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GUIDE FOR NATURAL REFRIGERANTS AT EUROSHOP 2017



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5 – 9 March 2017

Düsseldorf • Germany

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NATURAL REFRIGERANTS AT EUROSHOP 2017

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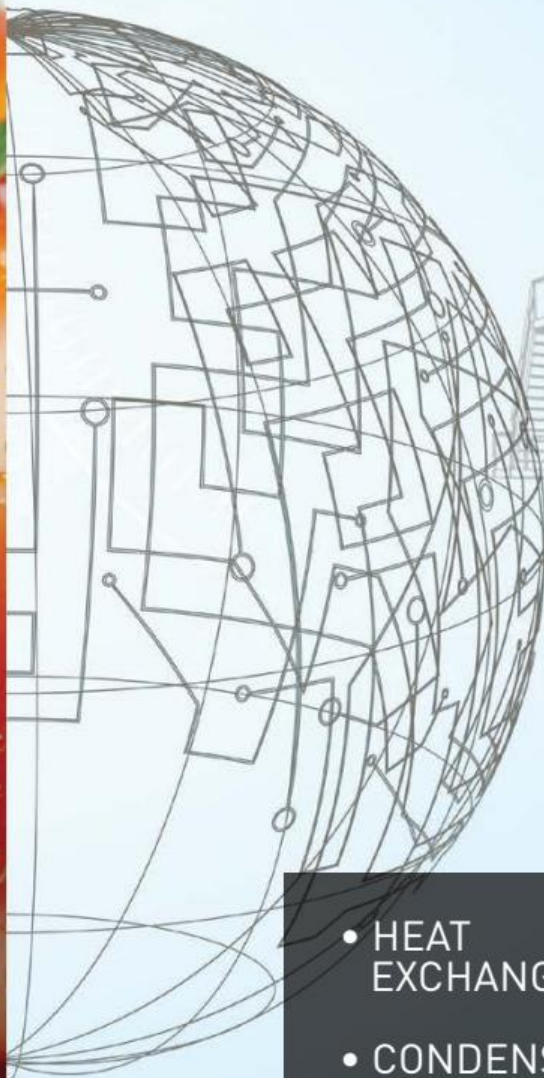


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SOLUTIONS FOR COMMERCIAL AND INDUSTRIAL REFRIGERATION.

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 **EuroShop**
The World's No. 1 Retail Trade Fair
5 - 9 March 2017
Düsseldorf - Germany
Hall 17 / C01

RIVACOLD
MASTERING COLD

Welcome message from the publisher



MARC CHASSEROT
Publisher / CEO

The world's biggest retail tradeshow, EuroShop 2017, will feature the most advanced natural refrigerant solutions for the sector. shecco, as the leading publisher of worldwide news for natural refrigerant-based solutions in HVAC&R, designed this Guide EuroShop 2017 as a simple tool to easily identify natural refrigerant-based solutions on display at the large exhibition hall in Düsseldorf. The Guide is presented as a supplement to the Spring issue (#6) of Accelerate Europe. These two publications provide the best overview of the most progressive business leaders working with climate-friendly solutions in refrigeration and air conditioning in Europe and other parts of the world. The European market remains a reference for future-proof technologies in commercial refrigeration, as evidenced by over 9,000 supermarkets working with transcritical CO₂ systems already today, for example. With the deadlines for phasing out HFCs approaching, increasing expectation for higher energy efficiency, and a growing demand for small capacity units for small stores, the offer for natural refrigerant solutions keeps increasing. We trust that this Guide will help you navigate your way around the vast offer of natural refrigerant-based technology at the tradeshow.

About this Guide



ALVARO DE OÑA
Editor / COO & Head of Media

Our Guide EuroShop 2017 provides a complete listing of all solutions related to natural refrigerants at the 2017 edition of EuroShop, which takes place on 5-9 March in Düsseldorf. EuroShop 2017 held once every three years, will serve as a barometer for the evolution of commercial refrigeration solutions, clearly turning towards a more sustainable model. EuroShop 2017 will feature approximately 2,200 exhibitors from over 50 countries, among which nearly 90 in the refrigeration section are using carbon dioxide, ammonia, hydrocarbons or water as refrigerants. By indicating all company booth locations relevant to CO₂, NH₃, R290, R600a and R718, the Guide will maximise the value of the trade show for people interested in - or already working with - natural refrigerants. In collaboration with our supporters, the Guide also provides a showcase for a range of state-of-the-art natural refrigerant systems and components on display in Düsseldorf. You may find all related companies either in the listing by alphabetical order or by searching the exhibitor hall maps.

The Guide EuroShop 2017 features the following sections:

About natural refrigerants

Reviewing the chemical, physical, technical and environmental properties of carbon dioxide, ammonia, hydrocarbons, water and air, the most commonly used natural working fluids.

Exclusive interviews

Providing insight on the latest trends in technologies employing natural refrigerants from some of the leading industry providers.

Events planner

Outlining the presentations and forums dedicated to natural refrigerants, energy efficiency, and related topics.

Premium product & company directory

Highlighting some of the latest technologies using natural refrigerants, both on display by exhibitors and offered by companies in attendance only.

Hall maps

Shows the exhibit locations of all natural-refrigerant-relevant companies, providing participants with the information they need to create a tailored, self-guided tour throughout the exhibition space.

Enjoy the trade show!



Think green, choose blue.

GEA Compressors for natural refrigerants



EuroShop

The World's No. 1 Retail Trade Fair

5 – 9 March 2017

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GEA Bock HG compressors for supermarket applications

Discover our compressors and learn more about the use of natural refrigerants – at EuroShop 2017 in hall 17, booth D77.

In supermarkets nothing should be left to chance: Customers always want to fill their shopping carts with fresh produce and optimally cooled food. GEA compressors are used in various areas of the cooling chain and always ensure the right temperature of the food. The main focus is on compressors, which have been specially developed for natural refrigerants. For use with the refrigerant CO₂, GEA offers compressors, optimally suited for the application with CO₂,

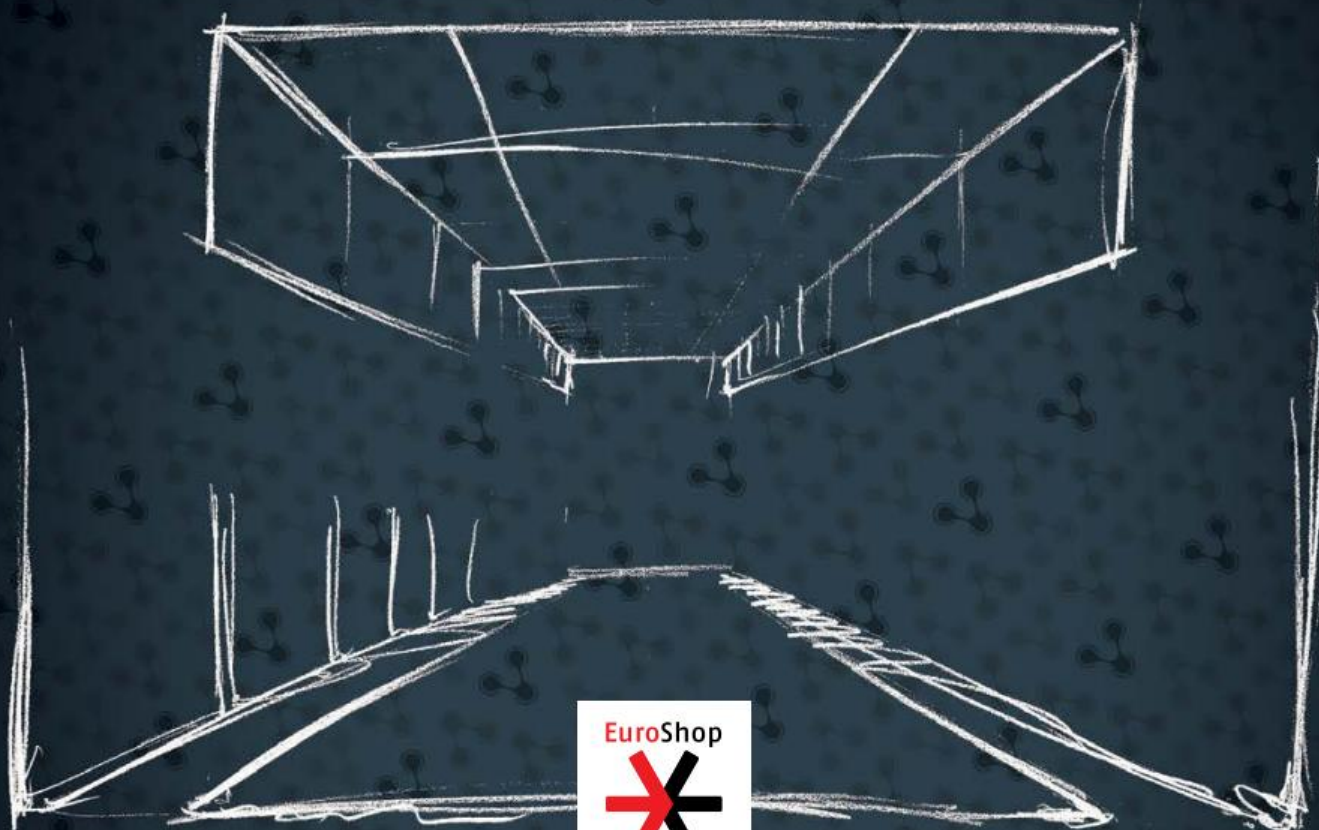
not only in terms of pressures, but in many other respects as highest efficiency in the market. Furthermore, the compressors of the hydrocarbon series GEA Bock HG HC as well as the series GEA Bock HG CO₂ (T) fulfill all the requirements of the F-gases regulation. GEA offers compressor solutions for the entire cold chain – starting from the food production to transport, food processing and storage in the cold store, to cooling in the supermarket.



