience stores.

Inside, the display uses CO2 as a refrigerant, a natural solution that dramatically reduces impact on the environment.

Know more

The bonus for our Platinum and Gold partners includes the free publication of press releases, subject to space availability in the Product Showcase section.

Learn more about opportunities for our partners.

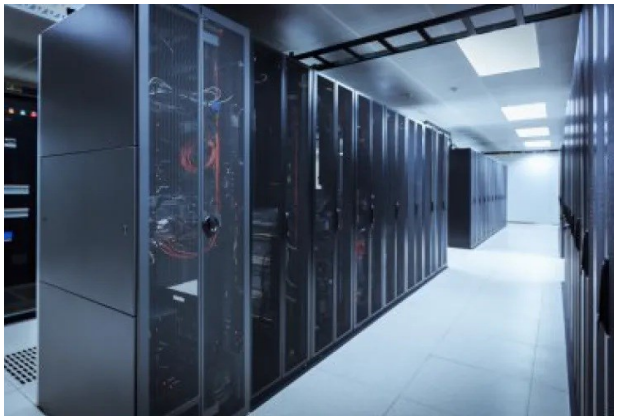
Market News

Copeland and Daikin Partner to Bring Advanced Inverter Swing Rotary Compressors to U.S. Residential HVAC Market

Copeland and Daikin have announced a partnership to introduce advanced inverter swing rotary compressors for U.S. residential HVAC applications. These compressors offer high energy efficiency and quiet operation, designed to meet growing demands for sustainable and comfortable cooling solutions.

The collaboration aims to support decarbonization goals by integrating innovative technologies into residential HVAC systems, enhancing performance and reliability.

Lennox Launches New Business Focused on Data Centre Cooling Solutions



Lennox has unveiled a new business segment dedicated to data center cooling solutions. The company aims to address the rising demand for energy-efficient and reliable cooling systems in data centers.

Utilizing advanced HVAC technologies, Lennox provides customized solutions designed to optimize energy consumption and ensure operational stability in critical environments. The launch marks Lennox's strategic expansion into the fast-growing data center sector.

Daikin Invests in Advanced Composite Corporation for Lightweight Material Technology in HVAC-R

Daikin Industries has invested in Advanced Composite Corporation to leverage lightweight material technology for HVAC-R equipment.

This collaboration focuses on developing innovative materials that enhance energy efficiency, reduce weight, and improve overall system performance. The partnership supports Daikin’s commitment to sustainability and advancing technologies that align with environmental goals in the heating and cooling industries.

Tecumseh Unveils New Products at Chillventa 2024

Tecumseh showcased its latest products at Chillventa 2024, highlighting innovations in cooling technologies. Key introductions included high-efficiency compressors designed for low-GWP refrigerants and compact condensing units tailored for commercial refrigeration. Tecumseh emphasized its commitment to sustainability and energy efficiency, offering solutions that align with evolving global regulations and industry trends.

Sono Group Enters Trailer Market with Solar-Powered Refrigeration System

Sono Group has debuted a solar-powered refrigeration system for trailers, marking its entry into the cold chain market. The system integrates photovoltaic panels with battery storage to provide reliable and sustainable cooling for perishable goods during transportation.

Designed to reduce reliance on diesel-powered systems, it offers a cost-effective and eco-friendly alternative for logistics providers.

Johnson Controls Delivers Germany's First Seawater Heat Pump

Johnson Controls has successfully implemented Germany's first seawater heat pump in Rostock, designed to supply renewable heating and cooling for residential and commercial buildings.

The system utilizes seawater as a sustainable energy source, significantly reducing carbon emissions. This project demonstrates Johnson Controls' expertise in delivering large-scale, eco-friendly heating solutions.

Copeland Unveils Unified Brand Identity Across Product Portfolio

Copeland has introduced a unified brand identity to consolidate its extensive product portfolio. This move aims to strengthen brand recognition and streamline customer access to its broad range of HVAC-R solutions. The unified branding reflects Copeland's commitment to innovation, energy efficiency, and addressing global sustainability challenges across diverse applications.

UK to Implement EU-Aligned F-Gas Ban Starting January 2025

The UK will adopt an EU-aligned F-gas ban beginning January 2025, targeting the use of high-GWP refrigerants in HVAC-R systems. This regulation aims to accelerate the transition to low-GWP alternatives and reduce greenhouse gas emissions. Industry stakeholders are urged to adapt to the new rules, which align with global environmental commitments to combat climate change.

ATMO Europe Summit 2024: Spotlight on Natural Refrigerant Innovations and Market Trends

The ATMO Europe Summit 2024 will highlight advancements in natural refrigerants and market trends shaping the future of HVAC-R. Industry leaders, policymakers, and researchers will gather to discuss innovative solutions, regulatory updates, and the transition to sustainable cooling and heating technologies. The event underscores the industry's commitment to environmental stewardship and low-impact refrigeration solutions.

