



# iskid MAGAZINE

## HVAC&R JOURNAL OF TÜRKİYE

ISKID AIR CONDITIONING &amp; REFRIGERATION MANUFACTURERS' ASSOCIATION | PER SIX MONTHS - 2025 - VOLUME 29



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Mr. Ulaş Çiftçi

**Editor in Chief**  
Ms. Melek Ünal Tavukcuoğlu  
melekunal@iskid.org.tr

**Visual Director**  
Mr. Abdullah Yanılmaz  
abdullah.yanilmaz@hvacmedya.com

**Advertising Manager**  
Mr. Kaan Kösemehmet  
kaank@iskid.org.tr

**Subscription**  
Ms. Esra Arslan  
esraarslan@iskid.org.tr

**Print**  
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**ISKİD Office**  
Şerifali Mah. Çetin Cad. Kızkalesi  
Sok. No.1 Elite Plaza  
B Blok Kat: 2 D: 6 Ümraniye  
34775 İstanbul Türkiye  
Tel. : +90 216 469 44 96 • Fax : +90 216 469 44 95  
www.iskid.org.tr • iskid@iskid.org.tr

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**TUNÇ KORUN**

**Chairman of the Board, İSKİD**

investments contributed to domestic growth, exports to markets in the Caucasus, the Middle East, and the Americas also saw significant strengthening. In 2024, the Turkish HVAC sector achieved a total export volume of \$7.14 billion.

Turkiye's air conditioner production capacity and quality continue to improve steadily each year. Thanks to investments in advanced technology and innovative approaches within the sector, Türkiye has become Europe's production hub for air conditioners. For the first time, the domestic market volume for individual split air conditioners reached 2 million units. Exports in this category also increased, and we expect these figures to continue growing in 2025.

Interest in renewable energy systems such as heat pumps also grew in 2024. Demand for air-source and hybrid heat pumps is expected to rise in both residential and commercial applications due to their energy efficiency and environmental benefits. The number of companies planning investments in this area is also increasing, and we anticipate this trend will continue to grow in the coming years. As seen in the European Union, there is a need for government incentives to promote the widespread adoption of energy-efficient products and the replacement of low-efficiency devices with high-efficiency ones. If this transition can be swiftly implemented in our country, the size of our domestic market could expand significantly.

We observe a growing interest in Indoor Air Quality (IAQ) within society, with awareness increasing significantly compared to previous years. High-efficiency filtration systems and ventilation solutions are now more commonly used in spaces such as hospitals, hotels, and office buildings.

## A New Year and New Opportunities

At İSKİD, we are actively working to promote the same level of sensitivity and implementation in our schools. In this regard, we are open to collaboration with all relevant stakeholders.

We also anticipate the rapid adoption of refrigerants with low Global Warming Potential (GWP) in 2025. The use of gases like R-454B, which have lower GWP values, will be encouraged, leading to the gradual phase-out of existing HFCs such as R-410A. Environmental regulations, particularly the EU's F-Gas regulations, will continue to have a significant impact on the sector.

In 2025, İSKİD will once again have a busy agenda. On May 5, 2025, we will host a comprehensive summit in Istanbul, where the multifaceted efforts, areas of interest, and challenges faced by the Turkish HVAC industry will be discussed. The summit will feature panels with speakers including representatives from ministries and relevant units in Türkiye, as well as international professionals who are experts in their fields. In line with this, our association's commissions are continuing their preparations with great dedication.

This year, we will participate with a booth at significant international events and fairs, including Climate World Moscow (February 25–28), ISH Frankfurt (March 17–21), and MCE Heat Pump Technologies (April 2–3). At these fairs, we aim to connect with our international stakeholders and work towards strengthening collaborations and joint activities in the upcoming period.

From October 22–25, the largest international fair of our sector in Türkiye, İSK-SODEX, will be held at Istanbul Expo Center. İSKİD will be participating, and I would like to invite all our global stakeholders to attend and add this event to their calendars.

As we welcome 2025, I would like to extend my warmest wishes to all HVAC&R industry professionals and stakeholders for the new year. May 2025 bring new hopes, success, and good health to all.



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# AIR CONDITIONING AND REFRIGERATION MANUFACTURER'S ASSOCIATION İSKİD



The air conditioning and refrigeration industry, which has emerged in the 1950s in Türkiye, developed very quickly. İSKİD was established in 1992 with the contributions of prominent companies in the sector, to conduct work towards achieving sustainable and regulated HVAC&R Industry development in compliance with the world.

Over 100 member companies are gathering under İSKİD's roof to conduct activities for the development of the industry and to produce with high-quality standards.

## **The objective of İSKİD:**

To ensure cooperation between the members that are manufacturers and/or importers of climatization, refrigeration and air conditioning devices in Türkiye and work on finding solutions for their problems,

To protect the rights of air conditioning consumers and companies on a national and international level;

To conduct activities that will ensure companies to protect the environment while providing solutions for the country's HVAC&R needs and contribute to the country economy by supporting energy efficient product solutions.

## **Mission:**

To realize strategic plans for the development of the Air Conditioning Industry and the actions that will carry out these strategies in cooperation with the sector and the other stakeholders.

## **Vision:**

To raise the Air Conditioning Industry to a reputable and leading position both in our country and abroad through its work increasing public life quality, to be sensitive to the environment, innovative, reliable and competitive.

## **Goals:**

- To develop the sector's research-development infrastructure and university-industry cooperation,
- To encourage the training of a qualified workforce for the sector,
- To encourage the use of renewable energy resources, high-end products, innovative technologies and applications,
- To increase activity in the national and international media,
- To track and update regulations and standards, create specifications when needed, perform market monitoring more effective and prevent unfair competition to maintain a more trustworthy sector image,
- To promote and support industry-Government relations,
- To introduce high-quality Turkish product image to the international market and increase our reputation,
- To increase cooperation with international organizations.





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# ISKID and DOSIDER Join Forces for Heat Pump Systems

**ISKID and DOSIDER have decided to merge their respective commission efforts related to heat pump systems into a single entity, forming the ISKID-DOSIDER Heat Pump Commission.**



ISKID (Air-Conditioning and Refrigeration Manufacturers' Association) and DOSIDER (Association of the Heating Appliances Industry and Business People) have decided to merge their respective commission efforts related to heat pump systems into a single entity, forming the ISKID-DOSIDER Heat Pump Commission.

Eco-friendly and low-emission heat pump systems, which help mitigate the impacts of global warming and climate change, are gaining increasing attention. As this product group becomes a new focal point for the industry, it is critical to prevent improper practices and establish a framework for producing accurate and reliable information.

To address these needs, ISKID and DOSIDER have consolidated their commission work on heat pump

systems under the name ISKID-DOSIDER Heat Pump Commission, ensuring unified efforts to drive the development and widespread adoption of this innovative technology.

Sharing his thoughts on the topic, Tunç Korun, Chairman of the ISKID Board of Directors, stated: "As ISKID, we began our work in this field in 2018 with the establishment of our Heat Pump Commission. During this process, we became a member of the European Heat Pump Association (EHPA) to closely follow developments in heat pump technologies in Europe, play an active role, and share up-to-date information with our members. In Türkiye, there are numerous exemplary applications of all types of heat pumps, both individual and commercial, and the necessary engineering expertise is readily available. Our commission



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aims to leverage this expertise in the most efficient way possible to contribute to our country's Green Deal targets. Seeing the same goal reflected in DOSİDER's efforts, we decided to combine our energies and experience to work more effectively together under the name İSKİD-DOSİDER Heat Pump Commission."

Ekrem Erkut, Chairman of the DOSİDER Board of Directors, stated:"Heat pumps are becoming increasingly common in both individual and industrial systems, both in Europe and in our country. Through our membership in the European Heating Industry Association (EHI) since 2015, we have participated in various events related to heat pumps via collaborative efforts and committee activities. In the coming period, high-efficiency systems utilizing heat pumps for heating and cooling, as well as hybrid applications incorporating gas-burning devices, will continue to grow in line with carbon reduction and green transformation efforts.

The decision for DOSİDER and İSKİD to collaborate on heat pump products and systems within their respective fields of expertise will make a significant contribution to our industry. The İSKİD-DOSİDER Heat Pump Commission will undertake crucial initiatives to raise awareness among all industry stakeholders and accelerate the adoption of these systems.

We believe that Türkiye has the potential to become a regional leader in heat pump systems, especially by leveraging its renewable energy capabilities. With this perspective, our commission aims to raise public awareness and support sectoral development through its activities."

The İSKİD-DOSİDER Heat Pump Commission will organize training programs, seminars, and create technical documentation to enhance knowledge sharing within the industry. Additionally, it will closely monitor international developments to ensure that Türkiye remains competitive in this field and plays an active role in the region.





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# ISKID shares the latest technical information needed by the industry through webinars and panels organizes by its commissions

## Webinar: Definition, Analysis, and Measurement of Sound in Central HVAC Systems

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**AREL ARSOY**  
ISKID  
Eurovent AHU Mirror  
Commission President

**TUNÇ KORUN**  
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Air Conditioning Systems

ISKID organized a webinar titled "Definition, Analysis, and Measurement of Sound in Central HVAC Systems" to provide accurate information to the industry regarding sound level definitions and measurement technologies or methods, particularly for central HVAC units like air handling units (AHUs).

In the webinar moderated by EAK- Eurovent AHU Mirror Commission President Arel ARSOY, Alper AKGÜL from Pro-Plan Project Engineering company shared the presentation titles on "General Definitions, Device and Noise Measurement in the Location", and Orhan GÜRSÖN from GMD Moskay Engineering company on "Acoustic Critical Circuit Analysis" with the participants.

Held on Thursday, November 21, at 10:00 AM, the webinar explored detailed technical topics such as the differences between sound power and sound pressure and critical considerations for accurate measurements.

The event attracted significant interest from industry professionals and concluded with a Q&A session, where participants' technical questions were addressed.

The webinar was successfully organized with strong participation, sponsored by İSKİD member companies DOĞU, İMBAT, KLS, and TERMOFAN. A recording of the webinar is available on the İSKİD YouTube channel.



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## Webinar: HVAC Products and Components Suitable for Explosive Environments (ATEX)



The graphic displays the participants and sponsors of the webinar. It features two rows of circular portraits with names and titles below them, and a row of logos at the bottom.

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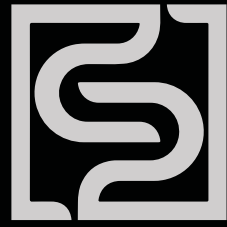
ISKİD organized a webinar titled “HVAC Products and Components Suitable for Explosive Environments (ATEX)” to inform the industry about ATEX classifications, HVAC products and components suitable for these classifications, their applications, certification processes, and related practices.

Held on Tuesday, December 3, at 14:00, the webinar covered detailed technical topics such as ATEX classifications and

products, ATEX components, fans, filtration in explosive environments, ATEX-certified filters, electric motors operating in explosive environments, ATEX regulations, and global application areas.

The webinar was organized with the support of İSKİD member companies DOĞU, MIKROPOR, SYSTEMAIR, TRANE, and ÜNTES. A recording of the webinar is available on the İSKİD YouTube channel.





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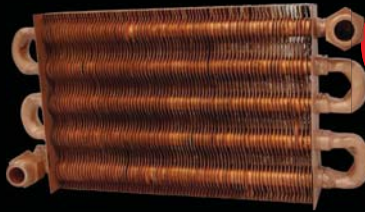
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## ISKID Organizes webinar on "The Importance of Heating Operation in HVAC Systems and Recommendations for Users"

MODERATOR



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ISKİD organized a webinar titled "The Importance of Heating Operation in HVAC Systems and Recommendations for Users" on Wednesday, November 6, at 14:00, to emphasize the efficient use of air conditioners for heating purposes.

In the webinar moderated by Neslihan Findik, a member of the SDDK - Split and VRV/F Air Conditioning Systems Commission, Erdem Süsler from SDDK presented on "Heating in Individual Air Conditioning Systems and Comparison with Alternative Systems", Berkan Bayrak from SDDK "Comparison of Central HVAC Systems and Alternative Heating Systems," , Zühtü Ferah from Dinamik Proje "New Trends in HVAC System Design" shared the presentation titles with the participants.

The webinar began with a welcome speech by Ece Uluğtekin, a member of the İSKİD Board of Directors. Uluğtekin stated, "İSKİD is an important industry association that strives to represent the Refrigeration, Air Conditioning, and Ventilation sector in the best possible way, both nationally and internationally, through the dedicated work

of its member companies and commissions. I would like to thank the valuable sector representatives who contributed to this webinar with their presentations, as well as our Split and VRV/F Air Conditioning Systems Commission."

During the webinar, it was discussed that every system has its own advantages and disadvantages, and that air conditioners can also be an efficient and sustainable solution for heating. Topics such as Environmentally Friendly Refrigerants and Compressor Technologies, System Comparisons, Investment and Consumption Costs, Heat Pump Systems, and Their Expansion were highlighted. The webinar, which attracted significant attention from industry professionals, concluded with answers to technical questions from the participants.

The webinar, organized successfully with high participation and sponsored by İSKİD members FORM, MITSUBISHI ELECTRIC, and TLC, is available for viewing on the İSKİD YouTube page.



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# Panel: “Energy Efficiency, Air Quality, and Decarbonization Solutions in HVAC Systems”



Rising energy costs in the industry directly impact the competitiveness and sustainability of businesses. The "Energy-Producing Factories" concept offers numerous critical solutions not only to control energy costs but also to reduce environmental impacts.

Efficient HVAC and ventilation solutions play a significant role in reducing energy costs for businesses, helping lower their

carbon footprint and supporting them in achieving green transformation goals.

On Wednesday, December 18, at 13:00, a panel titled "Energy Efficiency, Air Quality, and Decarbonization Solutions in HVAC Systems" was organized as part of the Energy-Producing Factories Summit at Istanbul Expo Center, Hall 5 - Stage 2. The panel attracted significant interest from industry representatives.





# 30

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# Panel: Heat Pump Systems and Applications from the Perspective of Experts and Designers



In 2021, Türkiye approved the Paris Agreement and announced its target of achieving net zero emissions by 2053. To reach this goal, the widespread use of heat pump systems that utilize renewable energy sources is a crucial issue. In this context, the İSKİD-DOSİDER Heat Pump Commission continues its efforts to promote the use of energy-efficient and environmentally friendly heat pump systems in our country and to inform the public.

On Saturday, December 14, at 11:00, the panel titled "Heat Pump Systems and Applications from the Perspective of Experts and Designers" took place at Anfaş Fair Center, Hall 2, as part of the Antalya HVAC 2024 National Air Conditioning Congress.

The panel was concluded with significant interest from industry representatives.





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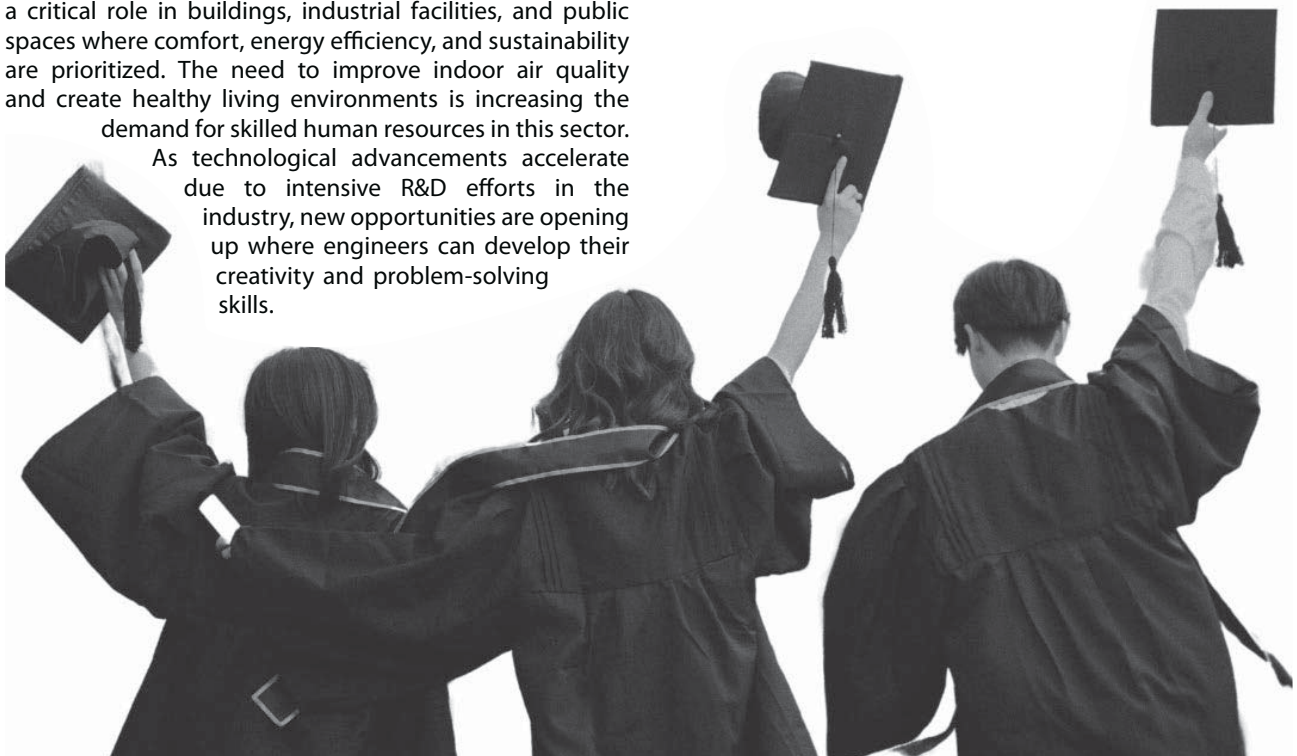


# The Turkish HVAC&R Industry Offers Careers and Opportunities for Young Engineers



Refrigeration, Air Conditioning and Ventilation is a vital technology used extensively in all areas of our lives, plays a critical role in buildings, industrial facilities, and public spaces where comfort, energy efficiency, and sustainability are prioritized. The need to improve indoor air quality and create healthy living environments is increasing the demand for skilled human resources in this sector.