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SHARING AVENUE



DÜSSELDORF
GERMANY
5 - 9 MARCH 2017
HALL 16



<https://euroshop.arneg.world>

About natural refrigerants

AS A GENERAL DIFFERENTIATION, NATURAL REFRIGERANTS ARE SUBSTANCES THAT EXIST NATURALLY IN THE ENVIRONMENT, WHILE SYNTHETIC REFRIGERANTS ARE MAN-MADE CHEMICALS. THE MOST COMMONLY USED NATURAL REFRIGERANTS TODAY ARE AMMONIA (NH_3 , R717), CARBON DIOXIDE (CO_2 , R744), AND HYDROCARBONS (HCS), SUCH AS PROPANE (R290), ISOBUTANE (R600A) AND PROPYLENE, ALSO KNOWN AS PROPENE (R1270).

The precision of the term natural refrigerants is sometimes debated, since, to be used as refrigerants, ammonia, carbon dioxide, and hydrocarbons also undergo an industrial purification and manufacturing process. However, natural refrigerants are naturally occurring substances, whereas synthetic refrigerants are not. Today, there is a well established distinction between substances whose chemical properties and safety aspects have been studied in their entirety and fluorinated gases, which, given their chemical complexity and comparatively short period of usage, have confirmed and/or unknown negative effects on ozone depletion, global warming and ecological safety, and therefore, are subject to continued debate.



CO_2 CARBON DIOXIDE (ODP*= 0; GWP*= 1)

Carbon dioxide (chemical symbol CO_2 , refrigerant designation R744) is colorless, odorless and heavier than air. With a Global Warming Potential (GWP) of 1, CO_2 is the reference value for comparing a refrigerant's direct impact on global warming.

Carbon dioxide carries an A1 safety classification (the highest possible level) indicating that it has low toxicity and is non-flammable. CO_2 as a refrigerant is sourced as a by-product from industrial processes. Although it is not toxic, if enough carbon dioxide builds up in an enclosed space, it will begin to displace oxygen. Over a certain period of time, this can cause asphyxiation of those present. With a long atmospheric lifetime, CO_2 does not lead to any by-product formation or decay products with serious environmental impact.

When used as a refrigerant, carbon dioxide typically operates at a higher pressure than fluorocarbons and other refrigerants. While this presents some design challenges, they can be overcome in systems designed specifically to use carbon dioxide. Carbon dioxide is compatible with some, but not all, commonly used refrigeration system lubricants. In particular, it is not suited for use with polyol ester (POE) and poly vinyl ether (PVE) lubricants and it only has limited applications with poly alkaline glycol (PAG) lubricants. It is generally regarded as a cheap and easily available refrigerant.

NH_3 AMMONIA (ODP= 0; GWP= 0)

Ammonia (chemical symbol NH_3 , refrigerant designation R717) is a colorless gas at atmospheric pressure. With zero ozone depletion and global warming potential, as well as a short atmospheric lifetime, it does not form any by-products or decomposition products with negative environmental impact. It is compatible with some, but not all, commonly used refrigeration system lubricants. In particular, it is not suited for use with polyol ester (POE) and poly vinyl ether (PVE) lubricants, and it has only limited applications with poly alkylene glycol (PAG) lubricants.

Despite its undisputed energy efficiency benefits, the use of ammonia is restricted in certain applications and geographic regions due to its toxicity. Ammonia is classified as a B2 refrigerant, as a result, NH_3 is effectively prohibited from use inside occupied spaces but can be used in unoccupied areas or outside. It is important to note that ammonia has a strong odor, making leaks easy to detect.

However, many advances have been made in recent years to minimise risks for human health, particularly for ammonia installations in populated areas. These advances include using ammonia in conjunction with other refrigerants, such as in secondary systems, in order to reduce and isolate an ammonia charge; using advanced safety equipment; deploying containment casings; or using ammonia absorption systems. Above all of them is the drive towards low-charge ammonia systems, which minimise the refrigerant charge while offering reliable and efficient performance.

Environmentally-friendly
refrigeration engineering

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REFRIGERATION UNITS FOR

- › subcritical CO₂ systems
- › booster systems
- › special compressor units
- › liquid cooling systems
- › heat pumps

WE ARE READY FOR

- › R290 [propane]
- › R717 [ammonia]
- › R744 [carbon dioxide]

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HC HYDROCARBONS (ODP= 0; GWP< 4)

With zero ozone-depleting characteristics and an ultra-low global warming impact, hydrocarbons (HCs) do not form any by-products or decomposition products in the atmosphere.

HC refrigerants can be applied either in systems designed specifically for their use, or as replacements in systems designed for a fluorocarbon refrigerant. This makes them a cost-competitive solution, and optimal for developing countries. If a hydrocarbon refrigerant is to be used in a system designed for a different refrigerant, it should be noted that modifications are probably required to ensure compatibility. Lubricant compatibility and the issues associated with hydrocarbons' flammability have to be addressed. Thus, the greatest potential for hydrocarbon refrigerants lies in new systems.

Hydrocarbons carry an A3 safety classification, which means they have a low toxicity but are in the higher range of flammability. HCs are often subject to stricter safety requirements concerning the quantities permitted in occupied spaces.

Hydrocarbon refrigerants are fully compatible with almost all lubricants commonly used in refrigeration and air conditioning systems. One major exception to this rule are lubricants containing silicone and silicate (additives which are commonly used as antifoaming agents).

H₂O WATER (ODP= 0; GWP= 0)

Water (chemical symbol H₂O, refrigerant designation R718) is one of the oldest refrigerants used for refrigeration applications. Also known as dihydrogen monoxide, R718 is an environmentally safe refrigerant with zero ozone depletion potential and zero global warming potential. It is odorless, colorless, nontoxic, nonflammable, non-explosive, easily available, and it is one of the cheapest refrigerants.

From an environmental and thermodynamic point of view, water is an ideal refrigerant for applications above 0°C. R718 has a higher latent heat of evaporation (2,270kJ/ kg) than other natural refrigerants. This means that R718 absorbs significantly larger amounts of energy, in the form of heat, during a change of phase, from liquid to gas, without a change in temperature. An obvious limitation is the high freezing temperature at atmospheric pressure. In addition, water leads to corrosion and oxidation of many metals as it is more reactive than other refrigerants. Thus choosing the right materials for an the R718 system during the design phase requires special attention.

AIR (ODP= 0; GWP= 0)

Air (refrigerant designation R729) is environmentally benign, cheap, totally safe and nontoxic. Environmental concerns about ozone depletion, global warming, and increasingly stringent legislation have renewed global interest in alternative refrigeration technology using air. However, air-cycle refrigeration systems is not new. It was used on refrigerated cargo ships around the turn of the 20th century.

Air-cycle refrigeration works on the reverse Brayton or Joule cycle. Air as a refrigerant does not undergo phase change (condensation/evaporation) at the temperature levels encountered in conventional refrigeration applications. The COP value of air is low because of its light weight, but air-cycle cooling systems can provide relatively high-temperature heat recovery without the efficiency setback experienced by vapor compression systems.

Air has been used commercially for aircraft cooling for a long time. Air has also been used as a refrigerant for residential and automobile air conditioning and cooling. In some refrigeration plants, air is used in the quick freezing of food products.





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Exclusive interviews

INDUSTRY LEADER INSIGHTS INTO THE
NATURAL REFRIGERANT MARKET

In the following section, representatives from leading companies in natural refrigerant solutions share their views on how the market is evolving in Europe and globally for commercial refrigeration solutions.



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PIETER BOINK

Head of Business Development & Marketing
Secop

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www.secop.com

How do you think the hydrocarbons market has changed since the last EuroShop three years ago?

At EuroShop three years ago there were a lot of companies exhibiting plug-in cabinets that were highlighting the fact that they were using R290. This was due primarily to OEMs anticipating the (at that moment) announced revision of the European F-Gas regulation.

With the introduction of the new F-Gas regulation on January 2015 the situation is different. Manufacturers are obliged to become f-gas compliant. At the same time they are also aware of upcoming European directives on energy efficiency improvement. That is where the introduction of variable speed hermetic compressors comes in, as they increase the energy efficiency of light commercial refrigeration systems even more.

Thanks to their unique thermodynamic properties, hydrocarbons can make systems more efficient compared to systems using HFCs. Adding variable speed technology on top, the industry can realise more than 40% system efficiency improvement compared to fixed speed compressors with HFCs or HFOs as refrigerants.

How do you see the competition between CO₂ and hydrocarbons for commercial refrigeration applications evolving in the coming years?