Vertiv Acquires BiXin Energy to Expand Chiller Technologies

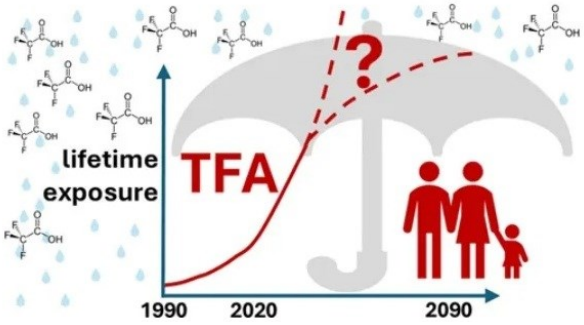
Vertiv has acquired assets and technologies from BiXin Energy Technology (Suzhou) Co., Ltd (BSE) through its Chinese subsidiary, enhancing its chiller portfolio. This move aims at boosting Vertiv's solutions for high-performance computing and AI globally.

Founded in 2010, BSE offers centrifugal water-cooled and air-cooled chillers with capacities of up to 5.5 MW and is recognized for its efficiency and reliability in the Asia region. The acquisition will benefit Vertiv's existing portfolio, addressing increasing cooling demands.

Giordano Albertazzi, CEO of Vertiv, stated, "This acquisition supports our capital allocation strategy...and will assist us in addressing growing air and liquid cooling demand." Since early 2024, Vertiv and BSE have collaborated on manufacturing in China. BSE's certifications enhance its offerings within Vertiv's global infrastructure solutions. BSE's CEO, York Zha, expressed excitement over the merger with Vertiv's product offerings for data centers.

Market Research

The Global Threat from the Irreversible Accumulation of Trifluoroacetic Acid (TFA)

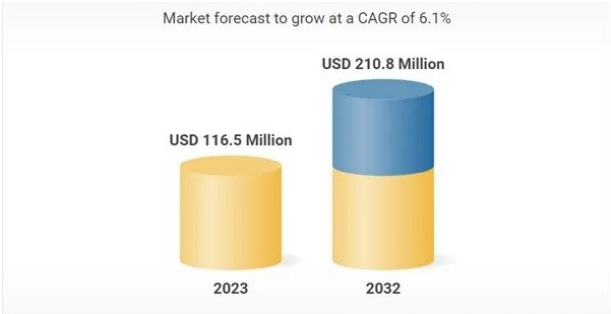


A new study highlights the growing risks of trifluoroacetic acid (TFA), a persistent by-product of hydrofluoroolefins (HFOs) and other fluorinated gases. Formed as these chemicals break down in the atmosphere, TFA has been identified as a “planetary boundary threat” due to its irreversible accumulation and potential impacts on critical earth systems.

TFA levels are rising rapidly in water, soil, crops, and even human serum, often exceeding proposed regulatory limits. Unlike many PFAS substances, TFA is highly mobile and chemically stable, making it resistant to environmental breakdown. Its presence in drinking water and its ability to accumulate in crops through contaminated soil raise concerns about long-term human exposure.

TFA’s potential ecological impacts, including effects on plant growth, soil quality, and algae populations, remain underexplored. The study calls for urgent action to phase out TFA precursors, adopt sustainable chemical alternatives, and innovate water treatment technologies to mitigate this global risk.

Europe Data Center Refrigerant Market: Key Insights and Forecast to 2032



The Europe data center refrigerant market is projected to grow from $116.5 million in 2023 to $210.8 million by 2032, at a CAGR of 6.1%. This growth is fueled by the rising number of data centers, government sustainability initiatives, and advancements in cooling technologies.

Key Drivers:

- **Data Center Expansion:** Increased demand for efficient cooling to support growing data processing needs.
- **Regulations:** EU F-Gas Regulation accelerates adoption of low-GWP refrigerants.
- **Sustainability Goals:** Operators are transitioning to eco-friendly refrigerants, supported by financial incentives.
- **Technological Innovation:** Advancements in liquid and hybrid cooling systems open new refrigerant opportunities.
- **Challenges:** High costs and limited availability of advanced refrigerants persist.

Key players include Climalife, Arkema, and Asetek, focusing on eco-friendly solutions and partnerships. By 2032, regulatory efforts and technology will reshape the market, enhancing sustainability and efficiency.

Sustainability

Magnetic Refrigeration: A Revolutionary, Disruptive Cooling Technology

As the global demand for energy-efficient and environmentally friendly cooling solutions intensifies, magnetic refrigeration emerges as a groundbreaking technology poised to transform the refrigeration industry. Leveraging the magnetocaloric effect, this innovative approach promises significant advantages over traditional cooling methods.