As technological advancements accelerate due to intensive R&D efforts in the industry, new opportunities are opening up where engineers can develop their creativity and problem-solving skills.





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Türkiye maintains its position as a large and important market in the global HVAC&R sector, ranking just after populous countries like China, Japan, and the USA. With the ability to quickly bring environmentally friendly products to market in compliance with European Union regulations, the country is attracting the attention of foreign investors as a production hub for HVAC&R. The Turkish HVAC&R sector, where both established local companies and large international firms operate, offers young engineering candidates stable job opportunities in a sector that is less affected by economic crises and has continuous growth potential.

### Wide and Diverse Career Opportunities

HVAC&R sector offers a wide range of career opportunities. Young engineers can embark on a strong career journey by taking on significant roles in projects addressing sustainable heating, cooling, and ventilation needs for buildings and facilities.

This sector provides opportunities to work across various disciplines, from mechanical design and energy management to technical operations management, service and maintenance, sales, project management, and research & development. Young engineers can plan their careers with both fieldwork and office-based tasks that align with their interests. Additionally, they have the opportunity to use their engineering skills to develop innovative solutions, contribute to sustainable projects, and specialize in areas such as energy management, one of the world's most critical issues.

One of the sector's key trends focuses on sustainability and green technologies. Developing systems that reduce carbon emissions, increase energy efficiency, and are environmentally friendly creates numerous opportunities for young engineers to contribute. The HVAC sector offers the chance to have a positive impact on the world by working on systems integrated with renewable energy sources, CO<sub>2</sub> reduction, and environmentally conscious technologies.

With the Industry 4.0 revolution, digitalization has gained significant importance in the HVAC&R sector. Young engineers can participate in innovative projects in areas such as smart building systems, IoT (Internet of Things), automation, and data analytics. These developments enable HVAC&R systems to operate more efficiently while allowing engineers to play an active role in the sector's digital transformation.

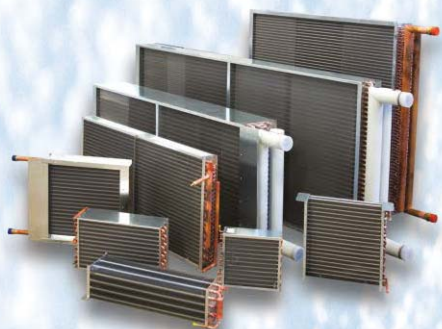
Certification programs offered by national and international organizations in the sector provide an excellent opportunity for young engineers to add value to their careers. Through these programs, engineers can acquire the most up-to-date knowledge and skills in the field, enhancing their professional competencies. There are also mentorship programs and a broad network available to help engineers develop in the sector. Industry associations and organizations like iSKiD (Air-Conditioning and Refrigeration Manufacturers' Association) facilitate young professionals' interactions with experienced engineers, encourage knowledge sharing, and provide opportunities for career growth.







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## ISKID at the BEYSAD Economic Outlook Conference



ISKID Chairman Tunc Korun shared information about İSKİD's activities and the HVAC industry with participants at the "Economic Outlook Conference" organized by the White Goods Suppliers Association (BEYSAD).

Speaking as a panelist at the conference held at Marriott Hotel Asia, Tunc Korun shared data on the 2024 HVAC industry figures and expectations for 2025. At the end of the panel, İSKİD Chairman Tunc Korun was presented with a plaque by BEYSAD Vice Chairman Sayat Çakır.





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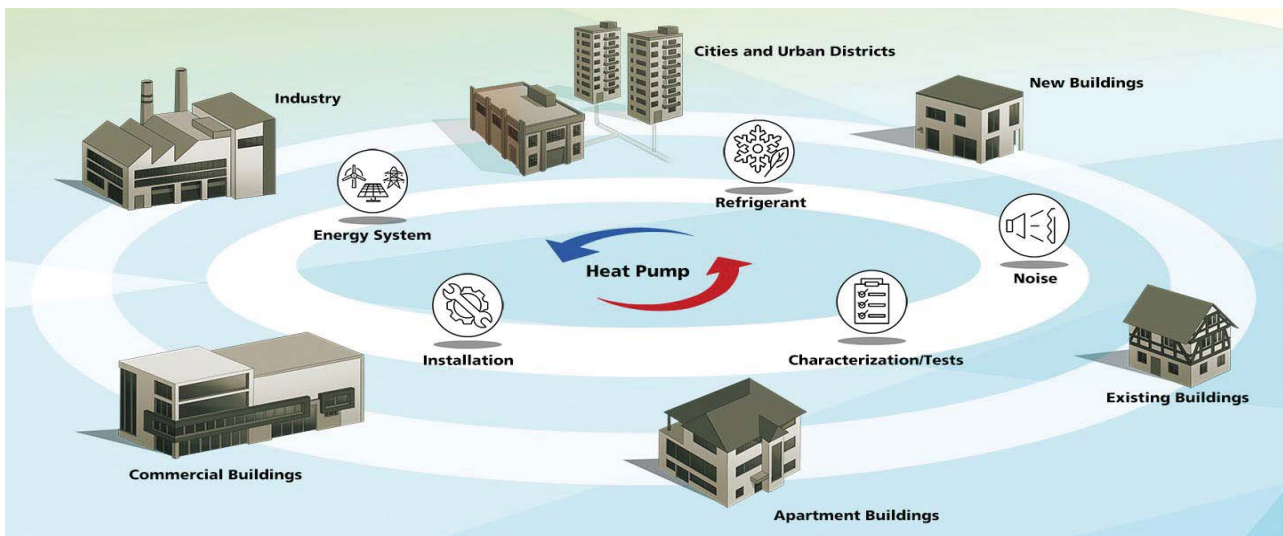
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# The use of economical and eco-friendly heat pump systems is becoming more widespread in Türkiye



According to the European Union Green Deal, the European Commission aims to reduce greenhouse gas emissions by 55% by 2030 and reach net-zero emissions by 2050. In line with this goal, Türkiye, which prepared the "Green Deal Action Plan," approved the Paris Agreement in October 2021 and declared the target of achieving net-zero emissions by 2053. In this context, the use of low-emission and eco-friendly heat pump systems is becoming increasingly important. Heat pump systems, with their energy efficiency, safety, comfort, aesthetic design, and low operating costs, stand out as attractive solutions.

Considering Türkiye's climate zone, heat pumps are emerging as efficient systems that should be preferred. In Europe, using energy derived from renewable sources, such as solar panels, with systems like heat pumps that efficiently consume energy is becoming more popular. Water, ground, and air-source heat pumps provide efficient heating and cooling while reducing carbon emissions from energy consumption by utilizing natural resources. The depletion of fossil fuels, the significant rise in their prices, and the growing environmental awareness are just a few reasons why using renewable energy sources is crucial for ensuring humanity's future. Today, reducing the consumption of fossil fuels and using clean, local, and renewable sources like hydraulic, solar, wind, ground, and geothermal energy is a necessity. This is where heat pumps come into play.

Heat pumps provide heating, cooling, and hot water by utilizing energy from the ground, water, or air. Heat pump

energy is sourced "for free" from the energy present in the ground, water, or air up to 75-80%, with 20-25% coming from electrical energy.

Air, water, and ground are renewable energy sources available in nature and are free of charge. The easiest to find among these energy sources is air. For this reason, air-source heat pumps are most commonly preferred today. Heat pumps are classified based on the heat sources used. The most commonly known general definitions include Ground-Water and Air-source heat pumps.

Ground, as a heat source for heating and cooling, stands out as an ideal energy source for heat pumps due to its ideal temperature values for efficient operation. If a water source is available, it can be utilized in water-source heat pump applications, potentially offsetting the initial investment in as little as one year or even less. Heating, cooling, and hot water production in buildings are among the most energy-consuming processes, and solving these issues with heat pumps significantly improves efficiency.

Air-source heat pumps can operate with high efficiency even in external temperatures as low as -20°C and can provide hot water at temperatures of up to +60/70°C, achieving maximum efficiency on an annual basis.

Heat pump technologies are developing and becoming more widespread worldwide. In Türkiye, there are examples of applications with all types of heat pumps in various sizes, and the necessary engineering knowledge is also available.



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# ISKID Organizes the HVAC&R Summit

ISKID is organizing the HVAC&R Summit on Monday, May 5th, under the slogan 'THE CLIMATE IS CHANGING! ARE YOU READY FOR THE CHANGE?' where the diverse activities, areas of interest, and challenges of the Turkish HVAC&R sector will be discussed.

The summit will feature panel discussions with both domestic representatives from ministries and relevant institutions, as well as international professionals who are experts in their fields.

The İSKİD HVAC Summit will last a full day, consisting of two sessions in the morning and two in the afternoon. This event will not only focus on sustainable solutions for the Turkish HVAC&R sector but also provide an essential networking opportunity by bringing together professionals from the industry.

For sponsorship details and further information, visit [iklimlendirmezirvesi.org.tr](http://iklimlendirmezirvesi.org.tr)



## İSKİD Meets with Visitors at Global Industry Exhibitions

### February 25-28, 2025 - Climate World Moscow Fair

ISKID is participating in the Climate World Moscow Fair with a 12 m<sup>2</sup> stand located at Hall 1, No: A374. One of Russia's leading fairs for the HVAC&R industry, CLIMATE WORLD EXPO 2025 offers opportunities to connect with industry leaders, explore the latest technologies, and establish strategic partnerships.



### 17-21 March 2025 - ISH Frankfurt

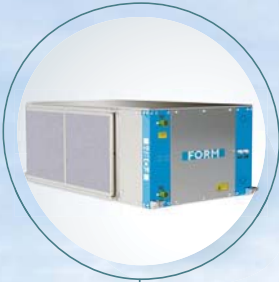
The ISH 2025, held in Frankfurt am Main, will focus on sustainable heating and cooling technologies as well as smart home systems. İSKİD will meet with visitors at its 12m<sup>2</sup> stand located at Hall 8, C42.

The latest issue of the İSKİD Magazine and the İSKİD Industry Statistics brochure can be obtained for free at the İSKİD stand.





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# İSİB Board Chairman Mehmet Şanal: "Expectations for 2025"



In 2025, we anticipate that the demand for sustainable products and low-emission HVAC-R solutions will increase and this will continue to be an opportunity for our industry. We plan to continue on our way by intensifying our R&D investments in this field. We will continue our efforts to increase the export figures of our sector by 8% every year. In this direction, we have planned to carry out 23 overseas activities by reaching new markets in 2025. In addition, we aim to bring qualified buyers from over 50 countries and hold more than 700 B2B meetings ahead of the ISK Sodex fair, which we have established as the third largest industry fair in Europe and organize every two years, with the next one scheduled for October 2025. This will provide an opportunity to showcase our sector to the global market.

Europe is the most important market of our industry and will be our route for export in the coming period. In 2025, we will exhibit our export power once again by representing our country in Europe at the ISH fair. In addition to Europe, we aim to work on initiatives that will increase our exports to North African, Middle Eastern, Southeast Asian countries, as well as Europe. Increasing our exports to these markets will be strategic for us to achieve the growth targeted for 2025 and beyond.

In order for the Turkish HVAC&R sector to increase its R&D activities in the coming years and to offer products with high energy efficiency, technologically advanced and environmentally friendly approaches to the market, we will continue our efforts to closely follow sectoral developments and to inform the sector companies about these developments.

2024 was a more difficult year than expected for the industry. The economic stagnation experienced as a result of monetary tightening moves around the world after the pandemic also affected our country, and 2024 was a difficult year for both the world and our country. We think that there will be a recovery in our country's economy in the coming period with macroeconomic stability and structural reforms. After a difficult year in 2024, we maintain our expectation of normalization in the industry and economy in the second half of 2025.

As the Turkish HVAC-R Exporters' Association, we will continue to contribute to our country's exports by continuing our activities to protect the competitive structure of our sector and increase its growth potential in the coming period.

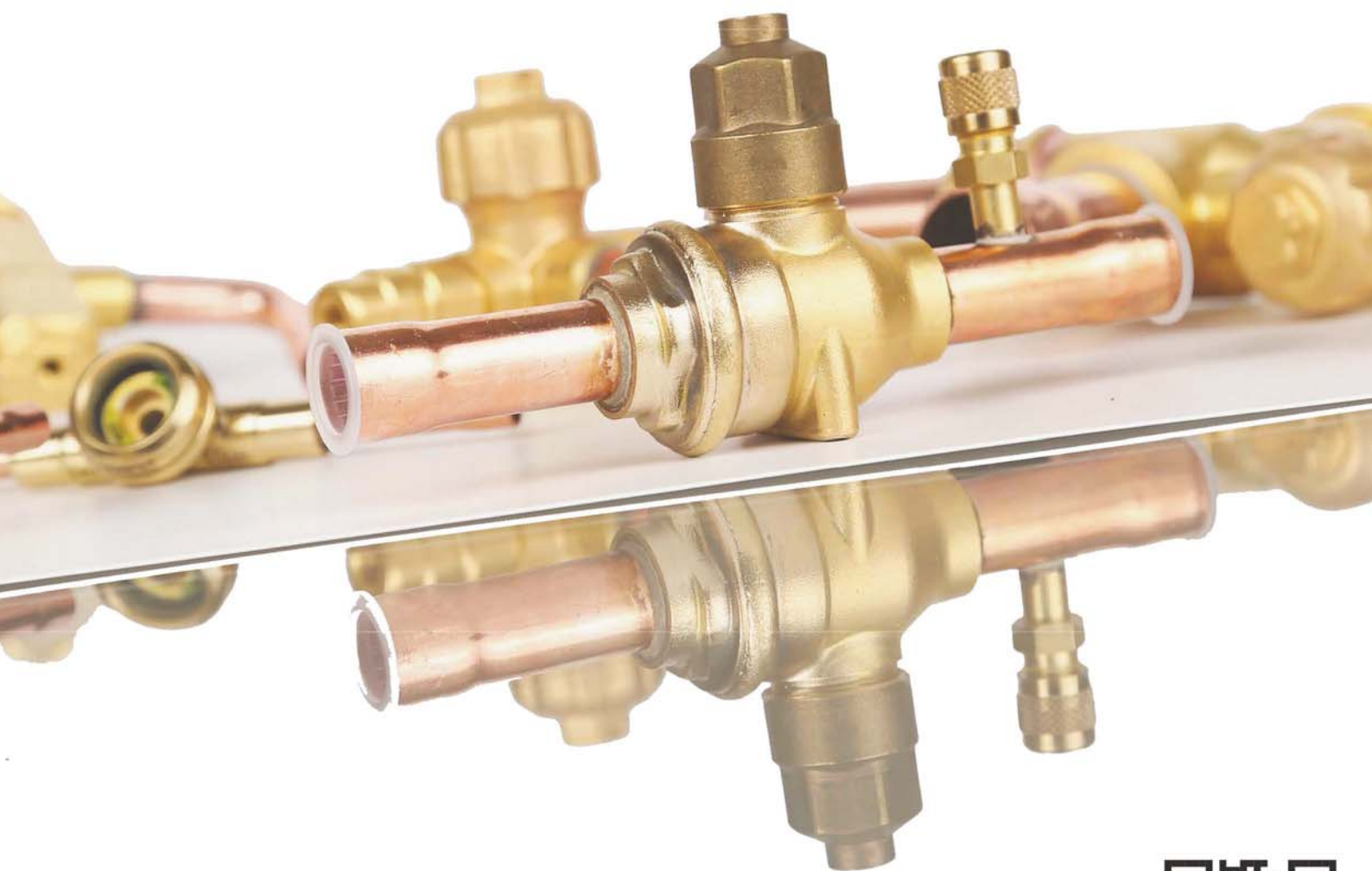


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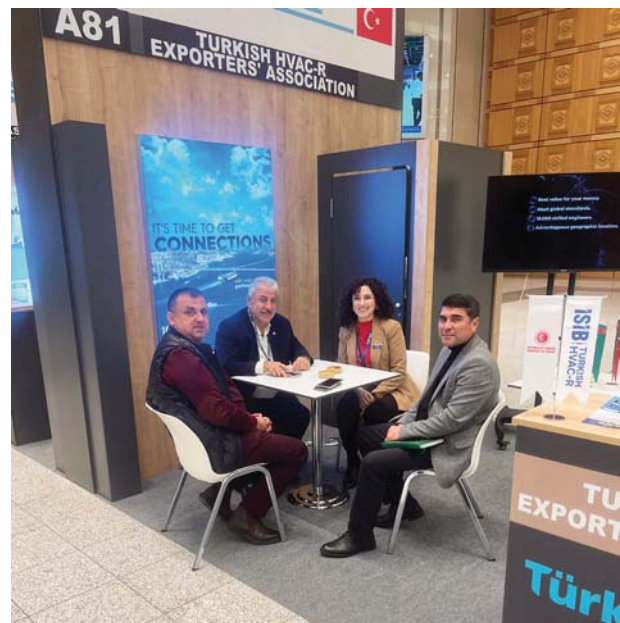
# Turkish Export Products Exhibited in Ashgabat



The Turkish Export Products Fair, which opened its doors for the 11th time this year, was held on December 4 – 6, 2024 in the complex of the Turkmenistan Chamber of Commerce and Industry in Ashgabat, Turkmenistan. Turkish HVAC-R Exporters' Associations took part in the fair with an info booth.