I think CO₂ and hydrocarbons have a lot of advantages but for different sizes of applications. The big rack systems are obviously much better with CO₂ and for smaller applications using a hermetic compressor, which is the target market segment for Secop, propane (R290) is the better option.

Do you think propane is going to become a standard for plug n' play cabinets?

What is going to be presented at EuroShop will be mainly new solutions and these will predominately be using hydrocarbons; R290 for the larger plug-in appliances and R600a for smaller ones.

Where do you see the biggest potential for expansion of your customer-base for hydrocarbon compressors over the coming months?

I think the biggest potential is in the combination of hydrocarbon refrigerants and variable speed technology. This brings system optimization and increases the energy efficiency of appliances. That is definitely something that will be exhibited by a lot of big manufacturers during EuroShop.

We at Secop introduced the first variable speed hermetic compressors in 1998. Since then, the technology has been constantly developed and we can now offer a complete variable speed product portfolio for all of our customers in all market segments, Light Commercial, Household and DC Powered. Our global networks of application laboratories support our customers in redesigning their systems to get the highest possible efficiency.



HANS OLE MATTHIESSEN

Director of Segment Marketing and Food Retail
Danfoss

✉ hom@danfoss.com

🌐 www.danfoss.com



Which products are you excited to show at EuroShop and Why?

First we have the Multi-Ejector, as this is a first of its kind in the world, making it possible to build simple, sustainable, efficient and cost effective systems worldwide.

Secondly, the AK-PC 782 CO₂ Pack Controller as it brings a new level of powerful control to the market. And finally, CO₂ Heat Reclaim Valve, which brings an elegant solution to solving problems with leaking three-way ball valves.

How have you managed to improve efficiency every year, when working with natural refrigerants?

It's a combination of strategic focus, close corporation with customers and developers, strong domain knowledge and significant investment in R&D. The result has been a lot of new products that are energy efficient.

How do you think this EuroShop will be different from previous years?

There will be a stronger focus on digitalisation and connectivity resulting in smarter solutions.

What opportunities do you see for hydrocarbons in retail applications?

In smaller stores and self-contained equipment.

Do you think the retail stores now see natural refrigerants as a no brainer?

In some markets, where people have worked with natural refrigerants for more than 5-10 years it's a standard application. In newer markets – especially warmer climates - it's still a new technology and a lot of training and experience is still needed.

During EuroShop you will be exhibiting your CO₂ mobile training unit. What was the logic to launch this initiative? What has been the feedback so far?

Feedback has been very positive but we feel a lot of competence building still needs to take place, to make the industry confident working with CO₂. This means having good training in a hands-on environment on a live installation, and now we are able to do this in close vicinity to the customer. As well as this, travel to training facilities and language barriers can be overcome by placing the unit close to the contractors and by providing training with local trainers.

How do you think the Internet of Things (IoT) will further help CO₂ become one of the most efficient refrigerants?

IoT will help to visualize and monitor how efficient your plant is running. – and predict if actions need to be taken to improve. IoT will help to make complex systems easy to manage, taking a part of the burden away from the declining pool of skilled service technicians.

How do you think the CO₂ market has changed since the last EuroShop two years ago?

CO₂ is now a global viable solution – in all climates. In central and northern Europe it is already the preferred solutions for new builds. As well as this, overall the efficiency has improved significantly making it the premium solution for supermarkets.



KIM G. CHRISTENSEN

Managing Director
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Which products are you excited to show at EuroShop and Why?

We will be showing four transcritical CO₂ products, that show off how economical, easy, innovative and energy efficient our CO₂ racks systems are.

First of all we have our "ValuePack" (the compSUPER XS 2x2 ValuePack). This is a popular system that is aimed at customers with medium sized supermarkets and the larger convenience stores that are more than 800 m². After coming up with this product , we noticed that the trend in Europe is to have smaller and smaller supermarkets. So, we started to invest in developing a new product for our customers called the "Mini-Booster"(compSUPER XXS 4x2 Mini-Booster). This is for even smaller supermarkets, that are sized from around 400m² to 800m².

The third product we have is the "Sigma ValuePack" (compSUPER XS 2+1x1 Sigma ValuePack), which is able to refrigerate, heat and air condition the store in one complete system. The heating and the air-conditioning is done through a cassette system using CO₂. It also utilises parallel compression and an ejector to improve the efficiency of the system further.

Finally we have the compSUPER S 3x3 CU, a larger system for bigger supermarkets. It's a simple booster, without any additional components (ejectors, heat reclaim, parallel compression, ect.),

How do you think this EuroShop will be different from previous years?

It will be a big change from six years ago when only people like us were talking about CO₂. Three years ago it was like maybe we can do CO₂ for some applications but now I would say there will be no discussion. It is just a matter of who is doing what best.

You had a very successful year in 2016, with a reported 24% growth in revenues. What has been the key to this growth last year?

I would put this success down to several reasons. There was a lot of growth in Germany and some growth in France and Sweden in the supermarket sector.

We also had a very positive year with our new ValuePack and we managed to successfully manufacture almost 300 units for sale.

Also, we have opened up to do a lot of CO₂ systems for the industrial sector. It now currently makes up 25% of our turnover, compared with three years ago when it was less than 10%. This has made a big difference as well.

Overall last year we made 650 transcritical racks for sale. We would now estimate that we have more than 2600 systems out there running in more than 30 countries.

How have you managed to improve efficiency and reduce cost over the years, when working with CO₂?

With energy efficiency there has been two things happening simultaneously. First of all, the components have been optimised for racks and we have a lot better compressors and motors, heat exchangers, valves and controls available in the market today. Secondly, we at Advansor have become a lot better at designing and building the systems and combining them with new technologies like parallel compression, sub-coolers, adiabatic cooling and ejectors. Our systems have become a lot more efficient in warmer climates as well.

Cost is really simple; if you look at the number of suppliers and rack manufacturers in the market right now then there is just simply a lot more manufacturers. At the same time, installers are much more experienced with these systems and so they can design and install them in the stores with very little hassle. Scale and experience have made it possible for us to bring prices down.

Copeland EazyCool™ CO₂ Refrigeration Unit

The Future-Proof Refrigeration Solution



Features and Benefits

- Future-proof solution with natural refrigerant and a GWP of 1 not impacted by F-Gas legislation
- Low carbon footprint
- Silent operation due to special attenuation on panels and sound optimized EC fans
- High energy efficiency through inverter controlled compressor and EC fans
- Space saving design
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The refrigeration units are the ideal choice for various target applications:



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Cold rooms



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DR. THOMAS TOMSKI

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How many applications do you now cover for the retail sector?

This question is best answered with reference to our “farm-to-fork” approach. Emerson provides location, temperature and condition monitoring to protect perishable food and high value shipments. This starts at the farm, providing growers real-time, continuous information delivered to computer, tablet, or smartphone, continues during transport and ends with the food distribution at the retailer or in the restaurant. A very strong focus is on providing solutions for refrigerant compression systems in food processing, food retail and food service applications. Compressors, condensing units, control & monitoring devices now fully support natural refrigerant applications using CO₂ and propane from small convenience stores up to large hypermarkets. But the journey continues and food waste is another topic that we will develop as a target application inside Emerson.

How do you see the evolution in the demand for controls and smart technology linked to natural refrigerant-based solutions?

Smart Technology is a broad term that is used across all industries. It is frequently associated with the generation and utilization of data for control, monitoring and processing in algorithms to provide deeper insights in order to increase system reliability, operational safety, energy efficiency and ultimately in our market to protect perishable food. A good example that relates to natural refrigerants is our new Copeland™ EazyCool CO₂ Refrigeration Unit which is equipped with the latest state of the art control concept including Modbus communication and its set up for remote monitoring.

What changes do you see in natural refrigerant use since the last EuroShop three years ago?

The industry is starting to come to terms with the fact that natural refrigerants are the only real “future-proof” alternatives in commercial refrigeration. CO₂ is continuing to path its way particularly into larger system applications. But the increasing number of CO₂ refrigeration units that come to market, including the latest Emerson offering, makes CO₂ more and more viable in smaller application formats, such

as convenience stores and cold rooms. At the same time, propane as a refrigerant in limited charge systems and in particular in integral display cases is clearly on the uprise. While the potential flammability issue is addressed by limiting the charge, these systems reduce in many aspects the complexity that come with CO₂ systems.

What have been your most relevant developments regarding compressors for natural refrigerants recently?

Emerson already had a full CO₂ compressor and controls offering for booster applications. The new Copeland EazyCool CO₂ Refrigeration Unit range is the latest expansion of our CO₂ offering and a real highlight as it features the full Emerson portfolio of CO₂ solutions.

Recent development effort has strongly focused on broadening our portfolio of propane scroll compressors. We can currently cover applications ranging from integral display cases all the way through to compact medium temperature refrigeration chillers or small cascade systems, or - in terms of capacity range – from 1.5 up to 11 kW cooling capacity. In preparation is already a variable speed propane scroll compressor range which is ideal for packaged units for cold rooms, small cascade and secondary systems and that is ready for the next generations of integral display cases when the propane charge limit increases.

How do you see the competition between CO₂ and hydrocarbons for commercial refrigeration applications evolving in the coming years?