Recent advancements are bringing magnetic refrigeration closer to commercial reality, signaling a new era in cooling technology.

Understanding Magnetic Refrigeration

Magnetic refrigeration is based on the magnetocaloric effect, a phenomenon where certain materials heat up when exposed to a magnetic field and cool down when the field is removed. Discovered in the late 19th century, this effect has been harnessed in recent years to develop efficient and eco-friendly cooling systems.

The Magnetocaloric Effect Explained

When a magnetocaloric material is placed in a magnetic field, its magnetic moments align, causing a slight increase in temperature. Removing the magnetic field allows the material to return to a disordered state, leading to a temperature drop. By cycling this process and integrating a heat exchange system, continuous cooling can be achieved without relying on conventional refrigerants.

See a diagram on next page.

Moving Beyond Gadolinium

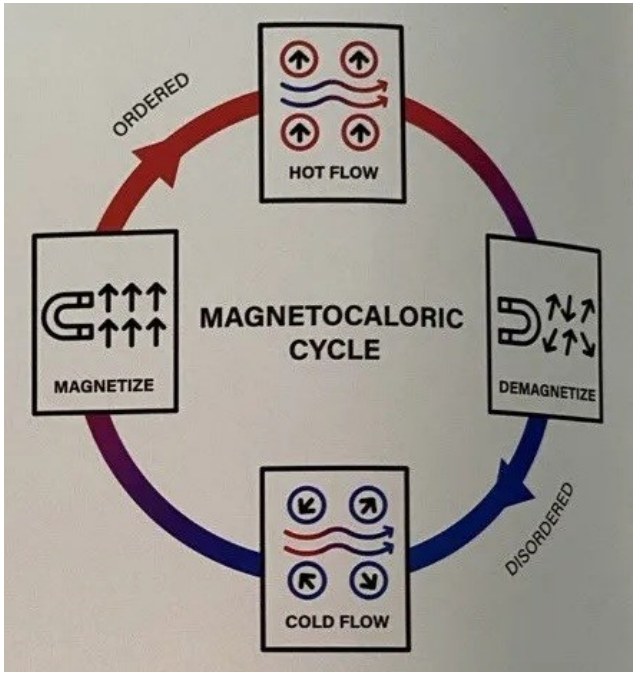
The industry has learned valuable lessons from previous commercialization attempts. Early over-promising by some companies, particularly regarding gadolinium-based solutions, led to market skepticism. Howev-

AKO

The power to reduce gas leaks is in your hands

Refrigerant gas leaks are the biggest cost driver in commercial and industrial refrigeration. Detect leaks early to secure your operations and improve efficiency, safety and sustainability in your facilities.

Discover more



er, the development of commercially viable alternatives has renewed market interest and confidence in the technology.

Industry Leaders & Recent Developments

MAGNOTHERM's Market Entry

At the forefront of magnetic refrigeration technology is MAGNOTHERM, a company that showcased its groundbreaking products at Chillventa 2024.

In an exclusive interview with Refindustry.com, Timur Sirman, CEO and Co-Founder of MAGNOTHERM, discussed their latest developments:

> "Here at our booth, we're showcasing the Polaris beverage cooler, which is essentially our minimum viable product for magnetic refrigeration. It's already certified and operational in local supermarkets around the Frankfurt area in Germany. This demonstrates that our technology is reliable and works effectively in real-world settings."

Read the interview

Camfridge's Pioneering Approach

Founded in 2005, Camfridge stands as the industry's oldest magnetic cooling company. Their approach focuses on three essential elements:

- Development of low-cost solutions that can be produced at scale.
- Compact designs that integrate with existing appliance formats.
- Superior energy efficiency and product longevity.

Unlike some competitors who rely on expensive gadolinium-based solutions, Camfridge has developed innovative third-generation alloys, making their technology more commercially viable and scalable.

Refrigeration Industry recently conducted this exclusive interview with Camfridge CEO, Neil Wilson.

Find the interview after this article.