A total of 48 companies from Türkiye from many different sectors such as construction, agricultural machinery, construction machinery, electrical-energy, steel construction, packaging, construction chemicals, furniture, cosmetics, etc. and Exporters Associations from 25 different sectors participated in the fair. The total number of visitors to the fair was 2,400.

President of Turkmenistan Chamber of Commerce Mergen Gurdov visited İSİB stand. Mergen Gurdov was informed about Turkish HVAC&R sector and sector exports to Turkmenistan. Turkish Ashgabat Trade Counselors Kadir Tursun and Özgür Arzik visited İSİB stand.







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# ISIB Attended the Launch of Heat Pump Technologies and Mostra Convegno Expocomfort Fairs at the Venetian Palace



Turkish HVAC&R Exporters' Association (ISIB) participated in an important organization at the Venetian Palace for the promotion of prestigious fairs to be held in 2025 and 2026. Held on Tuesday, November 12, the launch event introduced the Heat Pump Technologies exhibition to be held on April 2-3, 2025 and Mostra Convegno Expocomfort (MCE) to be held on March 24-27, 2026.

The opening speeches of the launch meeting were delivered by Stefano Kaslowski, President of the Italian Chamber of Commerce and Industry Association, Marco Vignali, Member of the Board of Directors, Mehmet Şanal, Chairman of the Board of Directors of İSİB and Massimiliano Pierini, General Manager of RX Italy.

In his speech, Turkish HVAC&R Chairman Mehmet Şanal emphasized the strong representation of the Turkish HVAC&R sector in the international arena and stated that the economic ties between Türkiye and Italy are rapidly strengthening. Şanal stated that the trade volume between

the two countries showed a significant increase after the MCE fair, which they participated as a Partner Country in 2022, and this reinforced the influence of Turkish companies in the Italian market. Reminding that Italy is among the top five export markets of Türkiye in the air conditioning sector, Şanal stated that he believes that Türkiye's presence at Mostra Convegno Expocomfort will be even stronger in 2026.

Turkish HVAC&R Chairman Şanal also expressed his appreciation for the success of Turkish companies in these fairs. He stated that in 2022, 136 Turkish companies participated in the MCE fair with a total area of 6111 square meters, this year 158 Turkish companies participated and the exhibited area increased to 6998 square meters.

Mr. Şanal wished success to the Turkish companies participating in the fair and reiterated his belief that these fairs will create important opportunities for both Türkiye's air conditioning sector and the country's economy.





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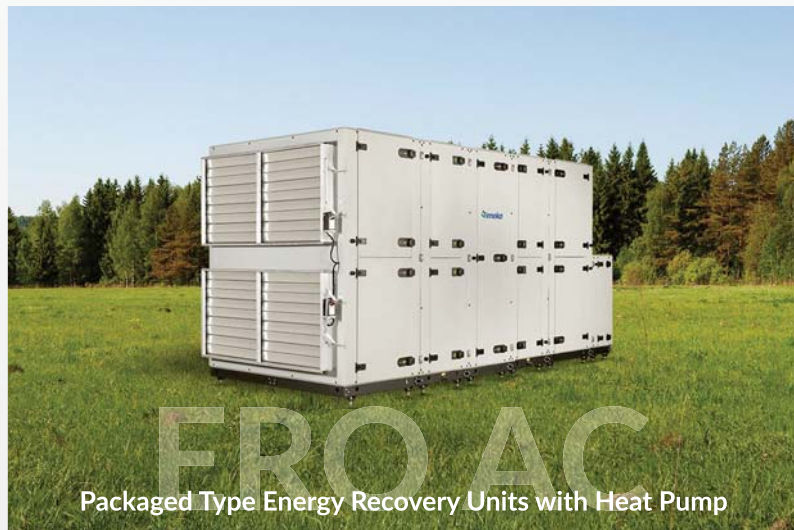
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## Turkish HVAC&R Exporters' Association Organized National Participation in the 16th Aquatherm Baku Fair held This Year



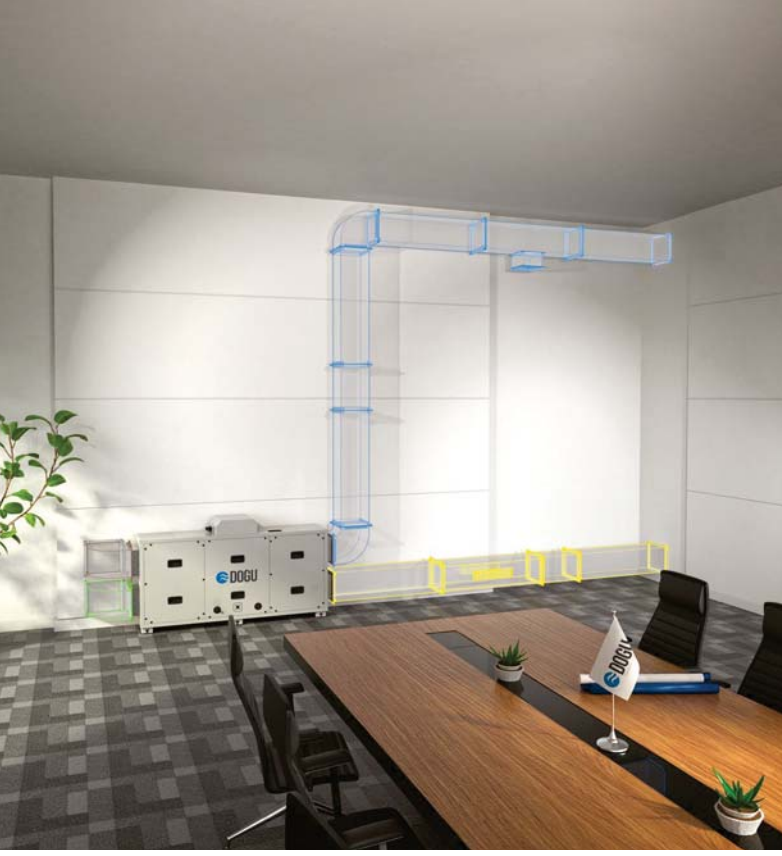
Turkish HVAC&R Exporters' Association organized a successful national participation organization at the Aquatherm Baku exhibition held at the Baku Expo Center in Baku, Azerbaijan between 15-17 October 2024. The fair is the largest fair addressing the air conditioning market in Azerbaijan and the Caucasus region. In addition, since the first day of its organization, it has been recognized as the ideal platform for establishing new business contacts, finding new partners, meeting potential new customers face to face, maintaining and developing existing contacts for companies and following the latest developments in the industry.

15 member Turkish companies participated in the fair. On the first day of the fair, Ahmet ERDAL and Yakup SEFER, Chief Commercial Counselors of the Republic of Turkey in Baku, visited İSİB booth and the booths of our participating companies and exchanged information about the country's economy, trade and business rules. Aquatherm Baku fair was organized simultaneously with BakuBuild and ReBuild Karabakh fairs. This year, 396 companies from 27 countries took part in the fair and more than 19 thousand people visited the fair.



Mehmet ŞANAL, Chairman of the Board of Directors, and Ali AKTAŞ, Member of the Board of Directors, participated in the fair representing Turkish HVAC&R Exporters' Association. Evaluating the fair with the participating companies, the officials stated that the fair generally met the expectations and that they were satisfied with the organization.





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## Turkish HVAC-R Exporters' Association Organized a Successful Buyer Mission Programme in the Second Half of the Year, Bringing 32 Participants from Gulf Countries Together with Turkish Companies



Turkish HVAC-R Exporters' Association, the umbrella organization of the Turkish HVAC&R sector, successfully completed the Gulf Countries Buyer Mission organization in the second half of the year. The event took place on October 22-25. On October 23, 2024, B2B meetings were held in Istanbul with the participation of 32 foreign company representatives from 8 different countries. 80 member company representatives participated in the buyer delegation program. In the organization, the power of the Turkish HVAC&R sector was proved once again.

Company representatives from Iraq, Iran, Kuwait, Qatar, Saudi Arabia, Kuwait, Qatar, Saudi Arabia, United Arab Emirates, Oman and Jordan, which correspond to approximately 12% of the exports of the air conditioning sector, stated that the meetings were very productive and the organization was very successful.

Salih Zeki Poyraz, Vice Chairman of the Board of Directors representing İSİB, participated in the delegation, which included 80 member companies from Türkiye. During the meetings with the companies participating in the program, they stated that the event was productive and that successful business meetings between us and the Gulf countries will make a great contribution to our country's exports. It was stated that buyer delegation organizations to other countries in the region will continue in the following period.







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## Turkish HVAC-R Industry Leaves its Mark in Paris



The Turkish HVAC-R Industry Exporters' Association (İSİB) made a strong impression at the Interclima Fair in Paris, held from September 30 to October 3. This premier European event showcased Turkish companies' innovative solutions that are shaping the future of the HVAC-R industry.

12 Turkish companies participated, presenting their cutting-edge products and services to international buyers. The numerous business meetings held during the fair underscored the Turkish HVAC-R sector's growing influence in the global market.

### **Support from the Turkish Embassy Office of the Commercial Counsellor**

The Commercial Counsellor of Türkiye in Paris provided valuable support to Turkish companies throughout the fair. Their involvement further highlighted the importance placed on Turkish businesses in the French market.

İSİB Vice Chairman Zeki Poyraz commented, "The Interclima fair once again demonstrated the Turkish HVAC-R sector's rising global prominence. The impressive performance of our members is a promising sign for the future."





# The First Organization of the Turkish HVAC-R Exporters' Association in 2025 Took Place in Morocco



Turkish HVAC-R Exporters' Association, the unifying power of the HVAC-R industry, organized the first event of 2025 with a sectoral trade delegation to Morocco. In the delegation organization held in Casablanca, Morocco on January 20-23, Turkish and Moroccan companies held B2B meetings. With the delegation organization attended by 20 Turkish companies, it is aimed to increase the 7.3% share of our country in Morocco's HVAC-R imports.

Cem SAVCI, Member of the Board of Directors, took part in the delegation representing the Turkish HVAC-R Exporters' Association. It was stated that 72 Moroccan companies came to the B2B meetings, more than 200 business meetings were held and the meetings were productive for both sides.

Before the B2B meetings held within the scope of the delegation, a presentation informing our companies about the Moroccan market was made by Burcu ÖZERGÜL ÇOLAK, Commercial Attaché of Casablanca. During B2B meetings, our Commercial Attaché met with all participating companies.



In addition, within the scope of the delegation, meetings were held with Chambre de Commerce d'Industrie et de Services Casablanca – Settat and Moroccan Association of Refrigeration Professionals (AMPF) to discuss the activities of our Association and possible future collaborations.



# Are You Risking Your Reputation?

Refrigeration is essential across industries like food, pharmaceuticals, and data centers. Yet, choosing equipment based on inaccurate performance data can lead to severe consequences, including operational inefficiencies, financial losses, and damaged reputations. A recent white paper, *Broken Trust: Energy Efficiency and the Refrigeration Industry*, highlights a potential 31% gap between claimed and actual product performance, raising concerns about safety, sustainability, and regulatory compliance.

## The Impact of Underperformance

Even the best systems fail when equipment doesn't perform as advertised. Often, customers blame HVAC installers, system designers, or specifiers, not manufacturers, for issues caused by underperforming products. This underscores the importance of selecting equipment with independently verified performance data.

## Critical Risks

- **Safety:** Underperforming systems compromise the integrity of temperature-sensitive goods, risking spoilage or unsafe conditions.
- **Energy Costs:** Overstated efficiency leads to higher electricity consumption and operational costs, particularly in energy-intensive sectors like data centers and cold storage.

- **Maintenance:** Incorrect sizing can cause excessive wear and tear, increasing maintenance needs and shortening equipment lifespans.
- **Compliance:** Failure to meet regulatory standards can result in fines, product recalls, and legal liabilities.
- **Sustainability:** Overstating efficiency undermines green building certifications and contributes to higher greenhouse gas emissions.
- **Reputation:** Product recalls or compromised goods can erode consumer trust and damage brands.

## The Solution: Certified Performance

The risks of underperformance are avoidable when decision-makers demand transparency and accuracy. Certification by impartial third parties ensures that products perform as claimed. Programs like Eurovent Certification involve rigorous testing, audits, and ongoing surveillance, providing robust assurance of quality and reliability.

## Why Certification Matters

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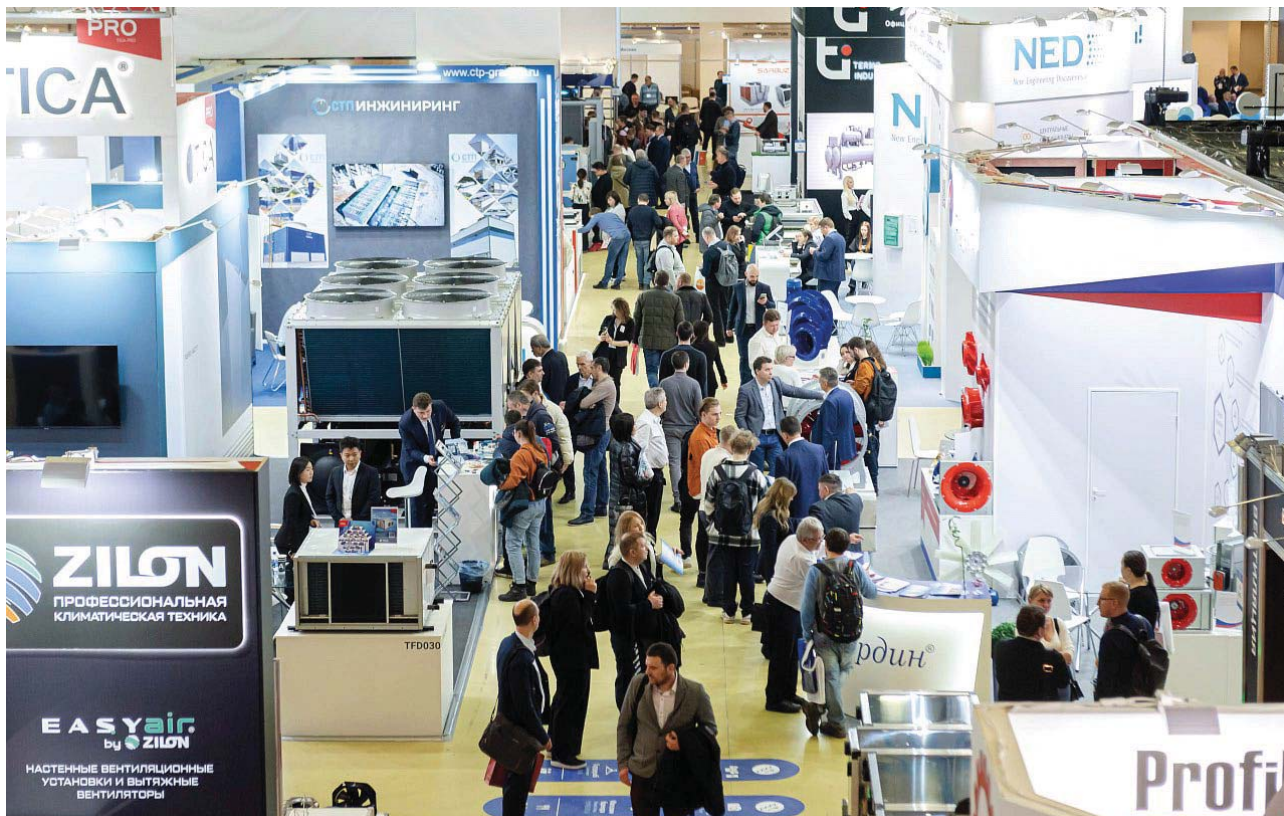
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# Climate World Fair 2025: The Premier HVAC Industry Event in Russia



The Climate World Expo, Russia's premier exhibition for heating, air conditioning, ventilation, and industrial and commercial refrigeration, will take place from February 25 to 28, 2025, at the Expocenter Fairgrounds in Moscow. With participation from over 250 companies, including strong contingents from Turkey, this event promises to be a remarkable showcase of innovation and expertise in the HVAC&R industry.