Applications with both refrigerant types are expected to evolve in parallel to serve varying needs and preferences. Market players will continue to address the individual challenges that each technology brings to the party.

Green and Global solutions for Food Refrigeration



ZANOTTI is once again at the forefront of innovation, with a strong commitment to reduce global warming that has led to the development of low GWP solutions for cold storage and food retail based on natural refrigerants, such as propane and CO2 both in sub- and trans-critical applications. Since these substances are excluded by the F-gas regulation, these products can be installed without worrying about future retrofits.

Zanotti has developed products for each section of the **global cold chain**. From the storage of raw materials (such as cereals in silos), all the way up to supermarkets, stores and restaurants, including food processing and distribution and you have the complete solution to ensure quality retention and waste reduction.

Now, Zanotti is a **member of the Daikin Group**, a really prestigious opportunity for the company to accelerate the technology performance in order to meet the customer requirements in the best possible way. Zanotti is always present, accurately and expertly responding to every need with a wide range of products, which actually is the most complete on the market.

Zanotti is innovation, green conscience, quality and expertise: these great promises for the future are based on its past experience.

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*Food Retail Solutions at
Euroshop HALL15/E22*

Events planner

SUNDAY 5, MONDAY 6, TUESDAY 7, WEDNESDAY 8, THURSDAY 9 MARCH 2017

The following Events Planner highlights presentations, educational programmes, product launches and networking events related to natural refrigerant technologies during EuroShop 2017. With this planner, you can see at a glance where and when these events will take place and best plan your attendance.

This information has been obtained from the Technical Programme on the Euroshop 2017 website - www.euroshop-tradefair.com - shecco cannot guarantee that there will not be changes after the date of print of this Guide.

SUNDAY 5 MARCH 2017

Time	Presentation	Presenter	Location	Language
14:00 - 14:30	Energy management made easily for retailers	Hendrik Fels, Tengelmann Energie	Hall 15 Booth E24	English
14:30 - 15:00	Aerofoils on Epta vertical cabinets	John Austin-Davies, EPTA and Matthew Burke, Williams Advanced Engineering and Paul McAndrew, Aerofoil Energy Ltd	Hall 15 Booth E24	English
15:00 - 15:30	Availability of alternatives to HFCs in commercial refrigeration in the EU - preliminary results of a study for the EU Commission	Barbara Gschrey, Öko-Recherche	Hall 15 Booth E24	English

MONDAY 6 MARCH 2017

Time	Presentation	Presenter	Location	Language
11:00 - 11:30	METRO: Climate protection and energy strategy – challenges, experiences, implementation	Olaf Schulze, Metro	Hall 15 Booth E24	English
12:00 - 12:30	METRO: Energy management made easily for retailers	Hendrik Fels, Tengelmann Energie	Hall 15 Booth E24	English
12:30 - 13:00	CO ₂ transcritical FTE SYSTEM	Francesco Mastrapasqua, Epta	Hall 15 Booth E24	English
14:00 - 15:00	1st Session: SuperSmart Training on Energy-Efficient Food Retail Stores	shecco	Hall 13 Room 13.2	English
15:00 - 16:00	2nd Session: SuperSmart Training on Energy-Efficient Food Retail Stores	shecco	Hall 13 Room 13.2	English
15:30 - 16:00	The display case fan of tomorrow	Patrick Stern, ebm-Papst	Hall 15, Booth E24	English
16:00 - 16:30	The coolest way to make money - Integrated system solution powered by natural gas for air conditioning, cooling and heating	Jan Burgunder, KKK Concept	Hall 15, Booth E24	English
16:30 - 17:00	Blue cool concept - integral refrigeration, air-conditioning and heat pump system with natural refrigerant for discount markets and supermarkets	Fiedhelm Meyer, Cool Expert	Hall 15, Booth E24	English
16:00 - 17:00	3rd Session: SuperSmart Training on Energy-Efficient Food Retail Stores (repeat of 1st session)	shecco	Hall 13 Room 13.2	English
16:00	New Refrigeration Products launch	Profroid, Green & Cool and Celsius	Hall 16 Booth A04	English

TUESDAY 7 MARCH 2017

Time	Presentation	Presenter	Location	Language
11:00 - 11:30	SUSTAINABLE SHOPS, Das neue DGNB System für Innenräume	Dr. Anna Braune, DGNB	Hall 15 Booth E24	German
11:30 - 12:00	dena-Pilot project: "Energieeffizient Handeln (energy-efficiency in retail business) - refurbishment of retail buildings"	Andreas Tiemann, dena	Hall 15 Booth E24	German
14:00 - 14:30	Technische vs. Politische Hürden in der Kältetechnik	Jonas Schönenberger, Frigo Consulting	Hall 15 Booth E24	German
14:30 - 15:00	Cooling, heating, air conditioning – integral systems with natural refrigerants in food retailing	Alexander Wirsching, TEKÖ Gesellschaft für Kältetechnik mbH	Hall 15 Booth E24	English
15:00 - 15:30	New frontiers for DC inverter compressors applied in waterloop systems for commercial refrigeration	Diego Malimpensa, Business Unit Manager, Retail Solutions at Carel	Hall 15 Booth E24	English
16:00 - 16:30	Developments in Ecodesign/Energy Labelling and energy efficiency of commercial plug-in refrigeration equipment	Christof Horvath and Maike Hepp, ProCold NN, European Commission	Hall 15 Booth E24	English
17:00 - 19:00	ATMOsphere Network Euroshop 2017- Natural Efficiency The availability, energy efficiency and safety of natural refrigerants globally	shecco, sponsored and hosted by Carel	Hall 16 Booth E03	English

Every bit of energy is used, nothing wasted

45,000 €

saved through CO₂
heat reclaim system
in a single store in
one year



Join the forward-thinking retailers who have achieved savings of up to one million kWh and 184 tons of CO₂ in a single store in only one year. These results are realized simply by reclaiming the heat generated by the CO₂ refrigeration system in a Danfoss Smart Store solution.

Come visit us at EuroShop from 5-9 March 2017. You will find us in hall 16 at stand C73.



Learn more at
smartstore.danfoss.com

ENGINEERING
TOMORROW

Danfoss

WEDNESDAY 8 MARCH 2017

Time	Presentation	Presenter	Location	Language
14:00 - 14:30	Refrigeration fans today and tomorrow – ECObdesign change the product world in Europe	Andreas Mokhlis, Ziehl Abbegg	Hall 15 Booth E24	English
14:30 - 15:00	Energy efficiency in transcritical CO ₂ refrigeration systems	Kim Christensen, Advansor	Hall 15 Booth E24	English
15:00 - 15:30	Integration of the hidden refrigeration capacity as heat pump in smart energy systems	Torben Funder-Kristensen, Danfoss	Hall 15 Booth E24	English
15:30 - 16:00	Opportunities from rethinking refrigeration system architecture in retail	Sylvain Lamy, Emerson Climate Technologies	Hall 15 Booth E24	English
16:00 - 16:30	Adiabatic CO ₂ gas coolers – Smart efficiency (also) in hotter climates	Michael Freiherr, Güntner	Hall 15 Booth E24	English
16:30 - 17:00	Transcritical CO ₂ condensing unit driven by DC inverter technology for small format stores	Nicola Pieretti, Application Manager, Retail Solutions at Carel	Hall 15 Booth E24	English
17:00 - 19:00	ATMOsphere Network Euroshop 2017- Natural Efficiency The availability, energy efficiency and safety of natural refrigerants globally	shecco, sponsored and hosted by Carel	Hall 16, Booth E03	English

THURSDAY 9 MARCH 2017

Time	Presentation	Presenter	Location	Language
11:30 - 12:00	Sustainable Refrigeration Solutions for Small Retail Applications	Markus Lenz, Emerson Climate Technologies	Hall 15 Booth E24	English
12:00 - 12:30	Blue cool concept - integral refrigeration, air-conditioning and heat pump system with natural refrigerant for discount markets and supermarkets	Fiedhelm Meyer, Cool Expert	Hall 15 Booth E24	English

Find your way around EuroShop

More companies than ever before are offering products and services related to natural refrigerants. Whether they work with CO₂, ammonia, hydrocarbons, water or air, the companies listed in this section produce a range of solutions including: systems, components, refrigerants, engineering services and training and you can find them all at EuroShop 2016.