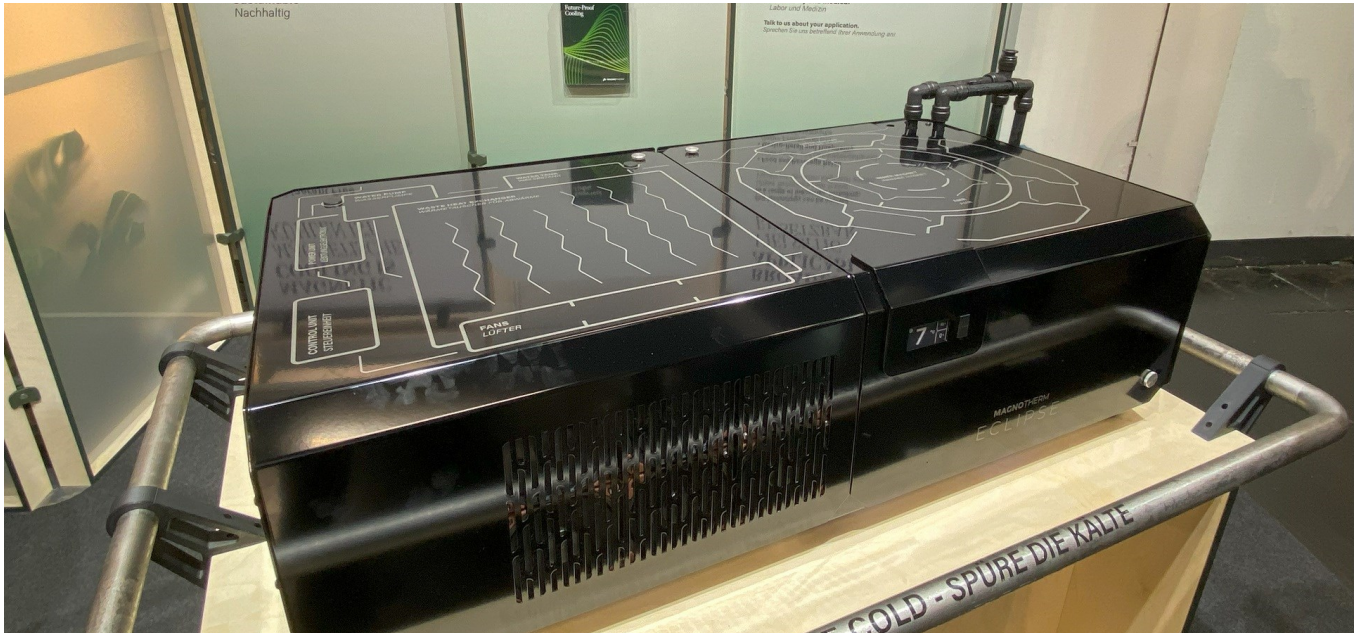
Advantages of Magnetic Cooling Technology

Energy Efficiency

Magnetic refrigeration systems demonstrate potential energy efficiency improvements of up to 30% compared to traditional vapor-compression refrigeration. This efficiency stems from the direct conversion of magnetic energy into thermal energy, minimizing energy losses and reducing operational costs.

Environmental Benefits

Unlike conventional refrigeration methods that use harmful refrigerants like hydrofluorocarbons (HFCs), magnetic refrigeration employs solid-state magnetocaloric materials, making it an environmentally superior cooling solution. These solid refrigerants have a Global Warming Potential (GWP) of zero, eliminating the risks associated with refrigerant leaks that contribute



to global warming and ozone depletion.

Operational Advantages

With fewer moving parts and the absence of compressors, magnetic refrigeration units operate quietly and require significantly less maintenance. Eliminating refrigerant gases prevents leaks and simplifies maintenance procedures, as specialized technicians with gas handling training are no longer required for repairs or servicing.

Applications and Operating Range

Magnetic cooling is a general way to move heat – from hot-cold or cold-hot – so it can be applied to a wide range of cooling or heating applications. It demonstrates remarkable versatility, operating effectively from below -50°C (-58°F) to above +50°C (122°F).

Key applications include:

- Domestic Appliances: Household refrigerators and air conditioners;
- Commercial Refrigeration: Retail cooling solutions;
- Industrial Cooling: Precise temperature control applications;
- Ground Source Heat Pumps.

Challenges and Ongoing Developments

Material Innovations

While significant progress has been made in refrigerant materials engineering and functionalization, the industry continues to work on scaling production methods and improving material efficiency. Recent focus has shifted from material discovery to practical manufacturing solutions.

Supply Chain Considerations

Current dependence on Chinese permanent magnets has sparked innovation in alternative magnetic materials. New developments promise higher-performance, lower-cost permanent magnets that can be produced globally within the next five years.

Scaling and Commercialization

The primary challenge lies in attracting investment to scale the technology and reduce costs. While initial costs may be higher than traditional cooling systems, the technology offers a competitive total cost of ownership with payback periods under three years.

Read the full article

Interviews

Camfridge: Magnetic Refrigeration Technology is Ready to Scale

by Ilana Koegelenberg

Founded in 2005, Camfridge is the oldest known magnetic cooling company, and it has been testing a commercially viable solution that does not use gadolinium for several years. Now, it's ready to scale its revolutionary Net Zero solution.

Neil Wilson, CEO of Camfridge, explores the opportunities and challenges of this highly disruptive technology in this exclusive interview with Refrigeration Industry.