In collaboration with the Association of Climate Industry Enterprises (APIC), the Russian Union of Refrigeration Industry Enterprises (RSHI), AVOK Moscow, the Nizhny Novgorod Region Development Corporation, among others, the event benefits from extensive industry expertise and networks, ensuring its status as a cornerstone of the HVAC&R calendar.

## Seizing Opportunities in a Changing Market

For over two decades, Climate World has been the leading B2B platform connecting climate equipment manufacturers and suppliers with decision-makers. In light of sanctions and the withdrawal of some Western companies, the industry faces equipment shortages and a growing demand for innovative solutions from emerging markets. With Russia's HVAC&R market expected to grow over 10% by 2030, the

2025 exposition presents a vital opportunity for companies to meet rising demand and establish a strong presence in this expanding sector.

The event will feature a dynamic and diverse lineup of participants showcasing cutting-edge technologies. Turkey will demonstrate its strong presence, with companies like Refkar, Boreas, Evapton, Sarbuz, and others leading the way. The Chinese national pavilion will feature over 100 exhibitors, including prominent names like Vocke Refrigeration and Xinlei Compressor.

## Climate World Congress 2025: A Platform for Global Innovation

The accompanying Congress will host over 100 global experts addressing smart climate control systems, energy efficiency, regulatory updates, market forecasts, and sustainable development. Sessions will include expert panels, workshops, and scientific conferences, providing unparalleled insights into the latest trends and technologies. Don't miss the chance to connect with global industry leaders and explore the future of HVAC&R. For further information, contact Ms. Anna Huber at [a.huber@euroexpo-vienna.com](mailto:a.huber@euroexpo-vienna.com) or visit [www.climate-expo.com](http://www.climate-expo.com).



# CLIMATE WORLD



20<sup>th</sup> International Exhibition  
of Heating, Ventilation,  
Air Conditioning and Refrigeration

**FEBRUARY 25-28, 2025**

**Expocentre Fairgrounds, Moscow**

**VENTILATION**

**HEATING**

**AIR CONDITIONING**

**REFRIGERATION**

**FLASHBACK 2024:**

**250 exhibitors**

**25 business events  
with over 100 speakers**

**Over 12.500 trade visitors**

**+50 media partners**

**CONTACT:**

Ms. Anna Huber

**E-Mail:** [a.huber@euroexpo-vienna.com](mailto:a.huber@euroexpo-vienna.com)

[climate-expo.com](https://climate-expo.com)



**Organised by:**

МОСКВА РОССИЯ  
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**РОССОЮЗХОЛОДПРОМ**



## ISK-SODEX which connects the HVAC-R industry from all over the world



ISK-SODEX which connects the HVAC-R industry from all over the world biennially, has come to an end. Nearly 1,000 exhibiting brands from 19 countries attended ISK-SODEX, where environmentally friendly, energy-recovery and high-efficiency sustainable products were showcased across 120,000-square-metre area at Istanbul Expo Center in 2023. ISK-SODEX hosted a total of 89,694 visitors, 15% of whom were from abroad.

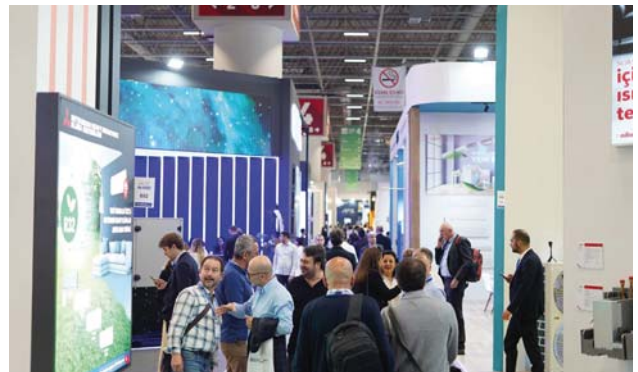
ISK-SODEX, showcasing the sectors of Heating, Refrigeration, Ventilation, Insulation and Installation contributed greatly to the development of the HVAC-R industry. A total of 89,694 trade visitors visited the exhibition and the trade fair hosted nearly 1,000 exhibiting brands from 19 countries.

### Attracted trade visitors from 114 countries

ISK-SODEX 2023 strengthened its international identity

with the exhibiting countries such as Azerbaijan, Bulgaria, China, Egypt, England, Germany, Italy, India, Japan, Poland, South Korea, Spain, Sweden, Switzerland and USA. At the same time trade visitors from 114 countries, including the countries that attract the most visitors such as Azerbaijan, Bulgaria, Egypt, Georgia, Germany, Greece, Iraq, Italy, Kosovo, Morocco, Romania, Tunisia and Uzbekistan, has visited the exhibition. Within the scope of the Buyer Delegation Program, organized by the HVAC-R Industry Exporters Association (İSİB), 300 VIP buyers from 69 countries participated in face-to-face meetings at ISK-SODEX and signed new commercial collaborations worth millions of euros.

The next edition of ISK-SODEX which brings the global HVAC-R industry together every two years, will be held at Istanbul Expo Center from 22-25 October 2025.





# ISK SODEX

INTERNATIONAL HVAC&R, INSULATION PUMP, VALVE, FITTING,  
WATER TREATMENT, FIRE PREVENTION, POOL & SOLAR ENERGY  
SYSTEMS EXHIBITION

22-25 OCTOBER 2025  
Istanbul Expo Center



Deutsche  
Messe

For More Information  
[sodex.com.tr](http://sodex.com.tr)  
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#### ORGANIZER

HANNOVER MESSE  
SODEKS FUARCILIK A.Ş.

T. +90212 334 6900  
info@sodex.com.tr  
www.hmsf.com

#### SUPPORTERS



#### FAIRGROUND



#### CO-ORGANIZERS / SUPPORTING ASSOCIATIONS



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# China Refrigeration Expo 2025: The 36th Edition Returns to Shanghai

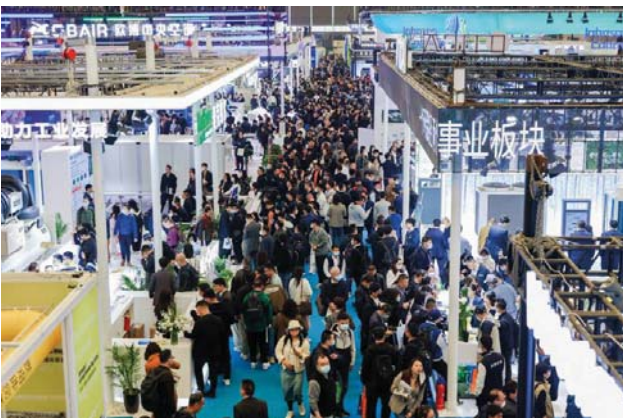


From April 27 to 29, 2025, the 36th International Exhibition for Refrigeration, Air Conditioning, Heating and Ventilation, Frozen Food Processing, and Storage (hereinafter referred to as the "China Refrigeration Expo") will take place at the Shanghai New International Expo Center. Sponsored by the China Council for the Promotion of International Trade Beijing Sub-council, the China

Refrigeration Society, the China Refrigeration and Air-Conditioning Industry Association, the Shanghai Society of Refrigeration, and the Shanghai Air-Conditioning and Refrigeration Institute, the event will be hosted by the Beijing International Exhibition Center.

The Expo, as one of the largest professional exhibitions around the world in the industry, was certified by two international authoritative institutions, UFI and FCS. It has formed a multi-disciplinary platform with exhibition and display as its main functions based on high-end forums and internet.

The theme of this year's China Refrigeration Expo is "Cooperative Innovation and Collaborative Development". Companies and institutions in the industry from 33 countries and regions around the world will participate in the exhibition to create a wonderful event for the HVAC industry. The organizing committee will continue to advocate the development concept of green exhibitions and fulfill the social responsibility of the organizers.





# THE 36TH INTERNATIONAL EXHIBITION FOR REFRIGERATION, AIR-CONDITIONING, HEATING AND VENTILATION, FROZEN FOOD PROCESSING, PACKAGING AND STORAGE

## Intelligence-Powered Cooling and Heating for Shared Future



APR 27-29, 2025 | Shanghai New International Expo Centre

### Organizers:



Chinese Association of Refrigeration (CAR)



China Refrigeration and Air-Conditioning Industry Association (CRAA)



Beijing International Exhibition Center Co., Ltd. (BIEC)



Shanghai Society of Refrigeration (SSR)



Shanghai Air-Conditioning and Refrigeration Institute (SARI)

### Supported by:



Beijing Chamber of International Commerce (BCIC)

### Show Management:



Beijing International Exhibition Center Co., Ltd. (BIEC)



Pre-registration



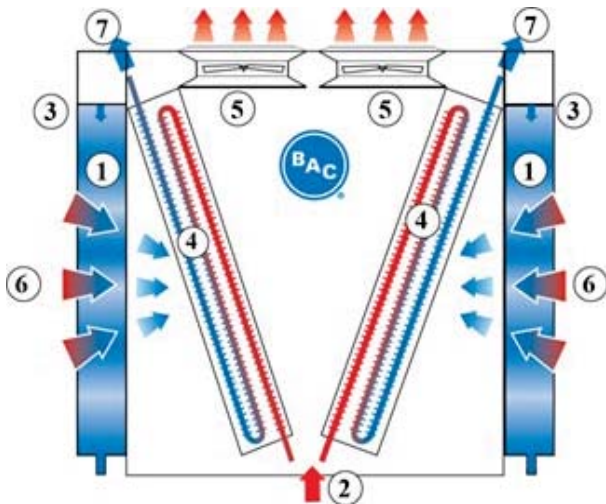
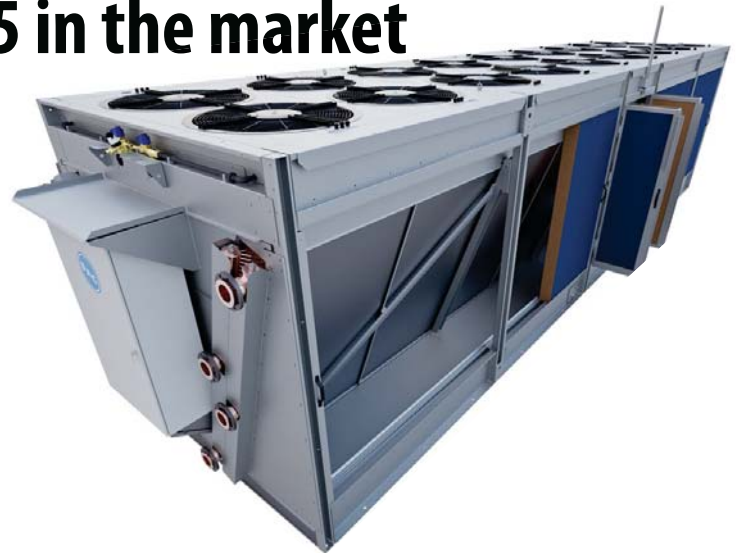
WeChat



TikTok

# At Baltimore Aircoil Company we developed and launched the first generation of adiabatic coolers in 2005 in the market

At Baltimore Aircoil Company we developed and launched the first generation of adiabatic coolers in 2005 in the market, which received a European Innovation Award at Interclima 2006. We didn't just settle for an air-cooled product with an adiabatic pre-cooler in front. The technology was taken a step further and the cooling system turned into a genuine adiabatic cooling system.



The TRF is a V-shaped TrilliumSeries adiabatic cooler equipped with adiabatic pre-coolers (1) that cool the warm process fluid (2) by sensible heat transfer. Water flows (3) evenly over evaporative cooling pads located in front of the dry finned coil (4). At the same time axial (5) fans draw air (6) through the pads where a portion of the water evaporates and cools down the saturated air. This increases the cooling capacity of the incoming air for cooling the process fluid (7) inside the coil.

## Redundancy

Large amount of fans that provide an unmatched degree of backup capacity and guaranteed redundancy. Optional internal partitioning panels create individual air intake ducts for each fan, eliminating thermal performance loss due to air bypassing the coil through an idle fan. Pre-cooler pump recirculation system with adiabatic backup guarantee in case of pump failure. Optimal controls guarantee full performance even with loss of controller or communication.

## Optimized design

Short gutter sections with diamond pattern holes and with pump distribution from the middle ensure an optimal water distribution. Separate panel with PLC interface.

## Lowest maintenance and easy inspection

All critical components are located outside, providing easy access at all times.

Fan motors can be replaced in all safety for both the intervening technician as well as for the unit. No risk of damage to critical components such as heat exchangers and bottom panels.

Pump maintenance is possible during adiabatic operation through large access doors in the pre-cooler.

Easy cleaning for the water distribution system from the fan deck.

## Unrivalled reliability

All structural elements are protected with Baltibond hybrid coating, offering the same reliable life expectancy as stainless steel 304L.

Special anti-abrasive protection on the pads ensures their durability under harsh conditions.

Epoxy coating (optional) on the coils increases the resistance against a humid environment, high chlorides and other corrosive agents.

## Superb hygiene

Without aerosol formation, TrilliumSeries Adiabatic Coolers-model TRF minimize the Legionella risk.

No continuously wet parts: all parts that come into contact with water are fully drainable, no water is stored in the unit during dry operation.

TrilliumSeries Adiabatic Coolers - model TRF cool incoming air without transferring water to the dry coil, preventing possible uncontrolled algae growth and corrosion.

## Plug and Play

Already for more than a decade we provide proven controls. All site specific parameters are factory set and tested before the unit is shipped.



# BVN: Shaping the Future of Ventilation



## Solutions in 2025 A Global Brand from Türkiye



For over 34 years, BVN has been a trusted leader in ventilation fan solutions, delivering millions of products to 98 countries worldwide. As we step into 2025, our commitment to innovation and excellence remains steadfast. We design, manufacture, and develop a comprehensive range of AC and EC ventilation fans and external rotor motors entirely in-house.

In 2025, BVN continues to invest heavily in Research and Development, staying ahead of global trends in energy efficiency, sustainability, and smart technologies. Our cutting-edge R&D facility allows us to pioneer new solutions, ensuring our products meet the highest international standards while supporting the global transition to greener technologies.

Our 100% local production ensures that BVN proudly delivers Turkish-made products with unmatched quality and reliability. This enables us to maintain a strong presence in the HVAC (Heating, Ventilation, and Air Conditioning) sector and other industries, catering to the dynamic needs of our partners worldwide.

Under our motto, "For a breath of fresh air," we aim to redefine comfort and efficiency while fostering a sustainable future for all. With a forward-thinking approach and a dedicated team, BVN is poised to lead the way in 2025 and beyond.

BVN AIR | BAHÇIVAN ELECTRIC MOTOR IND. VE TIC. LTD. STI.  
info@bvnair.com

# Daikin, The World's Number One

## Choice for Air Conditioning Systems

**Daikin, a leader in the air conditioning sector, continues to be the air conditioning choice of major projects both at home and abroad with its innovative, energy-efficient and state-of-the-art technology solutions offered in commercial and industrial areas. From hotels to hospitals, from shopping centres to universities, from factories to places of worship, Daikin adds value to countless projects worldwide.**



Daikin, the air conditioning industry's most experienced brand with over 100 years of experience, continues to be the preferred choice for major projects with its high-tech products and extensive service network. With a focus on customer satisfaction, sustainability and technological innovation, Daikin makes a difference in the industry with its energy efficiency, comfort, innovation and environmentally friendly products. Daikin develops tailor-made solutions for all types of projects by offering a wide range of products to meet different needs in different sectors. With deep-rooted experience and expertise in air conditioning, the brand has carried out many prestigious projects both at home and abroad, proving its reliability in the sector with its commercial and industrial projects.

With various commercial and industrial air conditioning options such as VRV systems, air handling units, fancoil products and chiller groups, Daikin Türkiye meets high quality and efficiency standards with domestic devices manufactured in its factory in Hendek. It is preferred in various areas such as hotels, shopping malls, residences, factories, hospitals, business centres, universities and housing projects.

### DAIKIN ASSURANCE AROUND THE WORLD

Projects with Daikin's signature are attracting attention abroad as well as in Türkiye. The Medeni Dinc Mall in Ashgabat, the capital of Turkmenistan, is perfectly air-conditioned with Daikin's chillers, air-handling units and fan-coil units, offering visitors a comfortable shopping experience. The Silk Road Samarkand complex in Uzbekistan, designed to be one of the most popular tourist destinations in Central Asia, is also air-conditioned with Daikin assurance. This huge project in Uzbekistan covers a wide



area from luxury hotels to convention centres and contributes to a sustainable approach to tourism thanks to Daikin's environmentally friendly solutions. The Sinomed MD Hospital, also in Tashkent, the capital of Uzbekistan, is also air-conditioned with Daikin's high-tech solutions.