HALL 15

NAME OF THE COMPANY	BOOTH	REFRIGERANT
ARCABOA - INDÚSTRIA DE FRIO S.A.	F22	HC
AREA COOLING SOLUTIONS	G59	NH ₃ HC
COMBISTEEL BV	C60	HC
COMPACT KÄLTETECHNIK GMBH	G60	CO ₂ NH ₃ HC
CÖZÜM ENDÜSTRİYEL SOĞUTMA SIST.INS.SAN VE TIC A.S.	G55	CO ₂
EBM-PAPST Mulfingen GmbH & Co. KG	F55	CO ₂ NH ₃ HC
FRI-JADO B.V.	F12	CO ₂
GÜNTNER GmbH & Co. KG	A21	CO ₂ NH ₃
HAGOLA GASTRONOMIE-TECHNIK GmbH & Co. KG	C41	HC
IGLOO	G41	CO ₂ HC
ISA S.P.A.	C22	CO ₂
ITV ICE MAKERS S.A.	B11	CO ₂
JBG-2 SP. Z.O.O.	A42	HC
KB KÄLTEBERATUNG GMBH	E24-12	CO ₂ NH ₃ HC H ₂ O
KKU CONCEPT GMBH	E24-3	H ₂ O
QINGDAO HIRON COMMERCIAL COLD CHAIN CO., LTD.	E05	HC
REFRION S.R.L.	G36	CO ₂
ROCHHAUSEN KÄLTESYSTEME GMBH	F26	HC
TEKSO TEKNIK SOĞUTMA SAN. VE TIC. AS.	F41	CO ₂ HC
TEKTRONIKS LTD	E42	NH ₃ HC
THERMOFIN GMBH	C59	CO ₂ NH ₃
WALTER ROLLER GmbH & Co.	G36	CO ₂
ZANOTTI S.P.A.	E22	CO ₂ HC

HALL 16

NAME OF THE COMPANY	BOOTH	REFRIGERANT
ARNEG S.P.A.	B41, C42	CO ₂
CAREL INDUSTRIES S.P.A.	E03	CO ₂
CARRIER KÄLTETECHNIK DEUTSCHLAND GMBH	A04, B04	CO ₂
COSTAN S.R.L.	A60	CO ₂ HC
DANFOSS GMBH	C73	CO ₂ NH ₃ HC
DK-KÄLTEANLAGEN GMBH	A37	CO ₂
DOCRILUC, SL	A78	HC
EMERSON CLIMATE TECHNOLOGIES GMBH	E56	CO ₂ HC
EPTA S.P.A.	A60, B60	CO ₂
FRIGOBLOCK SOĞUTMA SİSTEMLERİ SANAYİ VE TİCARET A.Ş.	C80	CO ₂ NH ₃
FRIGO-CONSULTING AG	A23	CO ₂ NH ₃ HC
FROST-TROL S.A	B24	CO ₂ HC
GALILEI REFRIGERAZIONE S.P.A.	E19	CO ₂ HC
GEORGE BARKER & CO. (LEEDS) LTD.	A60	CO ₂
GSK KÄLTETECHNIK FACHGROSSHANDEL GMBH	E77	CO ₂ HC
HAUSER GMBH KÜHLMÖBEL & KÄLTETECHNIK	A24	CO ₂ HC
HUSKY INTERNATIONAL LTD.	A77	HC
IARP S.R.L.	A60	HC
KÄLTERING AG AKTIENGESELLSCHAFT SCHWEIZERISCHER KÄLTEFACHFIRMEN	A19	CO ₂ HC
KNUDSEN KØLING A/S	A60	CO ₂ HC
NOVUM (OVERSEAS) LTD.	A73	HC
NURDIL COOLING INDUSTRY AND SUPERMARKET EQUIPMENT INC.	E73	CO ₂ HC
OSCARTIELLE S.P.A.	A42	HC
PASTORFRIGOR S.P.A.	C23	CO ₂ HC
SCHIESSL BULGARIA OOD	A71	CO ₂ NH ₃ HC
SCM FRIGO S.P.A.	E20	CO ₂
VISSMANN KÜHLSYSTEME GMBH	E23	CO ₂ HC

HALL 17

NAME OF THE COMPANY	BOOTH	REFRIGERANT
ADVANSOR A/S	D38	CO ₂
AHT COOLING SYSTEMS GMBH	A42	HC
AISBERG LTD.	C02	CO ₂ NH ₃ HC H ₂ O AIR
BITZER KÜHLMASCHINENBAU GMBH	D65	CO ₂ NH ₃ HC
CHRISTOF FISCHER GMBH	A78	CO ₂
COLDSERVICE SP. Z.O.O.	A19	HC
ELCOLD FREEZERS A.P.S.	D60	HC
ELIWELL CONTROLS SRL	A55	HC
ELREHA ELEKTRONISCHE REGELUNGEN GMBH	D10	CO ₂
ES SYSTEM K SP. Z O.O.	D21	CO ₂
FREOR LT, UAB	A74	CO ₂ HC
FRIGOCON INDUSTRIA DE FRIJO E CONGELACAO, S.A	C37	HC
GASTRO-COOL GMBH & CO. KG	D78	HC
GEA BOCK GMBH	D77	CO ₂ NH ₃ HC
JUKA SP. Z.O.O. SP.K. SPÓŁKA Z OGRANICZONA ODPOWIEDZIALNOSCIA SPÓŁKA KOMANDYTOWA	A30	HC
LIEBHERR-HAUSGERÄTE GMBH	C21	HC
MAFIROL -INDUSTRIA DE REFRIGERACAO, S.A.	A22	HC
MAJA-MACHINENFABRIK HERMANN SCHILL GMBH & CO.KG	A41	CO ₂ NH ₃
DORIN	D74	CO ₂ HC
RIVACOLD S.R.L.	C01	CO ₂ HC
SCANDOMESTIC A/S	D20	HC
SMEVA B.V. DIVISIE PRODUCTS TOONBANKEN	C10	CO ₂ NH ₃ HC
TEKO GESELLSCHAFT FÜR KÄLTETECHNIK MBH	A60	CO ₂ HC
UGUR	D37	CO ₂ HC
VOR SPOL. S R.O.	D02	CO ₂ NH ₃ HC
WURM GMBH & CO. KG ELEKTRONISCHE SYSTEME	C59	CO ₂
ZIEHL-ABEGG SE	D56	CO ₂

WITH MORE THAN 60 YEARS OF EXPERIENCE IN COMPRESSOR TECHNOLOGY AND HIGHLY COMMITTED EMPLOYEES, OUR FOCUS IS TO DEVELOP AND APPLY THE

ADVANCED COMPRESSOR TECHNOLOGIES TO ACHIEVE STANDARD SETTING PERFORMANCE FOR LEADING PRODUCTS AND BUSINESSES AROUND THE WORLD.



NO MORE ENERGY WASTE WITH VARIABLE SPEED COMPRESSORS

SECOP

up to **40%**

ENERGY REDUCTION
POSSIBLE WITH VARIABLE SPEED CONTROL COMPARED TO NON-OPTIMISED COMPRESSORS.



- SUITABLE FOR LBP AND MBP APPLICATIONS
- HIGH STARTING TORQUE
- EASY CUSTOMIZATION VIA TOOL4COOL® SOFTWARE
- VARIANTS FOR 100-127 V AND 208-240 V MAINS AT 50/60 Hz

The new Secop variable speed **DLV**, **NLV (R290)** and **XV (R600a)** compressor solutions provide in a single unit perfect cooling efficiency, tailormade features, easy integration while ensuring significant energy savings.

The new **°CCD®** controllers deliver a high starting torque and can start against a differential pressure.

Hall maps

These hall maps are a unique reference tool to draw attention to the companies offering climate-friendly solutions for HVAC&R at EuroShop.