Ri: For what refrigeration applications is magnetic cooling suitable? When should it be considered?

NW: Magnetic refrigerant materials can be operated from well below -50°C (-58°F) to above +50°C(122°F). Magnetic cooling is a general way to move heat – from hot-cold or cold-hot – so it can be applied to a wide range of cooling or heating applications.

For now, it will appeal most to those users who want to reduce the carbon impact of cooling and cut the total cost of ownership (which includes energy and maintenance costs) of their cooling applications. On this basis, magnetic cooling will already deliver a lower carbon and cost-competitive solution, with a pay-back period of significantly less than three years.

The technology probably works most efficiently (and thus delivers the highest operating cost savings) in applications where the operating temperatures are reasonably well defined, i.e., for domestic and commercial (retail) cooling appliances, many industrial cooling processes, or ground source heat pumps.

Ri: What are the advantages/ benefits of using magnetic cooling in refrigeration?

NW: The advantages can be divided into those that contribute to superior environmental outcomes and those that offer a cost advantage.

Superior environmental outcomes:

- The solid refrigerants used in magnetic cooling have a global warming potential (GWP) of zero. In contrast, all other refrigerants (with the exception of ammonia) have a GWP greater than 0, many with a GWP above even 1,000.
- Magnetic cooling products are ready for the circular economy (a focus at Camfridge).
- Lower carbon impact. At each stage of the product lifecycle – pre-production, production, use phase, and end-of-life – magnetic cooling reduces the carbon impact compared to the current vapor compression cooling.

Cost advantages:

- Lower energy costs (energy bills are a huge factor currently).
- Lower maintenance (no leaking refrigerants).

- Deskilling of repair and maintenance: being free from harmful (and pressurized) refrigerant gases means specialist technicians with gas handling training are not required.
- Competitive direct cost (once scaled).

Ri: What are the drawbacks/ potential disadvantages of magnetic cooling in refrigeration?

NW: It is a new technology, and because it takes time to build market traction, it also takes time to attract the necessary investment to scale the technology.

One concern that has been voiced is a dependency on Chinese supply chains for permanent magnets. In an ideal world, we should celebrate the cost efficiencies the Chinese have brought to the permanent magnet industry, but there are now broader strategic concerns.

The good news is that several new permanent magnet materials are being developed, including one that requires no Chinese input at all. In five years' time, we'll all be using even lower-cost, higher-performance permanent magnets that can be produced anywhere. This is very exciting.

Ri: Any resistance to magnetic cooling in the market? If so, why do you think people are reluctant?

NW: I think magnetic cooling has been guilty of over-selling in the past, and as a result, some customers have become skeptical of the technology.

For example, a few years ago there was company in France called Cooltech Applications that claimed to have the first industrialized solution for magnetic cooling. They eventually went bankrupt, and it was clear why. Inside their black box system was 1,000s (even 10,000s) of Euros worth of gadolinium – all hand assembled. The reality was very far from the sales hype, and this turned off potential customers (and investors) for many years.

Now, though, we have a commercially viable solution, without gadolinium, that has been tested for several years and is ready to be scaled. Customers are getting excited again.

Read the full interview

Technical Insights

First 90 Days in Ammonia Refrigeration Systems: A Technical Guidebook

by Kushal Aurangabadkar, Engineering Manager, Cargill Inc

Ammonia refrigeration systems play a critical role in industries such as food processing, cold storage, and HVAC. For new operators and technicians, the first 90 days are crucial for understanding the fundamentals, ensuring safety, and building proficiency. This technical guide provides a structured pathway to help one succeed in the new role with the deeper understanding of the ammonia refrigeration system.

Safety First

Ammonia (NH3) is a highly effective refrigerant but poses significant risks that require thorough understanding and vigilance.

Types of Ammonia Hazards

- Toxicity
- Flammability and Explosion Risk
- Environmental Impact

Common Sources of Hazards in Refrigeration Systems

The common sources of hazards in refrigeration systems are through leaks or system failures. Improper maintenance, corrosion of pipes, valve failures, or accidental damage are typical causes. Use ammonia sensors, handheld detectors, or chemical test paper to identify leaks early. Overpressure in the system can cause line ruptures or equipment damage. Equipment like compressors, condensers, and evaporators must be regularly inspected to ensure proper function.