### DAIKIN'S STRENGTH GROWS WITH LARGE PROJECTS

While these prestigious projects implemented by Daikin around the world showcase the brand's innovative solutions and reliable technology, they also add value to projects in Türkiye. Türkiye's largest pharmaceutical factory, VEM Pharmaceuticals, is being air-conditioned with Daikin's high efficiency chillers and air handling units. The project maintains high air quality and temperature conditions in sterile areas, ensuring the reliability of pharmaceutical production processes. The Basketball Development Centre, one of Türkiye's leading projects, is equipped with Daikin's high efficiency chillers, air handling units and fancoils to provide an ideal environment for athletes and spectators. Vakko Hotel & Residence in Nişantaşı, Istanbul, is equipped with Daikin's VRV systems and combines energy efficiency and comfort thanks to heat recovery systems and intelligent control units.

Daikin Türkiye's successful projects in various sectors clearly demonstrate the brand's ability to provide tailor-made solutions for different needs and its expertise in the field of air conditioning. It not only reinforces Daikin's leading position in the industry, but also supports its vision of contributing to energy efficiency and sustainability goals and shaping the future of the air conditioning industry worldwide.





# DOGU HVAC Innovative Solutions Featured in Moscow's Prestigious Badayevskiy Project!



DOGU HVAC has once again demonstrated its success in the international market with its contribution to the prestigious Badayevskiy project, a hallmark of modern architecture in Moscow. For this high-profile project, DOGU HVAC designed a total of 800 custom CFHR Ceiling Type(Counterflow) Heat Recovery Units tailored to meet the project's specific requirements.

The specially designed DOGU CFHR Ceiling Type (Counterflow) Heat Recovery Units are engineered to enhance indoor air quality in conditioned spaces. These units effectively reduce accumulated carbon dioxide and other harmful gases, delivering high-quality air. Equipped with plate heat exchangers, they recover up to 94% of the thermal energy from exhaust air, ensuring maximum efficiency. Unlike standard CFHR Heat Recovery Unit models, these custom units are designed for bottom-access maintenance and feature integrated automation panels supported by DOGU SMART IoT systems. With their energy-efficient and user-friendly design, the units have been tailored to meet



the project's high standards and performance requirements.

Additionally, the units are equipped with bypass dampers, free-cooling functionality, and frost protection to ensure safe and reliable operation in the building. By incorporating the CFHR Heat Recovery Units into this prestigious project, DOGU HVAC not only enhances energy efficiency but also makes a significant contribution to sustainability.

These high-efficiency units deliver exceptional performance through quiet-operating EC Plug fans. They offer adjustable airflow with a three-speed control system and a plug-and-play control panel, ensuring ease of use. The dual-wall panel structure with 30 mm insulation minimizes energy losses, while the optional smart automation solutions enhance energy savings and operational convenience.

At DOGU HVAC, we take pride in our innovative technologies and customized climate control solutions that leave a lasting mark on landmark projects like Badayevskiy.

# Eneko: The HVAC Expert Offering Efficient Solutions



Eneko is a company that provides high-efficiency energy and heat recovery and HVAC solutions for projects in various fields such as residences, offices, factories, shopping malls, airports, hospitals, industrial facilities, industrial kitchens, areas with swimming pools, and schools.

Founded in 2004 in İzmir-Çiğli, Eneko has continued its production in the same region since its establishment, bringing innovative solutions to the sector. The name Eneko derives from the phrase "Energy Economy," symbolizing efficient usage.

Initially, the company specialized in the production of heat recovery units, and since 2009, it has also started producing heat recovery air handling units and expanded into exports. Today, approximately 70% of its production is exported, primarily to European Union countries.

Eneko's extensive product range includes Residential-Type Units, Ceiling-Type Units, Compact, Modular and Heat Pump-Integrated Air Handling Units, Heat Pump Units, Packaged Dehumidification Units, and Commercial Kitchen Ventilation Systems. These units are designed based on the "plug-and-play" principle, ensuring easy installation and quick commissioning. Additionally, they can be monitored remotely, allowing them to operate at maximum efficiency at all times.

With its knowledge and experience, Eneko adopts a solution-oriented approach, adding value to its customers through flexible production processes and innovative product capabilities. The company places special emphasis on design in its R&D processes, producing products tailored to customer needs. This approach positions Eneko as a reliable and innovative solution partner in the industry.

With its strong R&D infrastructure, Eneko develops innovative products that make a difference in the industry. Its flexible approach to production ensures a focus on customer demands and the ability to provide tailored solutions. By prioritizing quality at every stage, from R&D processes to product design, Eneko places customer satisfaction at the forefront.

All of Eneko's devices are certified by Eurovent and CE, proving their compliance with international standards and high quality.

Through these practices, Eneko operates with the mission of delivering clean air to a wider audience, making its products a preferred choice in the global market. Looking ahead, Eneko aims to strengthen its presence in the industry with a commitment to continuous innovation and development.



# Air Cooled Water Chiller with Scroll Compressor - EBHS



ERBAY Water Chillers are designed to outdoor installation and provide chilled water leaving temperatures which are given on capacity tables in our factory carrying out EN ISO 9001:2015 Quality Management System. The Units are supplied to ready for installation. All connections, oil and refrigerant charge and required tests are made in our factory. Our units are in conformity with health and safety requirements of European Union directives and relevant harmonized standards.



**Cooling Compressor:** According to capacity hermetic scroll compressors are used between 1 and 6 pieces and compressors are used as single, tandem or trio on each independent refrigerant circuit. Tandem and trio compressors are mounted on solid frame rail so vibration effect is prevented. Equal oil distribution is provided on compressors by using oil equalizing system.

**Condenser:** Air cooled condensers are manufactured by collating special profile aluminium fins on copper tubes. Copper tubes are expanded special process in order to increase thermic conductivity between copper tubes and aluminium fins. By this means heat transfer reaches to maximum level.

**Fan:** The high efficient axial fan which is directly coupled with the motor, noiseless bearing, balanced statically and dynamically is mounted on the device to provide the condensation of the refrigerant in the condenser.

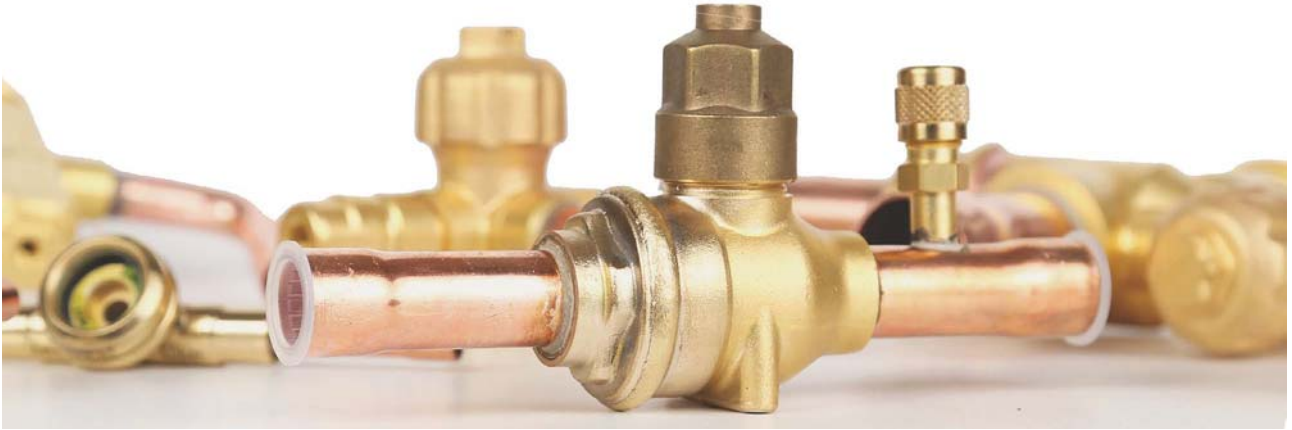
**Evaporator:** Direct expansion evaporator is manufactured in Shell & Tube form and special high efficient copper tubes are fixed to steel tubesheet holes with tube expander method. It's allowed to maintenance and clean up because of the removable tube bundle. Evaporators are in conformity with EN 14276-1 and EN 13445 standards and designed for chilling water and glycol brines. External surface of evaporators and compressor suction lines are insulated with insulation material with suitable thickness.

**Electrical Control Panel:** The panel is designed to IP54. To operate the Unit automatically and securely, the panel is composed of two different sections. The first section is power section and the other one is control sections. The panel is equipped with enough number of contactors, thermic, fuses and on-off switches. The panel and wiring are in conformity with EN 60204-1 standard.

**Microprocessor Control System:** Microprocessor control system is used on the Unit. By means of this; entering and leaving water temperature, refrigerant pressures on the suction and discharge lines, occurred superheat temperature of evaporator, operating times of compressors, all faults occurred on the system and all alarm history can be seen on the digital screen and also capacity control can be made easily. Besides condenser fans are controlled automatically depending on the ambient temperature and the operating times of each compressor is balanced so optimum efficient operation of the Unit is provided.

**Components of the Cooling Circuit:** To operate the Unit automatically and securely; electronic expansion valve drier-filter, sight glass, relief valve, flow - switch, high - low pressure switch and shut - off valves are included.

# Ercan Teknik & E.C.A Solutions for Cooling System Valves with Maximum Durability and Adaptation



**ERCAN TEKNİK and E.C.A's refrigerant valves, draw all attention towards themselves in the cooling market with their high performance and durability features.**

Although E.C.A. is the biggest valve manufacturer in Turkey, for more than 50 years they have focused on water, steam, sanitary and gas valve production. With the collaboration of E.C.A. and ERCAN TEKNİK engineers, the new refrigeration valve range has been introduced to the market almost 10 years ago. With "continuous improvement" motto, E.C.A. became the preferred brand passing its European competitors in Turkey. Currently Turkish HVAC-R market uses 85% of E.C.A. with its esteemed brand and high quality. E.C.A. product range covers all CFC, HFC, HCFC, HFO and Natural Refrigerants excluding the Ammonia (NH3). Nowadays the E.C.A. CO2 product range becomes very popular in Europe due to the F-Gas Regulation and its wide range of products.

**E.C.A. Refrigeration Product Range:** Bi-flow Ball Valves, 2-3 Way Motorized Ball Valves, Safety Valves, Sight Glasses with Moisture Indicator, Changeover Valves, Y-Filters, Service Valves, Check Valves, Solenoid Valves.

**SMART SYSTEMS WITH ENERGY EFFICIENCY THANKS TO 40 YEARS OF KNOWLEDGE AND EXPERIENCE FROM ERCAN TEKNİK!**

As it is well known, 40 years of existence in a sector brings with a strong experience and solutions. With this experience and skills, Ercan Teknik team; offers high-level systems to their customers. For Ercan Teknik, it is also important to reduce costs in systems with eco-friendly methods. Therefore, Ercan Teknik solutions consist of eco-friendly equipment focused on minimizing consumption while maximizing energy efficiency in applications.

## Ercan Teknik Solutions

### **RIPEN-IT:**

Thermoregulation, Humidification, CO2 Level Control, Air & Gas Homogenization, C2H4 Level Control, Periodically Generation of Food Quality & HACCP Reports, Live monitoring of the Ripening Process, Complete Control of the Refrigeration Cycle.

### **POT-8-0:**

Precision Thermoregulation, Humidification, CO2 Level Control, Air & Gas Homogenization, Free Cooling via Outdoor Air, Periodically Generation of Food Quality & HACCP Reports, Alarm Management & Notification via email or SMS, Potato Core Temperature Monitoring up to 3 different probes, Daily Potato Core Temperature Reduction Algorithm.

### **FRESH as EVER:**

Thermoregulation, Humidification, CO2 Level Control, C2H4 Level Control (optional), Complete Control of the Refrigeration Cycle (Split Units), Inverter Compressor Management, Digital Scroll Compressor Management, Condensation Management, Management of up to 3 Evaporators in a single Room.

### **DRYCOOLER**

DRY Cooler application; manages pump stations, adiabatic coolers and heat exchangers with advanced ventilation regulation. The flexibility of this application allows it to work in combination with many other applications. Application can work either stand alone or integrated to a chiller unit as a free cooling source.



# Form's Growth Fueled by Local Production and R&D: The Key Towards Global Success



## Efficient, Sustainable and Innovative Solutions

FORM Eurovent certified FKS air handling units meet the required level of indoor air quality while maintaining the humidity and the temperature under control. With modular, flexible and environment friendly solutions, it provides ideal comfort for commercial and residential buildings while providing high energy savings.

It stands out especially with T2 (TT Class) in Thermal Transmittance class and TB1 (TBF Class) in Thermal Bridging class values which represent very low energy loss.

FORM FKS Air Handling Unit, which can be produced in 60 different modules with a flow rate between 1,000 m<sup>3</sup>/h and 130,000 m<sup>3</sup>/h, has a special steel casing structure and 60 mm double skinned panels with thermal barrier PVC profile.

Form, one of the leading companies in the air conditioning industry in Turkey, leverages its 60 years of industry experience and focus on local production to deliver value-added projects. Offering a broad spectrum of both industrial and commercial products—from rooftop air conditioners to heat pumps, fan coils and heat recovery to air handling units and from adiabatic cooling systems to cooling tower—Form provides comprehensive service. Its product range combines cutting-edge technology with high efficiency. Form Group distinguishes itself with its nationwide sales network, robust presence overseas and production capabilities.

## As an authorized distributor for several global industry leaders, Form offers a wide range of high-quality products

On the sales side, Form not only expands its product offerings to customers with a range of domestic products but also serves as the sole authorized distributor for several global industry leaders in Turkey, including Lennox, Clivet, Mitsubishi Heavy and others. Form's product lineup includes locally produced items such as the Form WSHP water source heat pump, fan coils, heat recovery units, cooling tower and air handling units. Additionally, under a licensing agreement, Form produces and sells Lennox-branded rooftop air conditioners in Turkey. Remarkably, Form is the first company worldwide to receive exclusive licensed production rights from Lennox for these rooftop air conditioners.

## High level of R&D and local production

On the industrial equipment production side, Form manufactures a variety of systems including evaporative cooling units, smoke evacuation solutions, natural ventilation, and natural lighting systems. By delivering the fastest and most efficient products, Form effectively meets the demands and needs of the industry. With its strong team, extensive experience, and significant R&D investments, Form not only excels in innovation but also contributes significantly to exports and employment.

Apart from Form FKS Air Handling Unit, Form Hygienic Air Handling Units with stringent hygienic features are demanded also in Health Care, Pharmaceuticals, Semiconductors and Food & Beverage industries. Form Hygienic Air Handling Units differ from a standard units on lot of aspects like shaping of components, construction, cleanability, accessibility, material specification and component features. FKS- Hygienic Version is tested and certified by TÜV SÜD Compliance with Hygienic requirements used materials/accessibility/cleanability) according to German standards VDI 6022/Part 1 and DIN 1946-4 and is a perfect fit to various Hygienic applications.

Form Group is pleased to announce the establishment of its own Cooling Tower company called Form Freva that provides design, manufacturing, and turnkey installation services for process water cooling equipment for comfort and industrial sectors with a dynamic engineering and manufacturing team based on over 20 years of knowledge and experience. The activity subject devices are open and closed type cooling towers, hybrid type (can operate as semi-wet-semi-dry) cooling towers, dry and adiabatic coolers, evaporative and adiabatic condensers, and industrial type fin fan dry coolers. Especially in today's conditions where energy and water resources are of great importance, we gain customer trust by meticulously applying quality control processes, offering reliable products adhering to the highest quality standards.



# All-in-One Storage Solutions with FRIGO-PAC

Frigoblock proudly presents Frigo-Pac, an all-in-one device designed to meet all your potato and onion storage needs. Combining cutting-edge technology with user-friendly features, Frigo-Pac integrates cooling, heating, humidification, and ventilation in a single, compact system. This makes it the ultimate choice for preserving the freshness and quality of your produce.

Frigo-Pac is engineered for versatility, with models designed to accommodate various storage capacities ranging from 250 to 1,500 tons. Whether your produce is stored in crates or bags, this system ensures optimal conditions with precise temperature and humidity control. Frigo-Pac's advanced automation allows users to monitor and adjust storage settings easily through a computerized interface, providing full control.

The device uses external air, internal air, or a combination of both to maintain ideal storage conditions while minimizing energy consumption. This innovative approach results in significant cost savings and reduced environmental impact, making Frigo-Pac a highly sustainable solution. Additionally, its adiabatic humidification system prevents unnecessary drying, keeping your produce fresh for longer periods.

## Key Advantages of Frigo-Pac:

- **Easy Installation:** Quick setup with minimal installation costs.
- **Energy Efficiency:** Utilizes outside air for cooling when conditions are favorable, reducing energy use.
- **Smart Automation:** Computerized control system for effortless operation.
- **Enhanced Humidification:** Tailored humidity levels for different product types.
- **Scalable Options:** Models to suit small to large storage facilities.
- **Reliable Design:** Built with high-quality materials for durability and easy maintenance.

With Frigo-Pac, you are investing in a reliable, cost-effective, and sustainable storage solution. Elevate your storage capabilities and preserve the quality of your produce like never before. Frigo-Pac isn't just a device; it's the key to smarter and more efficient storage.