G60
COMPACT KÄLTETECHNIK

G55
CÖZÜM

G41
IGL00

E24-12
KB KÄLTEBERATUNG

G36
WALTER ROLLER

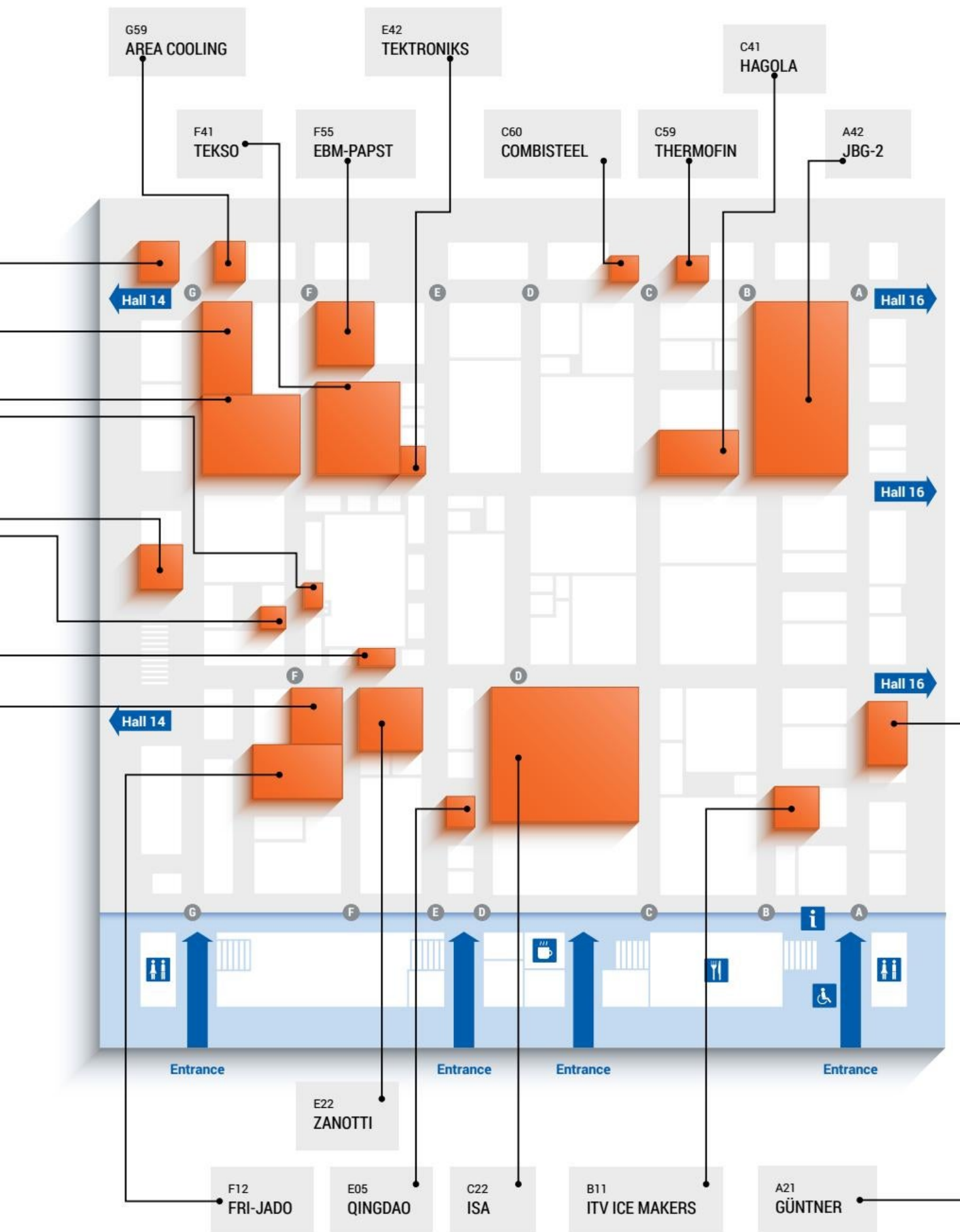
G36
REFRION

F26
ROCHHAUSEN

E24-3
KKU CONCEPT

F22
ARCABOA

HALL 15





HALL 16

A60
COSTAN
GEORGE BARKER & CO
IARP
KNUDSEN KØLING

B41, C42
ARNEG

E56
EMERSON

A42
OSCARTIELLE

A37
DK-KÄLTEANLAGEN

A24
HAUSER

B24
FROST-TROL

C23
PASTORFRIGOR

E23
VIESSMANN

E20
SCM FRIGO

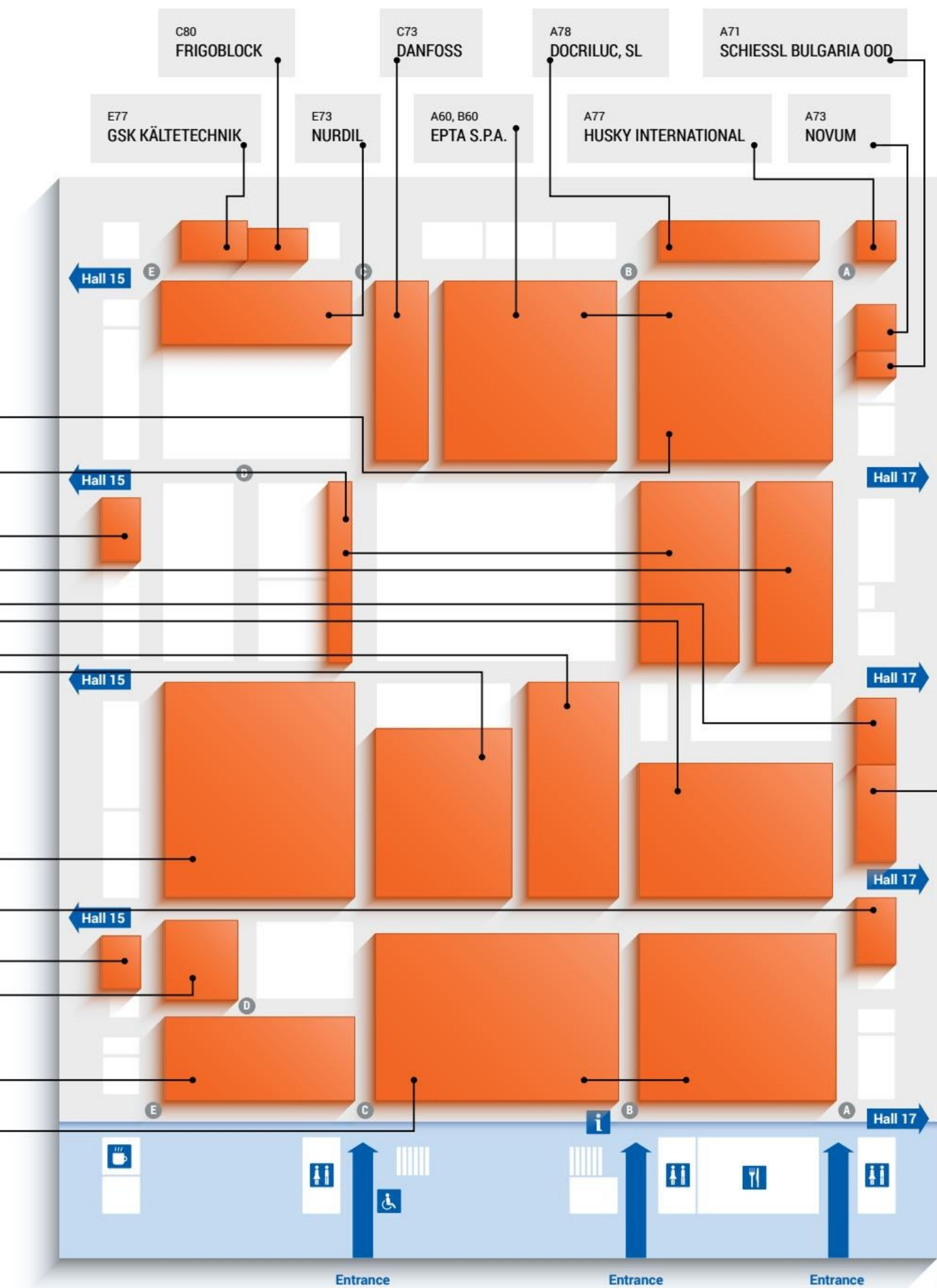
A19
KÄLTERING

E19
GALILEI

E03
CAREL

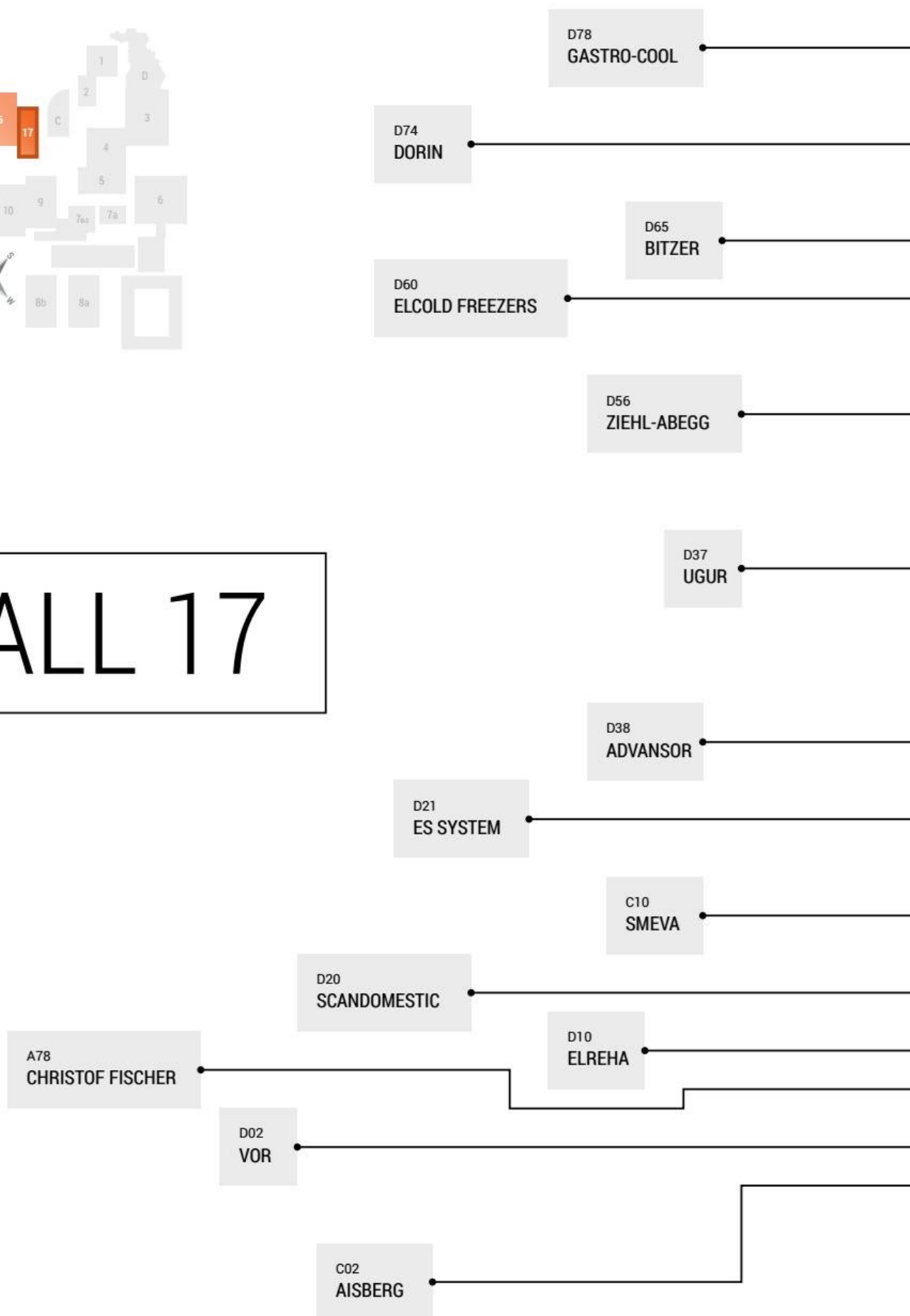
A04, B04
CARRIER