Mitigation and Prevention

The hazards can be mitigated by engineering controls, proper use of PPE, and emergency planning. Ensure proper airflow in all areas housing ammonia systems. Install exhaust fans and emergency ventilation systems. Use properly rated pressure relief

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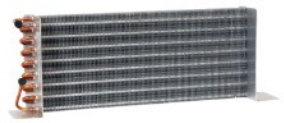
Applications in A/C, Refrigeration & Process Cooling
Across 79 Countries

CO2, NH3, R290, R600a
Compatible Products



5 mm **Condenser**

Heat Pump **Coil**

Water **Coil**

Karbox **Condensing Units w/o Compressor**

Fruit & Vegetable **Unit Cooler**

Commercial **Condenser**

KAR YER | HEAT EXCHANGERS

AHR
10-12 February 2025
Stand: 5564

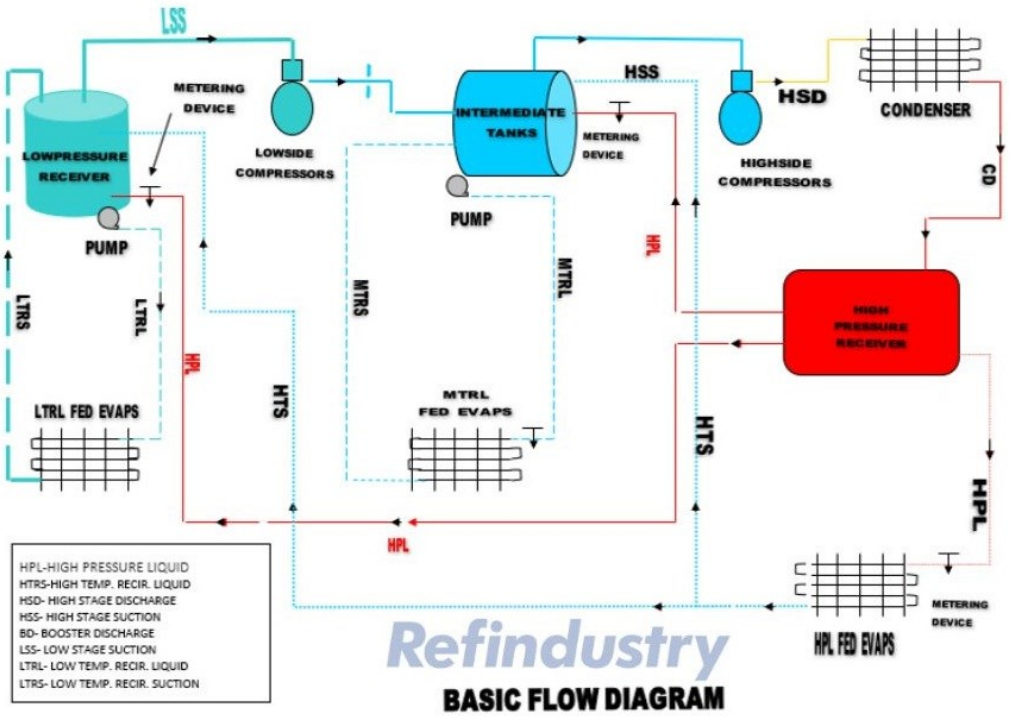
ISH
17-21 March 2025
Hall: 8 Stand: C58

TURKEY'S SECOND TOP 500 INDUSTRIAL ENTERPRISES 2023

2023 TOP 1000 EXPORTERS OF TURKEY

2023 TOP HEAT EXCHANGERS COILS EXPORTER

ISIB TURKISH HVAC-R



valves to prevent overpressure incidents.

PPE includes gloves resistant to chemical burns, splash-proof goggles, face shields for eye protection, proper clothing, and full-face respirators with ammonia-rated cartridges or self-contained breathing apparatus (SCBA).

Train personnel to handle ammonia leaks, spills, and exposures as part of an emergency response team. Establish clear evacuation routes and assembly points and provide eyewash stations and safety showers.

Key Tips for New Operators and Technicians

- Treat even minor leaks seriously; they can escalate quickly.
- Understand alarm systems and respond promptly to warnings.
- Participate actively in all safety drills and inspections.

By maintaining vigilance and adhering to safety protocols, you can effectively minimize risks associated with ammonia refrigeration systems.