# Friterm Continues to Expand its Product Range



Stainless Steel Heat Exchanger

Since 1979 Friterm has been developing and manufacturing heat exchanger for any type of applications. Stainless fin material was integrated into fin die 50x50, with this investment Friterm is able to design and manufacture completely stainless steel heat exchanger made of SS304 (1.4301) or 316L (1.4404).

**For following applications, the use of a stainless steel heat exchanger is appropriate to take into consideration**

1- Internal corrosion risk due to fluid in tube; demineralized water, NH<sub>3</sub>, CO<sub>2</sub> etc.

2- External corrosion risk

- environmental reasons or industrial markets with a corrosive environment such as off shore, sewage treatment plants
- food industry such cheese, fish cold rooms, wine cellar
- for aggressive sanitizing washings
- for minimum of susceptibility to soiling and demanding hygienic areas
- for continuous passage of water as for hydro cooling applications

3- Temperature reason (air inlet temperature below -40°C)

4- High material strength

Depending on application, the suitable material combinations are selected from a wide range of materials. Tube material is copper, K-65, stainless steel, aluminium and fin material is aluminium, copper, aluminium alloys, coated aluminium, stainless steel for finned type heat exchanger. Carbon steel and titanium tubes are also possible for custom made solution.

Please visit the website [www.friterm.com](http://www.friterm.com) for further information or please contact Friterm sales engineer. Friterm engineers are happy to advise the best solution using our know-how and thermal software.



Custom made Stainless Steel Air Cooler for NH<sub>3</sub> Pump System

# GEMAK offers “Product Selection Programme”



## GEMAK Product Selection Program



Serie Selection

Data Input

Preferences

Required Total Capacity

10000

Watt

No. of Unit/Capacity

1

10000.00

Tolerance

10

10

Refrigerant

R404A

Average Room Temperature

0

Evaporation Temperature/ΔT

-8

8

SC1

SC2

SC3

SC4

Find Product

Evaporator Product Selection List

|    | Model            | Unit Capacity (Watt) | Number of Units (Adet) | Total Capacity (Watt) | Capacity Ratio (%) | Heat Transfer Surface (m²) | Fin (mm) | Air Flow (m³/h) | Fan Diameter (mm) | Number of Fan (Pcs) | Total Power Input (kW) | Price | Tot. Fail. Curr. (A) |
|----|------------------|----------------------|------------------------|-----------------------|--------------------|----------------------------|----------|-----------------|-------------------|---------------------|------------------------|-------|----------------------|
| 13 | 8 GNE 40.3.4     | 9.700,00             | 1                      | 9.700,00              | 97,00              | 35,7                       | 8        | 10.800          | 400               | 3                   | 0,48                   | 0,00  |                      |
| 14 | 4 GNE 40.2.4     | 9.800,00             | 1                      | 9.800,00              | 98,00              | 48,4                       | 4        | 6.500           | 400               | 2                   | 0,32                   | 0,00  |                      |
| 15 | 4 GNE 50.1.6 S   | 9.800,00             | 1                      | 9.800,00              | 98,00              | 44,7                       | 4        | 5.500           | 500               | 1                   | 0,71                   | 0,00  |                      |
| 16 | 4 GNE 50.1.6 B   | 9.900,00             | 1                      | 9.900,00              | 99,00              | 47,9                       | 4        | 5.700           | 500               | 1                   | 0,71                   | 0,00  |                      |
| 17 | 8 GNE 35.3.6     | 10.000,00            | 1                      | 10.000,00             | 100,00             | 38,2                       | 8        | 7.200           | 350               | 3                   | 0,41                   | 0,00  |                      |
| 18 | 6 GNE 50.1.8 S   | 10.170,00            | 1                      | 10.170,00             | 101,70             | 41                         | 6        | 5.500           | 500               | 1                   | 0,71                   | 0,00  |                      |
| 19 | 8 GNE 45.2.5 S   | 10.180,00            | 1                      | 10.180,00             | 101,80             | 32,2                       | 8        | 9.200           | 450               | 2                   | 0,49                   | 0,00  |                      |
| 20 | 6 GNE 50.1.8 B   | 10.230,00            | 1                      | 10.230,00             | 102,30             | 43,9                       | 6        | 5.750           | 500               | 1                   | 0,71                   | 0,00  |                      |
| 21 | 4 GNE 50.1.6 B S | 10.300,00            | 1                      | 10.300,00             | 103,00             | 47,9                       | 4        | 5.700           | 500               | 1                   | 0,71                   | 0,00  |                      |
| 22 | 4 GNE 40.2.4 S   | 10.500,00            | 1                      | 10.500,00             | 105,00             | 48,4                       | 4        | 6.800           | 400               | 2                   | 0,32                   | 0,00  |                      |
| 23 | 6 GNE 40.2.5 S   | 10.500,00            | 1                      | 10.500,00             | 105,00             | 41,6                       | 6        | 6.900           | 400               | 2                   | 0,32                   | 0,00  |                      |
| 24 | 8 GNE 35.3.6 S   | 10.500,00            | 1                      | 10.500,00             | 105,00             | 38,2                       | 8        | 7.200           | 350               | 3                   | 0,41                   | 0,00  |                      |
| 25 | 4 GNE 35.3.4     | 10.520,00            | 1                      | 10.520,00             | 105,20             | 47,9                       | 4        | 7.050           | 350               | 3                   | 0,41                   | 0,00  |                      |

Page 1 of 1

View 1 - 32 of 32

Dimensions

Technical Specifications

Fan Specifications

Technical Documents

A (mm) : 1815

B (mm) : 530

C (mm) : 365

D (mm) : 1550

F (mm) : 465

G (mm) : 415

ØDin : 16 mm

ØDout : 28 mm

Gemak provides Standart product selection software which is available free on our web site [www.gemakltd.com](http://www.gemakltd.com) with multiple language options like English, German, Russian, Italian and Arabic. Gemak standart product selector software is an application developed to select the most appropriate standart condensers and evaporators by entering the parametres

such as capacity, operating conditions, fin spacing, diemensions etc.

With its motto “Quality First” GEMAK has identified its success with the quality product policy. Our Quality Management System is of a structure in which all employees feel that they are a part of the system and evaluate their work. Aiming to achieve continuous

improvement, our company continues to work with a customer oriented approach. Focusing on customer satisfaction our company has the principle of assuring customers with its products and product quality. Diversity of products, opting to use international standards and advance technologies is the proof of this mindset.



# Güven Soğutma's Strategic Alliances and Global Expansion in the HVAC&R Market



Güven Soğutma Ünit. San. ve Tic. A.Ş. produces liquid receivers and compressor protective equipment at 15.000 m<sup>2</sup> production area with experienced staff and increases its equipment variety each day.

We are happy to inform you about our expanded product range. Now our customers can reach quality products and wide varieties at best prices. We have firstly included the German DEKA company, which produces liquid and oil control equipment, and then the engineering experience of American Parker Sporlan to the value-added product sales we initiated with the Italian OLAB brand, which manufactures valves and connection equipment for cooling systems. And finally we have made an authorized dealer agreement with SANHUA company.

Sanhua is a leading HVAC&R manufacturer of controls and components with a global footprint and 30 years of experience. The company has 9 important production bases and more than 20 factories, located in China (Zhengjiang, Anhui, and Jiangxi), Poland, Austria, Mexico and America with more than 25 thousand employees all over the world.

Thanks to our nearly 40 years of experience in HVAC&R industry, we export to 65 countries and we have sales representatives in 47 countries. We are powered by our customer's needs and continue to take bigger and firmer steps each day.

|                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>GVN (TURKEY)</b> <ul style="list-style-type: none"> <li>• Liquid Receivers</li> <li>• Collectors</li> <li>• Suction Line Accumulators</li> <li>• Filter Drier Shells</li> <li>• Mufflers</li> <li>• Oil Strainers</li> <li>• Oil Level Regulators</li> <li>• Oil Reservoirs</li> <li>• Oil Separators</li> <li>• Liquid Line Filter Driers</li> <li>• Vibration Eliminators</li> </ul> | <b>SANHUA (CHINA)</b> <ul style="list-style-type: none"> <li>• Thermostatic Expansion Valves</li> <li>• Electronic Expansion Valves</li> <li>• Solenoid Valves</li> <li>• Check Valves</li> <li>• Ball Valves</li> <li>• Electronic Controls</li> <li>• Sight Glasses</li> <li>• Pressure Controls</li> <li>• Filter Driers</li> <li>• 4-way valves</li> <li>• Micro-Channel Heat Exchangers</li> </ul> | <b>DEKA (GERMANY)</b> <ul style="list-style-type: none"> <li>• Electronic Level Sensors</li> <li>• Electronic Oil Level Regulators</li> </ul> <b>OLAB (ITALY)</b> <ul style="list-style-type: none"> <li>• Safety Valves</li> <li>• Fittings</li> </ul> <b>PARKER / SPORLAN (USA)</b> <ul style="list-style-type: none"> <li>• Thermostatic Expansion Valves</li> <li>• Electric Expansion Valves</li> <li>• Filter Driers</li> </ul> |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

# Isışah Group: 43 Years of Excellence in HVAC and Innovation



We as a İSİSAH GROUP is one of the oldest company in HVAC (Heating, Ventilation and Air Conditioning) sector in Turkey. Which specialize in such as Electric Heating systems and Stainless Steel Tubes with 35 years of experience and strength with various industries in Bursa/TURKEY since 1982.

As one of the largest companies in its sector in Turkey, İSİSAH, with the power and experience of 43 years, received the R&D Center registration certificate in 2018 and continued its activities on the way to becoming an exemplary company with its expert staff.

**There are 3 companies under our group company.**

## **1. İSİSAH ENDÜSTRİYEL REZ.VE İSİ EKİP. A.Ş**

*Our main production groups are;*

- Engineering Projects
- Heaters for Railways Industry
- Heaters for White Goods
- Mobile Electric Heating Units
- Duct Type Heating Units
- Tube Resistors
- Infrared Technology Paint Drying Units

*For Railways Industry ;*

- AC Heaters,
- Staff and Passenger Seat Heaters,
- TIJ-TIJ Cases,
- Chassis Heaters,
- Rail and Point Heaters



## **2. BORŞAH BORU SAN.VE TİC.A.Ş**

*For Tube Industry we produce;*

- Production of round stainless tube
- Production of round stainless annealed tube Diameter (from Ø 7.5 mm to 42 mm)
- Oval stainless tube production
- Oval stainless annealed tube production

## **3. SALMEX İSİ SAN.TİC.A.Ş.**

*Combi Boiler Components Production*

- Condensing Heat Exchanger
- Electrical Heat Exchanger
- New Generation Electrical Heat Exchanger
- Conventional Copper Heat Exchanger





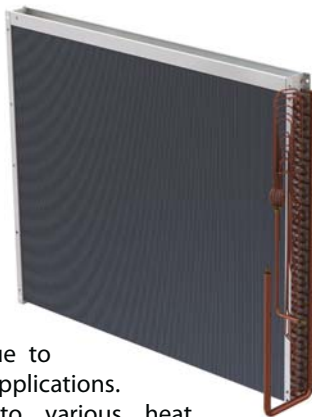
# KARYER Investing to the future of Heat Exchangers



KARYER, a global leader in heat exchanger, evaporator and condenser production, continues to set benchmarks in the fields of refrigeration, air conditioning and process cooling. With over four decades of expertise and portfolio of 36,000+ standard and OEM products, KARYER has known as a trusted partner in 79 countries.

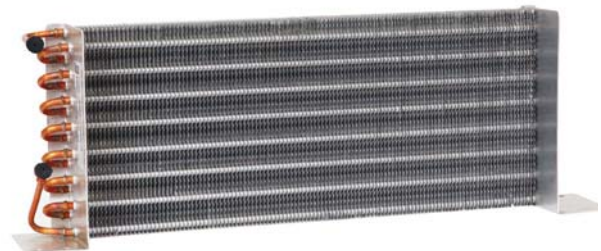
In 2024, KARYER captured significant customer attention in its energy-efficient products. These solutions, designed to minimize environmental impact while maximizing performance. Here is some of the innovative products that stand out:

**Heat Pump Coil:** Heat pump coil ensures a highly efficient heat transfer process, supports low-energy consumption while aligning with sustainability goals by reducing environmental impact. R290, R32 and R410A are frequently used in our heat pump applications. The use of R290 refrigerant has been recently increasing due to the low GWP in heat pump applications. Perfect for integration into various heat pump configurations, have a compact design and can be integrated into different systems.



**5mm Condenser:** Designed for use with CO2 refrigerant, KARYER's innovative 5mm condenser offers high capacity and enhanced efficiency in a smaller, more compact form. The eco-friendly design requires less installation space, uses

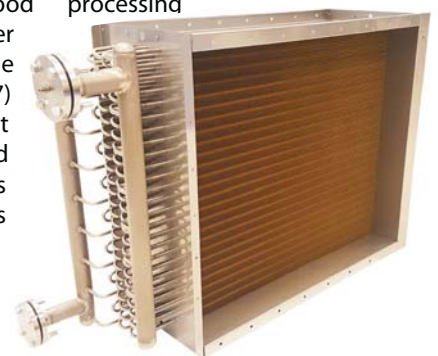
lighter materials, and reduces refrigerant charge volumes, aligning with energy-saving and environmental goals.



**EA-DA Evaporators:** Engineered for small and medium-sized cold rooms, the EA-DA evaporators excel at maintaining optimal conditions for fruit and vegetable storage. These evaporators are thermally efficient and designed to minimize moisture loss while operating effectively at small temperature differentials, making them ideal for cold storage applications.



**Stainless Steel Coils:** Stainless steel is highly resistant to corrosion and rust, making it suitable for marine, chemical, pharmaceutical, food processing and many other fields. It is suitable for Ammonia (R 717) application and it can be produced in different sizes and configurations according to customer needs.



# ISO 16890 General Ambient Ventilation Filter Tests



The ISO 16890 standard is the new standard that has replaced the EN779:2012 standard. This standard covers Coarse filters (Class G), Medium filters (Class M) and Fine filters (Class F). MGT Filter performs tests within the framework of ISO 16890 standard, exposing a filter to particles from 0.3  $\mu\text{m}$  to 10  $\mu\text{m}$  in size. This means testing the filters in conditions much more similar to real life and getting a product with the performance you expect.

MGT Filter performs tests on its products according to ISO 16890, EN 779 and ASHRAE test standards. Eurovent, which is independent, also has tests done on the capacity and performance test data of the products it produces in order to ensure "proven/confirmation".

R&D activities are carried out according to the pressure and efficiency performance results of the filter. In line with the customer's request, filter testing service is also offered.

## EN 1822 and ISO 26463 High-efficiency Hepa-Ulpa Filter Tests

Efficient air filters (EPA), high efficiency air filters (HEPA) and ultra-low penetration air filters (ULPA), filters produced for ventilation and air conditioning systems such as clean room applications are tested according to EN 1822 and ISO 29463 standards. MGT Filter tests every product it produces according to these standards and determines the filter performance.

R&D activities are carried out according to the pressure and efficiency performance results of the filter. In line with customer demand, filter testing service is also offered to customers.

## ISO 16890 General Ambient Ventilation Filter and EN 1822 Media Tests

MGT Filter makes detailed comparisons by pre-testing the media produced by raw material manufacturers. The selection of the most suitable quality raw materials is supported by the test results obtained from here. Pre-tests of raw materials before filter production are carried out with this system and controls are carried out.





# A Solution for All Four Seasons



Founded in 2008, Refkar rapidly grew by investing in technology and machinery, solidifying its position in the industry. Today, with nearly 100 employees, Refkar continues its production operations in a 6,500 m<sup>2</sup> open and 5,100 m<sup>2</sup> enclosed facility. The company achieves high production efficiency with its advanced machinery park and modern production lines, continuously following technological innovations to maintain its leadership in the sector.

As one of Turkey's leading manufacturers of Shell & Tube type heat exchangers, Refkar offers a wide range of products, including Freon, CO<sub>2</sub>, and biogas heat exchangers, flooded evaporators, and water and seawater-cooled condensers. Using high-quality materials in its production, Refkar provides fast and reliable solutions tailored to customer demands.

Prioritizing environmentally friendly technologies, Refkar focuses on minimizing waste and increasing efficiency in its production processes, while working towards reducing its carbon footprint.

With exports to over 50 countries, Refkar holds a strong position in international markets, offering the "Refkar Selector" product selection program and multilingual customer support.

Şant Özbülül, Chairman of the Board of Refkar: "We will continue to work with all our strength to provide the highest quality products to our business partners."

For more information, visit [www.refkar.com](http://www.refkar.com)



# New Design Dry Cooler with Adiabatic



SARBUZ HEAT EXCHANGERS Industry and Commerce Inc. was established in 1953 with the purpose to serve HVAC-R industry. Through its gradually increasing experience and knowledge by years, SARBUZ has started manufacturing finned type of heat exchangers in 1974. Sarbuz manufactures evaporators, condensers, heating and cooling coils, steam coils, dry coolers and O.E.M. coils for over 45 years for the companies which are active in the HVAC-R, energy and mobile refrigeration industry and also provides finned type heat exchangers for different companies in the country or internationally.

SARBUZ serving you customers by their new design DRY Cooler with Adiabatic Cooling Pad Systems.