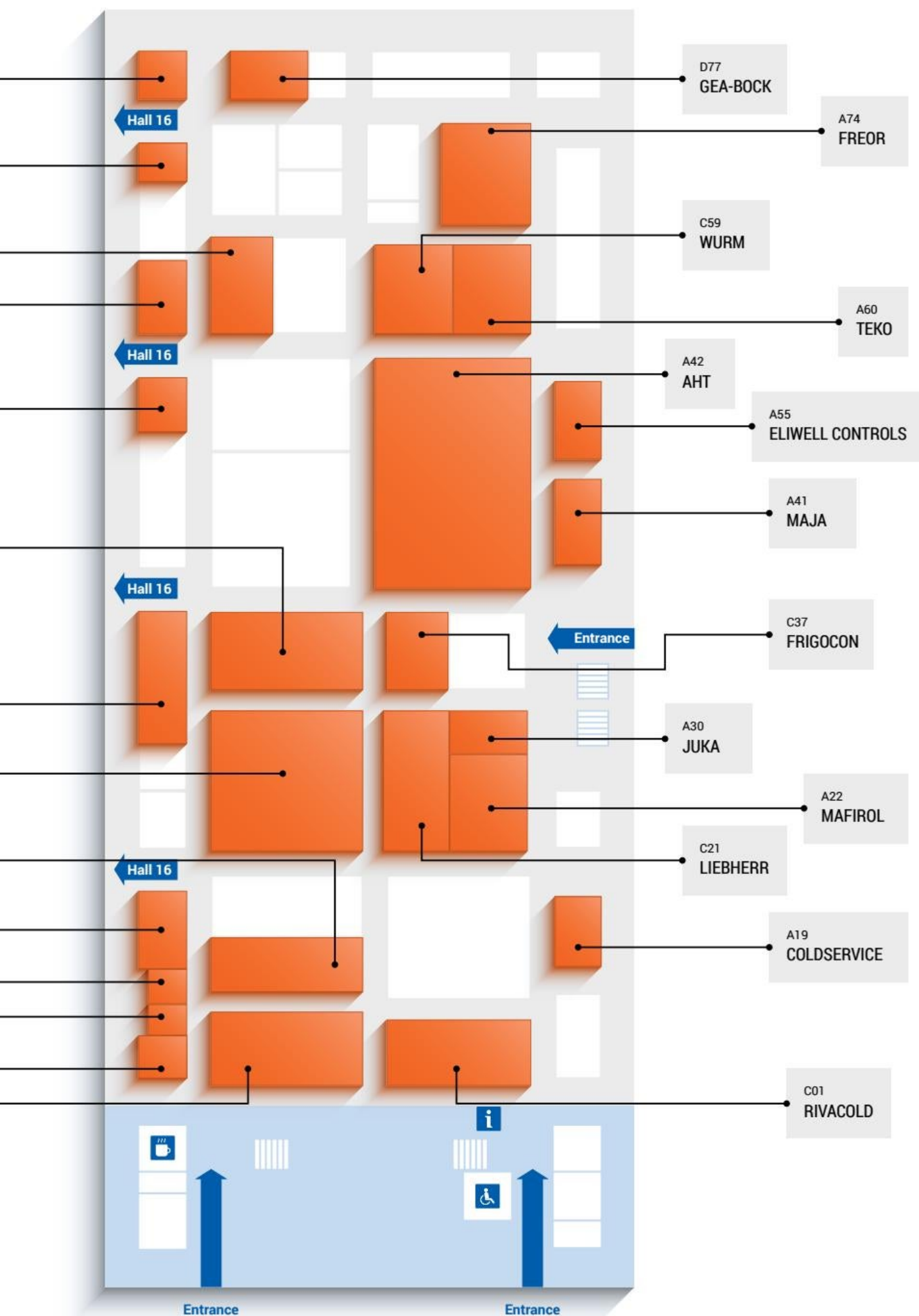
A23
FRIGO-CONSULTING





HALL 17







CUBO₂ smart₂

CO₂ Systems for MT applications

Transcritical condensing units DX
Cooling Capacity from 0,6 up to 8,5 kW.

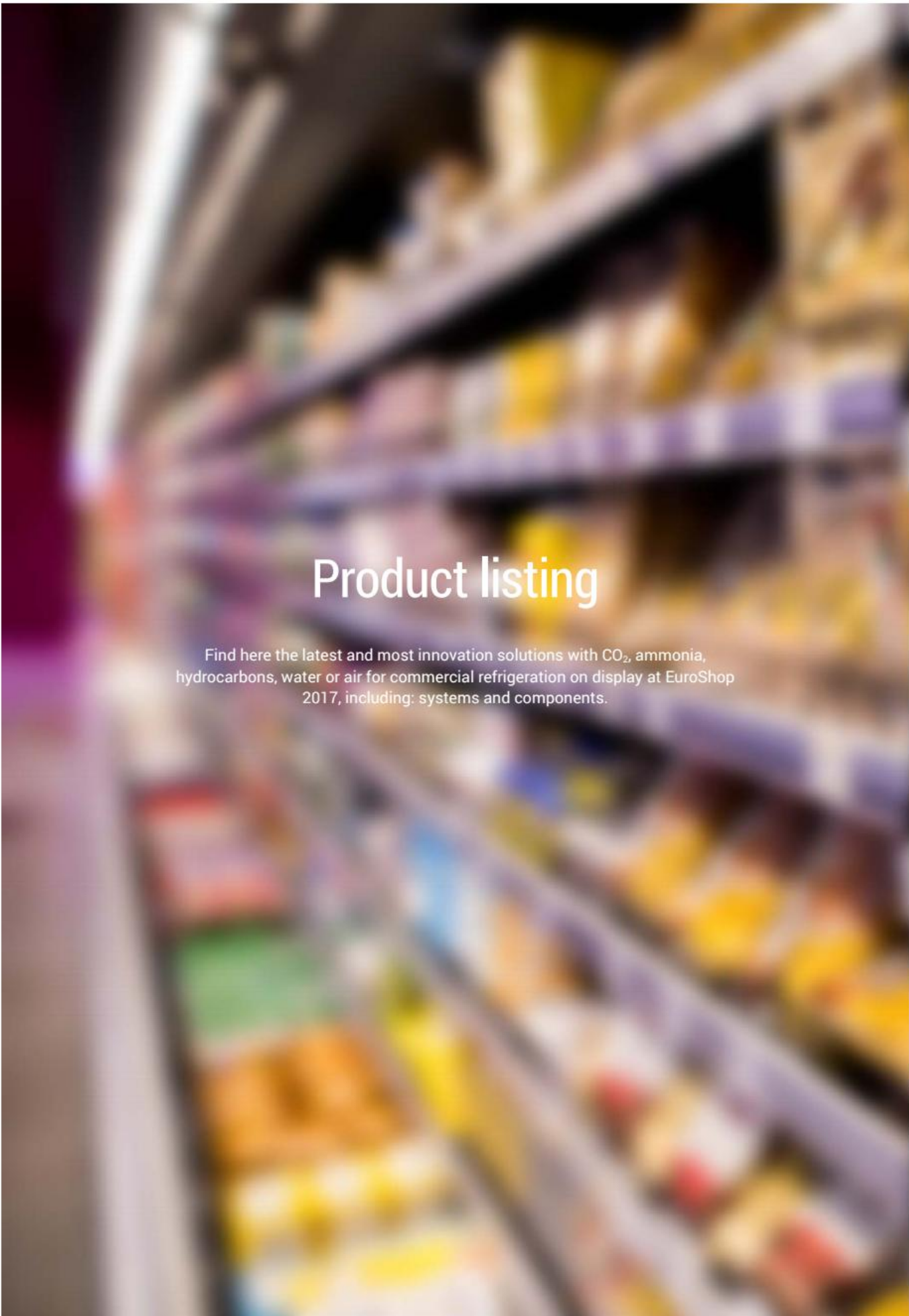


CUBO₂ plus₂

CO₂ Systems for MT and LT applications

Transcritical condensing units DX
Cooling Capacity from 2 kW up to 30 kW.





Product listing

Find here the latest and most innovation solutions with CO₂, ammonia, hydrocarbons, water or air for commercial refrigeration on display at EuroShop 2017, including: systems and components.