Day 1 to Day 30 – Building the Foundation

- Training and Orientation

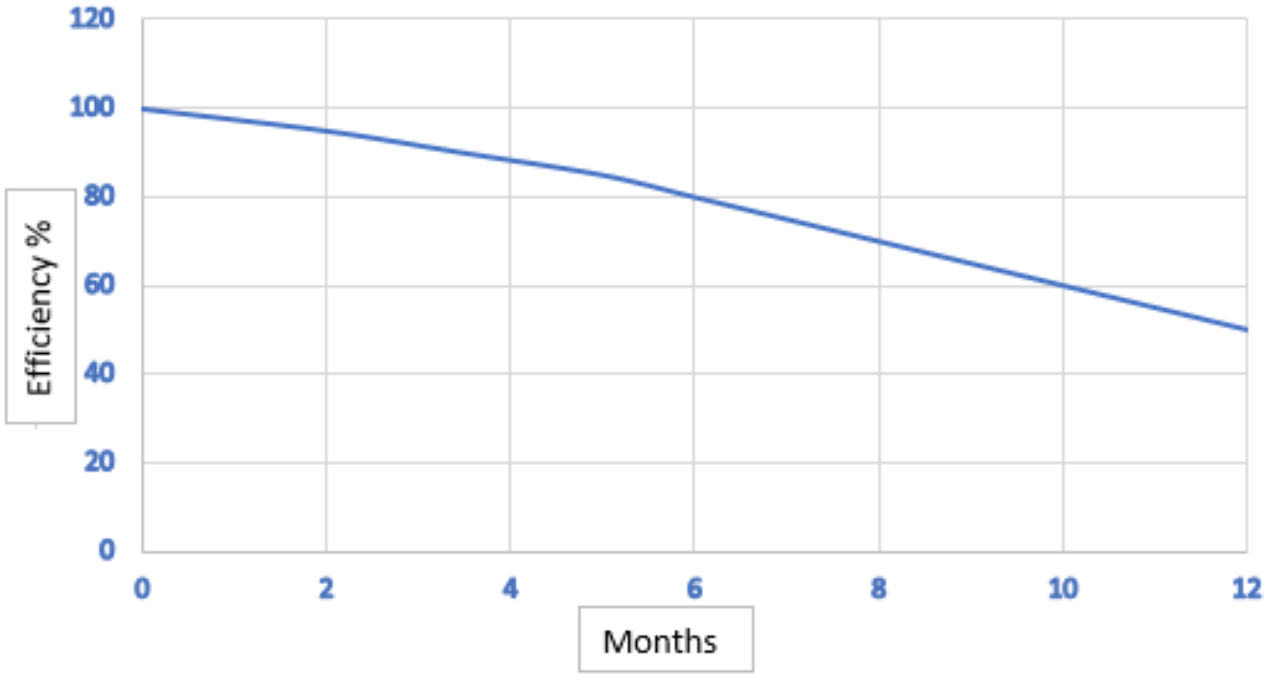
Attend company-specific orientation programs to learn about system design and protocols. Shadow experienced technicians to observe daily operations. Study Standard Operating Procedures (SOPs) for operating and troubleshooting equipment. Learn about common system configurations, such as direct expansion and flooded systems.

- Check system pressures and temperatures.
- Inspect for visible leaks or abnormal noises.
- Ensure proper operation of compressors, condensers, and evaporators.
- Learn about ammonia sensors functionality and leak detectors.

Day 31 to Day 60 – Developing Competence

- Hands-On Maintenance and Monitoring Performance

Practice basic maintenance tasks like oil changes and filter replacements. Learn to conduct leak detection using instruments



such as ammonia sensors.

- Understand how to read system gauges and analyze performance trends.
- Record data regularly to identify potential inefficiencies.
- Identify common issues, such as pressure imbalances or compressor overheating. Follow diagnostic steps to isolate and resolve problems.

Day 61 to Day 90 – Building Independence

- Advanced Operations and Emergency Response Skills

Understand how to adjust system settings for seasonal variations. Gain experience with defrost cycles and their impact on system performance. Participate in annual safety drills. Learn to manage ammonia releases safely and efficiently.

Impact of Heat Transfer Efficiency in Refrigeration Systems Over Time

Interpreting the graph below, we can correlate that the heat transfer efficiency drops over time. The biggest and most common drivers are clogging of heat exchanger surfaces, oil contamination in the system, corrosion of the heat exchanger causing the system to operate at reduced capacity, poor maintenance of the heat exchanger, reduced airflow, and aging equipment.

Conclusion

The first 90 days as an ammonia refrigeration operator or technician are critical for mastering the basics, ensuring safety, and building a core foundation for long-term success. By following this structured guide, you'll be well-prepared to contribute effectively to your team and advance in your career.

Read the full article

Introducing the magazine in PDF Format to the partners

We are thrilled to introduce our new PDF magazine, designed to be a valuable resource for our readers. In a world brimming with information, our mission is to streamline the process of staying informed by delivering the most crucial updates and insights from the past quarter.

Distribution Strategy

We are committed to ensuring that our readers receive our magazine promptly. We distribute it through our newsletter to over 4,000 subscribers, registered users on our website, and webinar attendees.

Additionally, we will actively promote the magazine across our social media platforms. With more than 50,000 followers on our news feeds and over 150,000 members in our LinkedIn and Facebook groups, we guarantee extensive and far-reaching exposure.

We are excited to share our initial outlook on this new magazine and have plans for its ongoing development. Join us on this exciting journey, and please share your feedback and ideas.

Discover more about the magazine's features and pricing on the following pages.