## Adiabatic Cooling Pad Systems

Efficiency has come to the fore in cooling systems due to increasing energy consumption costs. One of the most important energy consumption elements in cooling systems is defrost. In many applications, electric heaters are used for defrosting, negatively affecting energy consumption. Sarbuz company continues to take measures to reduce this energy consumption. Thanks to this technology called glycol defrost, a glycol circuit is used inside the evaporator instead of an electrical heater, providing a hot glycol-water mixture to pass through this circuit and defrosting is performed. It is possible to obtain the hot water-glycol mixture by using a desuperheater between the compressor and the condenser. In this way, there is an extra saving as it also reduces the need for condensers.

Condenser selection is very important in cooling systems and directly affects system efficiency and cooling capacity.

In the well-known finned and tube condenser, the heat transfer is directly limited by the dry bulb temperature. Therefore, it is possible to increase the efficiency of the system in dry and hot weather by using an adiabatic pad. The system works by evaporative cooling reduction of the condenser air inlet temperature by placing specially designed pads at the air inlet of the condenser and wetting pads. The air temperature entering the condenser reaches levels close to the wet bulb temperature. In this application, thanks to the pads, it is aimed to increase the efficiency by targeting the minimum water consumption.

As a Company Quality Policy, first quality material usage is very important subject also for this new series.

SARBUZ Family is racing with herself about increasing her turnover, export percentage and quality bar by long term customer relations and supports.





# Tekfil: Your Trusted Solution Partner **tekfil®** in Filtration with 33 Years of Experience

*Clean Air is Our Business*



In today's modern, densely populated, and industrialized world, the need for clean air to protect people, products, and processes is increasing. There is no better place to express the importance of clean air than Tekfil, with its slogan "Clean Air is Our Business." Since its establishment in 1992, Tekfil has been operating in the production and marketing of industrial filters, ventilation and air conditioning systems, dust collection systems, and filtration systems for odor and gas filtration with its experienced and specialized staff. Furthermore, as a result of its commitment to quality and

customer satisfaction from the very beginning, Tekfil has emerged as a trusted name in the industry.

Among the product groups produced by Tekfil are particle, molecular, and air filtration products and components for commercial and industrial HVAC, automotive, gas turbine, odor and gas filtration, and clean room applications. The main products it manufactures include panel filters, bag filters, compact filters, mini-pleated panel filters, HEPA filters, and activated carbon filters.



# Thermoway Inc. expands its product range



Thermoway Inc. Since its establishment, it has been following the technological developments, making needs oriented designs regarding customer expectations, and making growth oriented investments every day by observing the principles of energy efficiency and environmental protection.

For these purposes, Thermoway Inc. it expands its product range by adding new products to its product range.

- In our newly designed TLG series condensers, thermal efficiency has been increased and energy efficiency has been brought to the forefront by using inner grooved pipes and changing the lamella surface structure.



Capacity Range: between 17,8kw - 709,4kw  
Lamella Spacing: 2,1mm - 2,5mm  
Fan Diameter Range: From Ø500mm to Ø800mm

- Our new TEC series for cold room evaporators which have been designed to insure high heat transfer efficiency along with easier assembling and maintenance processes are begin produced with 4-4,2-6-7-8-10 mm fin spacings. TEC series evaporators are offered to your service in 5 different series according to their intended use. TEC C series standard room wall type, TEC S series corner ceiling type in small sized rooms, TEC D series is generally double blow ceiling type in working environments and places where low air velocities are preferred, TEC A series is designed to reduce product loss in fruit and vegetable storage, to increase thermal efficiency and to provide more homogeneous air distribution in the room. TEC M Mini Air Coolers - Specifically designed for small cold rooms, display cases and reach-in cabinets

Capacity Range: 2,0kw – 83,4kw  
Lamella Spacing: 4-4,2-6-7-8-10mm  
Fan Diameter Range: From Ø250mm to Ø500mm



- Box series condenser units designed in line with customer demands are designed to be able to install many types of compressors and auxiliary equipment, and 4 different types (TBOX, EBOX, MBOX, SBOX, HBOX, QBOX, WBOX) are offered to our customers.

Capacity Range: between 2kw – 1.150kw  
Lamella Spacing: 2,1mm - 2,5mm  
Fan Diameter Range: From Ø250mm to Ø800mm



Thermoway Inc. It will continue to work with the aim of improving its machine park day by day, ensuring that its personnel are trained in a way that will ensure their development, and making product traceability possible under all conditions by improving the quality management system and will continue to be your reliable business partner by offering new products to our customers.

For the further information please visit our website.



# ULPATEK, On the Path to Becoming a Global Brand



With over 45 years of deepening experience in industrial filters and filtration systems, ULPATEK has started to emerge as a significant player not only in its nearby regions but also on a global scale. Long established as one of the leading manufacturers in Europe, the Middle East, and North Africa, the company has recently been making its mark in broader markets such as Australia, North America, and South America. Its customer-focused approach, efficient use of internal resources, and continuous R&D efforts allow it to swiftly adopt the latest

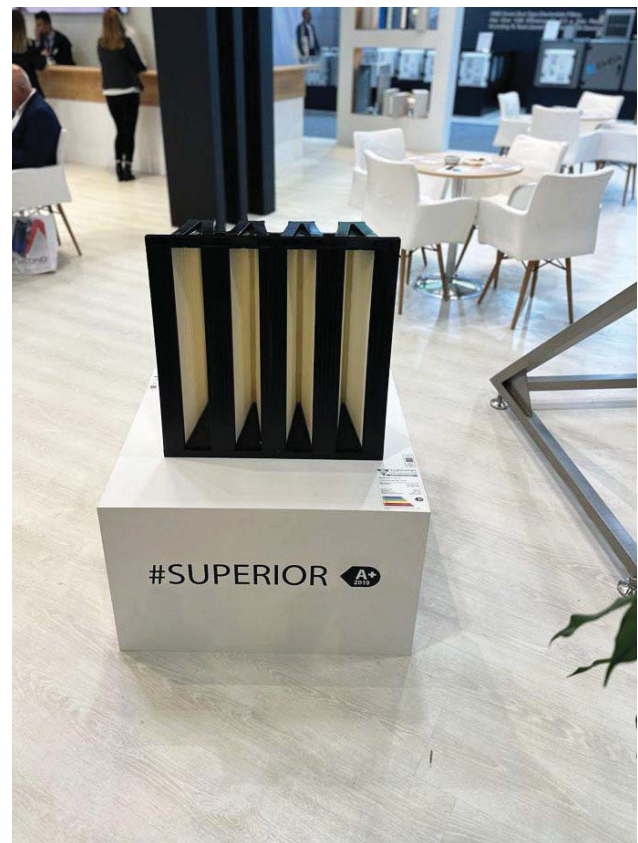
technologies in the industry, reinforcing its sustainable success.

ULPATEK prioritizes customer satisfaction with a service philosophy focused on improving air quality and increasing energy efficiency, playing a pioneering role in the industry with its innovative products. With new products like the 'V-Compact Superior Filter' and 'Tool Free' HEPA Filter Box, it has made significant progress by offering innovative solutions to the industry's needs.



## Tool Free

**Tool Free** The HEPA Filter Box stands out with its 'tool free' feature, allowing filter changes to be easily performed by a single technician without the need for tools. It also features advanced capabilities such as easy Access from room to room, pressure, aerosol supply, and aerosol sampling nozzles, making a difference in the industry.



## V-Compact Superior Filter

**V-Compact Superior Filter** model pushes the limits of energy efficiency, with an A+ rating in the Eurovent Energy Classification. Developed with innovative technology, this model establishes a new standard in air quality by providing energy savings and superior filtration capacity.

# ThermoFresh Plus Series Heat Recovery Unit



The ThermoFresh Plus Series Heat Recovery Units are designed to meet Ecodesign requirements, achieving up to 90% thermal efficiency thanks to their counterflow heat recovery system, while minimizing thermal leakage with their double-skin structure.

Equipped with high-efficiency EC plug fans, the ThermoFresh Plus series ensures proportional flow

control and operates at minimum noise levels even at full performance. Manufactured in 8 different models, these units deliver airflows of up to 3,600 m<sup>3</sup>/h and provide optimal indoor air quality with advanced filters.

The user-friendly room control unit offers Wi-Fi technology for remote access, enabling easy management from various locations via mobile applications.

## Üntes introduces a new series of Eurovent Certified Rooftop units, compliant with Eco-Design criteria



Üntes, a company with over 55 years of experience in the air conditioning industry, partnered with the Swedish-based NIBE Group, a global player with over 15,000 employees and a focus on heat pump products, towards the end of 2021. This partnership has enabled them to continue their investments and R&D activities without slowing down.

With their Tropikal Rooftop Series, Üntes has been exporting rooftop units to the Middle East market for approximately 5

years. Now, they are introducing the new ECO-SER series of rooftop units to the market, which is Eurovent Certified and compliant with Eco-design criteria.

The ECO-SER series offers flexible solutions with 10 different models to meet various capacity requirements. It stands out with its operation using 100% fresh air, design compliant with ErP 2021 requirements, and the environmentally friendly R454B gas with low GWP value.



The unit prioritizes high efficiency with its Effective Efficiency Control System (EEC System). Additionally, it comes with options for gas-fired heating module, electric or water heating, and cross-flow or plate heat recovery for enhanced performance.







**NEW  
SERIES**

**Green  
Chill**

SERIES



**HFO  
R1234ZE**

52.8-791.4 kW

## GreenChill Series

**LIQID CHILLERS WITH SCROLL COMPRESSORS  
AND AIR COOLED CONDENSERS**

**GreenChill Series;** introduces compact and reliable water chillers to the plastic, packing, machining and, air conditioning, and pharmaceutical industry which require reliable cooling for their processes by utilizing hermetic scroll compressors. They incorporate all the features required for outdoor operation and the electrical panel is protected by a double enclosure designed specifically for outdoor locations. Superior part-load efficiency is achieved by using scroll compressors in tandem configuration.



**MORE THAN  
50  
YEARS  
EXPERIENCE**

### STANDARD FEATURES

- |                                                                                             |                                                                                     |                                                                                                        |
|---------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
| - Low noise level.                                                                          | - Reliable hermetic Scroll compressors.                                             | - Electrical board includes safety switches and thermal overload protectors for trouble free operation |
| - Eco friendly design with low GWP refrigerant.                                             | - Step type Capacity Control feature.                                               | - Electrical power and control panel complying with EN602041 standards.                                |
| - All models are tested under real conditions before shipment.                              | - High part load efficiency by utilizing tandem configuration of compressors.       | - Condenser coils are protected by hot dip galvanized guard grills.                                    |
| - Less refrigerant charge by utilizing brazed plate heat exchangers.                        | - Galvanized steel frame further protected with polyester powder paint.             | - 1 year warranty.                                                                                     |
| - Centrifugal water pump and thermally insulated stainless steel water tank in TP versions. | - Generously sized copper pipe aluminum finned condenser coils for high efficiency. |                                                                                                        |

# Wind Catchers and Their Historical Evolution, Modern Applications

Have you ever wondered what it would feel like to be in a space without mechanical ventilation systems on a hot summer day? Imagine not even having a desktop fan to come to your rescue—how would that feel? It seems we don't even consider such scenarios anymore. Yet, not too long ago, just 30-40 years back, owning a home air conditioner was considered almost a luxury.

So how did people living in hot climates throughout history manage to ensure comfortable conditions? There is ample evidence regarding how this challenge was overcome in regions such as the Arabian Peninsula, North Africa, and the Middle East. Some of this evidence has come to light through archaeological excavations, while other insights are gleaned from the few surviving examples that still convey their stories today. For instance, during excavations in Akhetaten (modern-day Amarna), the city founded in the



14th century BC by Pharaoh Akhenaten, who briefly steered Egypt toward monotheism, archaeologists uncovered a remarkable wall painting. This painting (Figure 1) depicted a two-story villa with an interior courtyard adorned by two palm trees [1]. However, two additional features in the painting caught the researchers' attention: elevated openings oriented in opposite directions atop the villa and windows covered by what were likely wooden lattices. Let us note here that these wooden lattices likely absorbed morning moisture and cooled incoming air through evaporative cooling.

Let us focus on the elevated structures in the painting, which are shown in triangular cross-sections from the side. It is highly likely that these represent wind catchers, known as Malkaf in Arabia and North Africa, Badgir in Iran and Afghanistan, and Badgel in the Southeastern Anatolia region of Türkiye. The primary function of wind catchers is to "capture" the prevailing winds and channel them into the interior of the building (Figure 2).

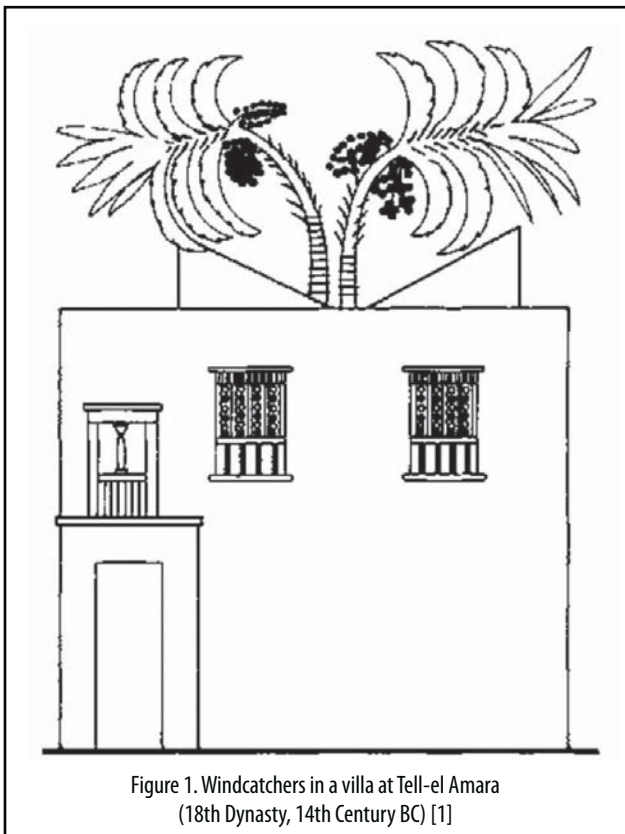


Figure 1. Windcatchers in a villa at Tell-el Amara (18th Dynasty, 14th Century BC) [1]

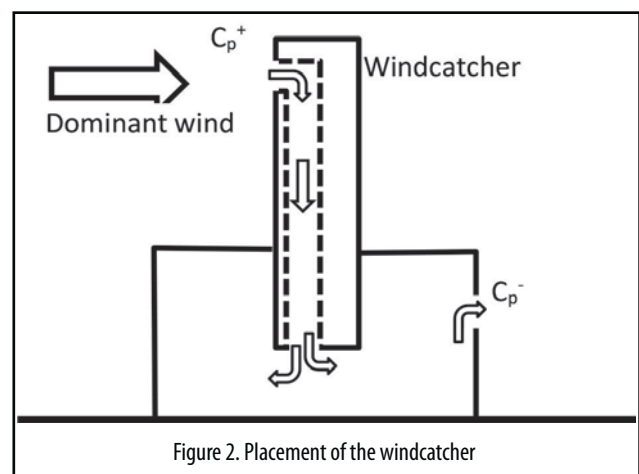


Figure 2. Placement of the windcatcher

The most extensive use of wind catchers in the world is observed in Yazd and Ardakan in Iran, as well as in Hyderabad in Pakistan. In Turkey, most traditional wind catchers are located in the southeastern provinces, particularly in 19th-century mansions of prominent local families, where they are known by the local term *badia*



or badgel. One of the most notable examples is the Hacı Hafızlar Mansion in Urfa. This mansion features two scoop-shaped wind catchers, one facing north and the other west, which are utilized to ventilate and cool the mansion's central eyvan (Figure 3) [2].