3-WAY MOTORIZED BALL VALVES FOR R744 (CO₂) SYSTEMS

Castel presents a preview of its new 3-Way Motorized Ball Valves series 6690 for subcritical and transcritical CO₂ systems. The 3-way valves series 6690EM, 6697EM and 6698EM operate as a changeover valve, with the inlet in central position and the two outlets in side positions. These valves must be coupled directly to the electrical actuators supplied in the same package of the valve, without the need to use a flanged adapter between the two parts. After coupling it is possible a remote control on valve moving or a manual control, excluding the actuator. All the electrical actuators can be equipped with auxiliary switch units, separately sold. Available actuators 24Vac and 230Vac 50/60Hz, on-off or modulating 0-10 V.

www.castel.it

By Appointment Only:

Antonio Sepe, Product Manager

asepe@castel.it

HALL 15



LT BOOSTER FOR OUTDOOR USE IN WAREHOUSE AND PROCESS INDUSTRIES

Technical equipment: housing, gas cooler, electrical cabinet

Capacity: 140 kW at -47/36°C (t0/tg).

Environmentally-friendly refrigeration engineering by compact Kältetechnik.

www.compact-kaeltetechnik.de



Hall 15, booth G 60



GRANULAR ICE FOR SUPERMARKETS

ITV Ice Makers is a manufacturer of ice machines with multiple solutions for the ice needs of supermarkets. Its Ice Queen machines, GIQ generators, which run on CO₂, and Scala machines, are just some of the options the company has to offer.

ITV's machines produce both granular and flake ice which you can choose between depending on the moisture content and type of ice you need.

Different types of bins for storing and transporting ice can be attached to the machines.

www.itv.es

Booth contact:

Armando Lumbreras, Sales & Marketing Director

Hall 15, booth B11

HALL 16

Heos



HEOS: NOW REFRIGERANT NEUTRAL

Carel's skills and experience in managing natural refrigerants with low GWP, combined with our know how in water loop systems, have led to the development of the new version of Heos, now Refrigerant Neutral and compatible with the most commonly-used refrigerants. This new solution adds the latest innovations in the use natural and low-GWP refrigerants to the established energy efficiency, direct cabinet temperature control, fast installation and flexible design of the Heos system.

A new revolution in commercial refrigeration that brings all the benefits of continuous modulation ensured by the Heos system, independently of the refrigerant used, above all natural ones.

www.carel.com

Booth contact:

Diego Malimpensa, Business Unit Manager

Hall 16, booth E03



DANFOSS MULTI EJECTOR

The Multi Ejector allows retailers to go beyond ambient temperature limitations and use transcritical CO₂ across the entire estate. The solution has been tested on different sites in Southern Europe and Africa under varying conditions with ambient temperatures up to 40°C and all test sites return average energy savings of up to 10 percent compared to traditional HFC systems. The Multi Ejector, when used together with parallel compression, reduces the required compressor capacity and thereby also reduces first cost.

www.food-retail.danfoss.com

Hall 16, booth C73



COPELAND SCROLL ZB COMPRESSORS FOR R290 APPLICATIONS

Emerson's complete R290 solutions offers a broad portfolio of compressors, flow controls and system electronics to address the needs of distributed and centralized system architectures. The ZB*KAU range of scroll compressors are ideal for self-contained display cases with multiple circuit designs and suitable for all propane applications below 150 g refrigerant charge. The available models are more compact and lightweight thanks to the 3-feet design of the compressors.

www.emersonclimate.eu

Booth contact:

Venugopal Kandi, Product Manager Refrigeration Marketing

Hall 16, booth E56



LEAN LINE - CO₂ BOOSTER FOR CONVENIENCE STORES

This range of units, MWL, is specifically designed for convenience stores application and can provide a cooling capacity up to 100 kW in MT and 20 kW in LT.

The main features are:

- » Very compact footprint and tidy lay out
- » Inverter on MT and LT compressors
- » Easy access to all component from the front side (possible installation against a wall)
- » Low maintenance required
- » Full Heat recovery and Air conditioning on request
- » Bitzer ECOLINE plus (upon availability)
- » Vapor ejector option
- » Possibility to include electrical protections for cabinets

SCM FRIGO will increase by 30% its booster production due to this new line and to the growing request by this market sector.

www.scmfrigo.com

Booth contact:

Anna Stella- Key account Manager

Hall 16, booth E20

HALL 17



ADVANSOR[™]
by Hillphoenix

compSUPER SIGMA RANGE

The compSUPER SIGMA range represents the most sophisticated models in Advansor's portfolio using only CO₂ as refrigerant. The range provides single pack solutions with integrated capacity for (MT) and (LT) refrigeration, air conditioning (AC) and heating.

The range is suitable for supermarkets with needs for a "combined energy management system" and provides customers with possibilities for optimizing their stores. Only one system is needed to satisfy all cooling and heating requirements.

- » All-in-one unit - integrated cooling, freezing, air conditioning and heating
- » Compact, easy-to-install and service-friendly design
- » High-quality as all other Advansor systems
- » Energy efficient performance in hot climate

www.advansor.dk/en

Booth contact:

Jens Kallesøe

Hall 17, booth D38



NEXT GENERATION OF COMPRESSORS FOR CO₂ APPLICATIONS IN SUPERMARKETS

Energy-efficient, environmentally friendly and future-proof: BITZER CO₂ compressors for booster refrigeration systems are the ideal solution for your supermarket. They're also setting new benchmarks in the low temperature stage of cascade systems – cleverly combined with ECOLINE reciprocating compressors. This reduces energy costs.

www.bitzer.de

Hall 17, booth D65



GEA COMPRESSORS FOR TRANSCRITICAL CO₂

Since the beginning of the 90's, GEA has been engaged in the development of compressors for transcritical CO₂ systems. The series now covers displacement from 6.2 to 38.2 m³/h (50 Hz) with 2, 4- and 6-cylinder reciprocating compressors. The compressors are distinguished by high reliability, excellent operating performance, wide frequency range for minimum part-load needs and previously unachievable efficiency standards in the market. The collected outstanding performance data has now also been confirmed officially through ASERCOM (Association of European Refrigeration Component Manufacturers). Therefore the compressors contribute to lowest life-cycle costs and comply with long-term legal requirements such as the F-gas regulation in Europe. The compressors are used in transcritical and subcritical applications for supermarkets, industrial refrigeration and heat pumps.

www.gea.com

Booth contact:

Michael Nagler

Hall 17, booth D77



CO₂ AND R290 SOLUTIONS FOR SUPERMARKETS

Rivacold (member of Vitri Alceste Group) is presenting a wide range of products that have been specifically designed for retail. All products have been developed for the current and future refrigeration market demands and trends, and at the same time to combine reduced environmental impact, low energy consumption and good quality for all varieties of supermarket retail in their single or integrated solutions. Customers will be guided through the stand to two main products using natural refrigerants: CO₂ (R744) and Propane (R290). CO₂ solutions for cold storage of different sizes and a high-efficient R290 water loop integrated system, designed to match all supermarket needs concerning summer and winter air conditioning, sanitary water and refrigeration.

www.rivacold.com

Booth contact:

Francesca Giombini, Marketing Manager

Hall 17, booth C01

ACCELERATE

ADVANCING HVAC&R NATURALLY

EUROPE

The magazine for and about business leaders
in natural refrigerant-based technology,
with the latest market and technology trends.



READ ONLINE AT
accelerateeu.com



About the authors

MARC CHASSEROT
Publisher / CEO shecco



Marc holds degrees (including two Masters) in Economics, Politics, and Marketing. He has studied at the London School of Economics, INSEAD Singapore, Sciences Po Paris, and the College of Europe. He has specialized in natural refrigerants since 2003. He is an active member of ASHRAE. He founded the leading industry platforms R744.com, hydrocarbons21.com, ammonia21.com and R718.com. Since 2007 Marc is co-founder and CEO of shecco, an independent market development company specializing in bringing natural refrigerants faster to market and with offices in New York, Brussels and Tokyo.

ALVARO DE OÑA
Editor / COO & Head of Media shecco



Alvaro is a shareholder and co-founder of shecco as an independent entity. With a background in social sciences (with a degree in Psychology and a Masters in HR Management) and a postgraduate degree at the London School of Economics in International Relations, he is currently shecco's Chief Operating Officer. As part of his tasks, Alvaro is leading shecco's media team in its efforts to share relevant stories, news and updates on the global transition towards natural refrigerants.

CHARLOTTE MCLAUGHLIN
Reporter shecco



Charlotte's background is in Politics and Economics at University College Dublin but she has had a long interest in journalism - having worked previously for the BBC and Irish radio stations. As a reporter in shecco, Charlotte is covering breaking news in the natural refrigerants industry. She currently writes for online industry platforms and contributes regularly to Accelerate Magazines.



**Visit us:
Hall 17/D38**



EuroShop

The World's No. 1 Retail Trade Fair



Kim G Christensen



Jens Kallesøe



Cornelius Moeller



Mark Kristensen



Manfred Mahnert



Joana Costa



Darren Lacroix



Robert Petryk



Wolfgang Jakob



Conny Andersson



Peter Staal

The entire Advansor sales team + a number of our specialists will be present during the Exhibition. We anticipate another successful exhibition and look forward to introducing our current portfolio + the new "compSUPER XXS 4X2 Mini-Booster".



compSUPER XS 2X2 VP



compSUPER S 3x3 CU



compSUPER XS 2+1+1 SIGMA VP

ADVANSOR[™]
by Hillphoenix

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