Main Headings in the Magazine

- **The Most Popular News from Refindustry.com:** Stay updated with the most crucial developments.
- **Sustainability:** Discussing green refrigeration practices and their impact on the environment.
- **Technical Insights:** Explaining complex concepts and providing technical insights into refrigeration equipment.
- **Case Studies:** Real-world examples of successful industrial refrigeration projects, installations, and problem-solving.
- **Maintenance and Troubleshooting:** Tips and guides for maintaining and troubleshooting refrigeration equipment.
- **Interviews:** Insights from industry experts, engineers, and leaders in the field.
- **Opinions:** Expert perspectives, commentary, and analysis on relevant industry issues and trends.

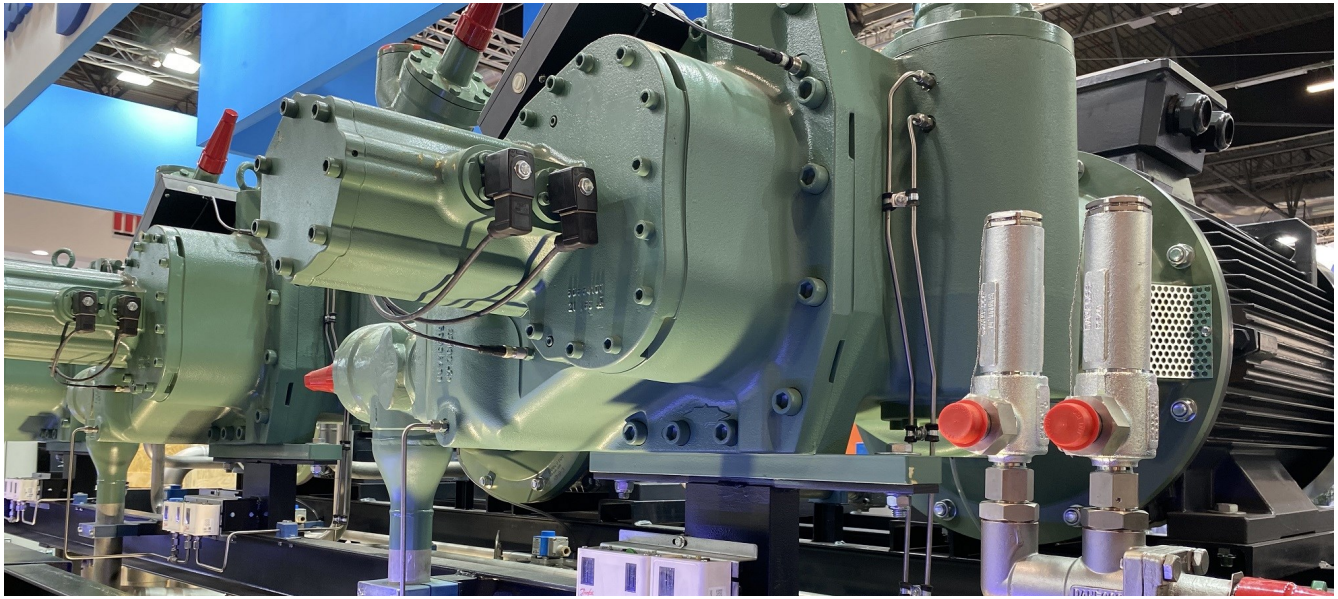
Advertising Opportunities in Our Magazine

Place an advertising module or contribute an article on topics like sustainability or successful case studies, sharing your company's experience with the magazine audience. Know more in Media Kit 2024.

Magazine Issue Plan

- N 2025 / 1 — January
- N 2025 / 2 — April
- N 2025 / 3 — July
- N 2025 / 4 — October

For any inquiries, feel free to contact us at info@refindustry.com.



The opportunities

Enhance Your Visibility in the Refrigeration Industry with Our Targeted Advertising Options on Refindustry.com

As a leading online magazine and resource in the global refrigeration sector, we cater to over 250,000 users and generate more than 300,000 sessions annually, with a significant audience from the US, India, the UK, and the EU.

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What's in the Global Refrigeration Directory? Our directory features companies and brands from across the global refrigeration industry.

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- Displaying the company profile on the Directory
- A link to the company profile at the end of each company news
- We to promote the company profile on our social networks LinkedIn (35,000+ followers), Facebook (19,000+ followers), Twitter (3,700 followers).

All these benefits are provided for free!

Special Offer:

Add your company to the directory and enjoy our Bronze tariff plan absolutely free for the first month. Afterwards, you can choose to upgrade to one of our premium plans or continue with the Standard plan at no cost indefinitely.

How to add a company the Global Refrigeration Directory.

For a detailed comparison of our plans, please refer to the Media Kit.

For any inquiries or assistance with your profile and our services, please contact us.

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Forward this file or share the subscription form with them!