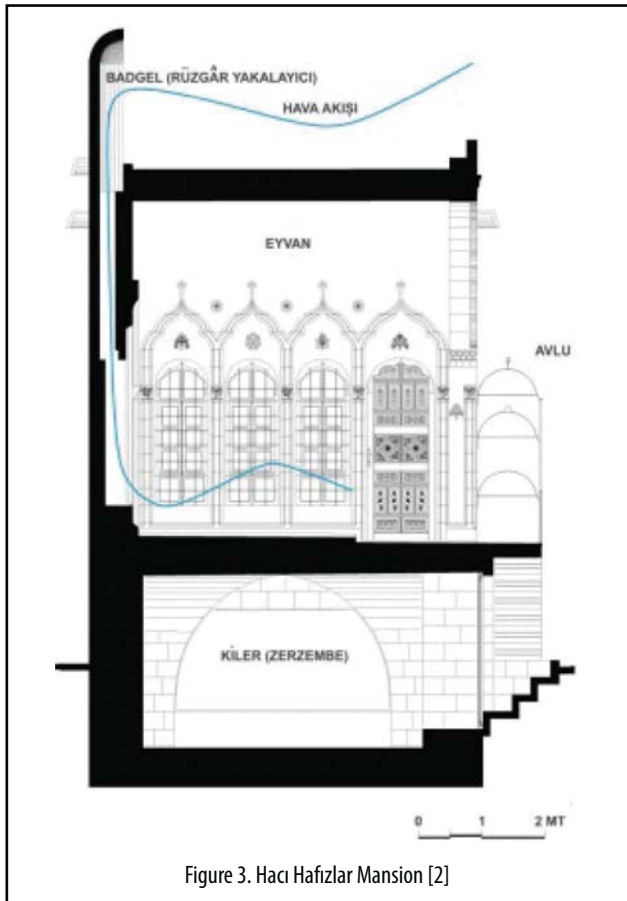


Figure 3. Hacı Hafızlar Mansion [2]

Another application of wind catchers is evaporative cooling. The fresh air captured by wind catchers during summer may have high temperatures. In such cases, the air is directed over

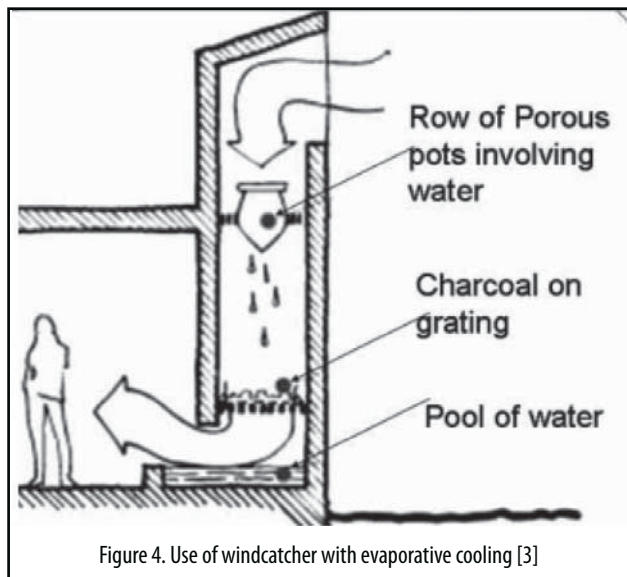


Figure 4. Use of windcatcher with evaporative cooling [3]

a pool, an unglazed water-filled jug, a salsabil (a decorative water feature), or an underground kahriz (qanat) system carrying water. This contact reduces the air temperature. Figure 4 presents a sketch illustrating how this cooling method is implemented. This approach can be applied in homes and, on a larger scale, in cisterns to oxygenate stored water and lower its temperature (Figure 5).



Figure 5. Cistern ventilated and cooled with windcatcher

What could wind catchers possibly convey to modern humans living in cities built of concrete and steel, reliant on grid-connected air conditioning systems running 24/7? I can almost hear you saying, "Almost nothing." Yet, among us are architects and engineers who believe in a sustainable future. For this reason, since the early 21st century, wind catchers have started to make humble contributions as part of modern architectural examples—not just in hot and arid climates.

The COVID pandemic we all experienced has taught us one crucial lesson: proper ventilation of indoor spaces is vital.



Figure 6. Windcatchers at Bluewater Shopping Center [4]



Figure 7. Windcatchers at Melbourne Council House 2 [5]

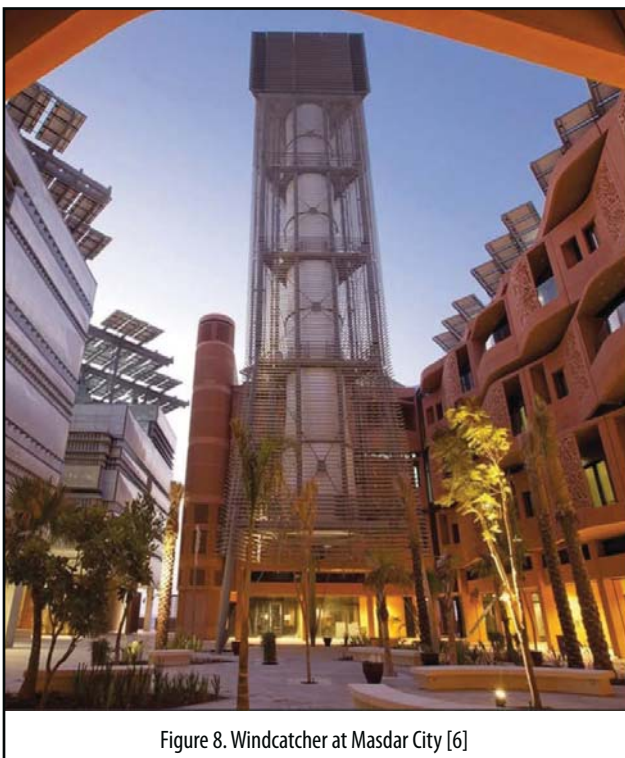


Figure 8. Windcatcher at Masdar City [6]

For example, the Bluewater Shopping Centre in Kent, England, utilizes a series of wind catchers alongside its mechanical ventilation system for the shared indoor spaces (Figure 6). The wind catchers at Bluewater are designed as elements that can rotate toward the wind regardless of its direction. They are activated under suitable outdoor conditions to alleviate the load on the mechanical ventilation system, thereby achieving significant energy savings (4). Similarly, five wind catchers installed on the southern façade of Council House 2 (CH2) in Melbourne are used innovatively. These catchers help freeze plastic balls filled with phase-change materials inside large tanks in the building's basement at 15°C. The cooled balls are then used to chill water that cools the building (Figure 7).

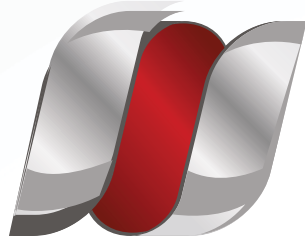
As of 2023, with a population of only 15,000, a striking example of modern wind catcher design can be found in the massive Masdar City project in Abu Dhabi, the capital of the United Arab Emirates, is being designed by Foster + Partners. A 45-meter tall, three-sided modern wind catcher (Figure 8) has been installed above the main pedestrian axis of the city. This installation is not part of any building and is designed to bring cooled, evaporatively chilled clean air down to pedestrian level (6).

A more unconventional interpretation of wind catcher aesthetics is seen on the modern façade of Qatar University in Doha. The wind catcher ventilation principle has made significant strides toward becoming an integral element of contemporary architectural approaches. Designing structures inspired by nature's intrinsic mechanisms and utilizing traditional principles represents a small yet meaningful step toward a sustainable future.

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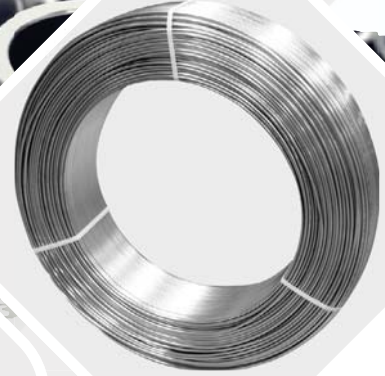
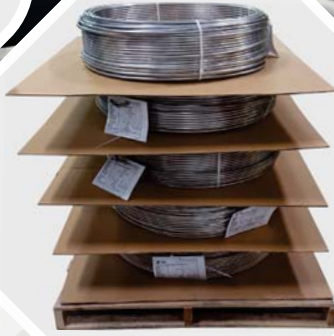
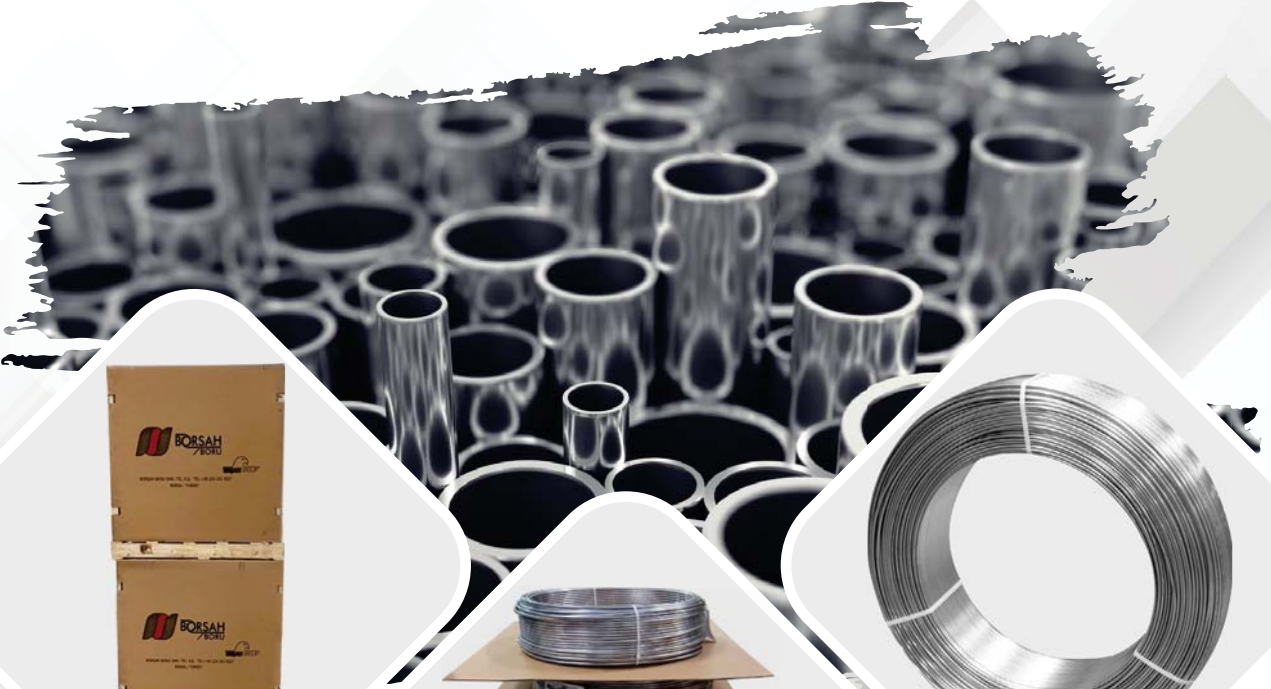


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## Hamit Mutlu: “To ensure occupant comfort and indoor air quality, systems capable of simultaneous heating and cooling should be prioritized”



**HAMİT MUTLU / Mechanical Engineer / Owner**

Since founding the Mekanik Proje (Mechanical Project) in 2004, Hamit Mutlu has played a pivotal role in advancing the industry. Drawing on his profound expertise in engineering and design, he shared his perspectives on the sector, the challenges he has encountered, and innovative solutions for the future of mechanical installation projects with ISKID Magazine readers.

### **1- Can you briefly introduce yourself and share your journey into the industry?**

I was born in 1967 in Kırşehir, a small town that shaped my formative years. After completing my primary, secondary, and high school education there, I embarked on my

career journey by enrolling in İ.T.Ü. Sakarya Faculty of Engineering's Mechanical Engineering program in 1984. I graduated in February 1989, and though I extended my studies by one semester, I later realized how profoundly that extra time enriched my personal and professional growth.





In 1991, I passed the civil service exam organized by the General Directorate of Pension Fund's Construction and Real Estate Department and began working as a control engineer for the Yeni Çelik Palas Hotel construction project in Bursa. This project marked my first encounter with mechanical installation systems, and it was truly a comprehensive project encompassing every aspect of the discipline.

What made this project particularly meaningful was the opportunity to work under the late Ersin Gürdal, the project designer, and my esteemed mentor Hasan Özoğul, to whom I extend my warm regards and wishes for good health. Over the course of a year, I meticulously examined 97 installation plans, column diagrams, flow charts, and 27 detailed design sheets, all accompanied by comprehensive reports.

I also had the privilege of attending regular site visits every two weeks for more than a year. During these visits, I prepared detailed questions, asked them at the right time, and gained invaluable insights from the answers. The reports were typewritten, heat loss and gain calculations were prepared manually, and psychrometric diagrams and battery calculations were all done by hand. This year-long period of collaboration served as an invaluable educational journey for me. Moreover, my mentor Hasan Özoğul played a significant role in my development by sharing his design resources, including a photocopy of the late Şadi Taner Bey's book on air conditioning and ventilation, which greatly enriched my knowledge.



I transitioned from my government role in August 1998 and took on the position of project manager at Akkor Engineering. This role gave me the chance to lead and execute dozens of projects, handling everything from design and manufacturing to commissioning. In September 2004, I took a significant step in my career by founding Mekanik Proje (Mechanical Project), a company specializing in mechanical installation design, consultancy, and project supervision. Now, in our 21st year, I am proud to continue this journey alongside a dedicated team of 16 colleagues.

## ***2- What are the main challenges you encounter in mechanical installation projects, and how do you address them?***

The greatest challenge during the design phase of mechanical installation projects is the insufficient definition of the building's mechanical expectations for the planned investment. For example, while there are frequent demands for energy efficiency—a critical priority in today's world—there is often an unrealistic expectation for drastically low costs to accompany it. We also face challenges in understanding the user's specific requirements for the building. To overcome this,



we take an active approach by asking the administration numerous detailed questions, allowing us to better define and address these expectations.

### **3- What is your perspective on the development of Turkey's mechanical installation sector, and what are your thoughts on its future?**

I see the mechanical installation sector in Turkey progressing in a highly positive direction. Our industry has built a strong foundation of expertise in design, contracting, and HVAC equipment manufacturing, complemented by well-structured organizational capabilities. Of course, as the saying goes, "the enemy of good is better." I firmly believe we have the potential to push these achievements even further.

Organizations such as MMO, TTMD, MTMD, ISKAV, İSİB, İSKİD, and KSBD play a vital role in the sector's progress

by fostering collaboration and collective wisdom. It is essential to foster collaboration with these civil society organizations through shared initiatives and develop projects and actions aimed at expanding internationally. Mechanical installation designers should play a leading role in this process. To achieve this, it is crucial to provide support to mechanical installation design offices. By enabling designers to expand their reach globally, we can also strengthen the international position of our manufacturers and contractors.

### **4- What roles do renewable energy and sustainability play in mechanical installation? Which technologies are likely to stand out in the coming years?**

Renewable energy and sustainability—two of today's most critical concepts—are key focus areas for our industry. Particularly in the context of international regulations aimed at preventing further atmospheric pollution and mitigating climate change, these concepts have become indispensable. When selecting systems for new buildings, variables such as the building's physical structure, operating conditions, climatic zone, and working hours must be carefully considered. A detailed analysis of the building's annual operating hours and heating-cooling load distribution is essential to compare alternative systems and determine the most suitable solution.

For new buildings, systems capable of providing both heating and cooling simultaneously should be prioritized to ensure occupant comfort and indoor air quality. In line with international standards, dual-function systems tailored to a building's specific needs should replace single-function heating or cooling systems. The simultaneous need for heating and cooling in a building offers a clear opportunity: areas generating excess heat during cooling can transfer this energy to heating systems instead of expelling it outside. Designing systems that harness this excess heat and integrating free cooling capabilities during periods with favourable outdoor temperatures, are vital steps toward improving energy efficiency and sustainability.

Air-to-water and water-to-water heat pumps, as well as heat recovery VRV/VRF systems capable of simultaneous heating and cooling, can significantly enhance the efficiency of building designs. Furthermore, the heat sources available in the building's location must be thoroughly explored. For instance, nearby groundwater, seas, lakes, or rivers can serve as valuable resources for heat pump systems. Similarly, in industrial facilities, various heat sources—such as process heating, process cooling, and ovens—can be used more effectively by transferring energy between these sources based on usage patterns.

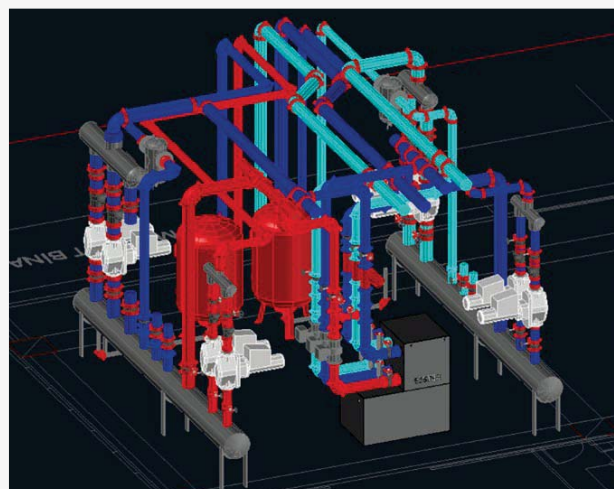


### 5- Can you share examples of projects involving heat pumps, renewable energy sources, and heat recovery systems?

As I emphasized earlier, identifying suitable heat sources in the region where a building—whether for comfort or industrial purposes—is located is essential for designing efficient systems with heat pumps. In the absence of such resources, conventional fuel-based systems may remain the only alternative.

One remarkable example comes from a project at a food production facility specializing in chocolate products. This particular setup required heating the product transfer pipe with 45°C water while simultaneously cooling the production line. To address these simultaneous heating and cooling needs, we implemented a heat recovery system integrated with heat pumps. The result was an exceptionally efficient system with a Total Energy Ratio (TER) of approximately 8. This project not only met operational requirements but also represented a significant step forward in terms of decarbonization.

A shopping mall located in the centre of Eskişehir features two basement floors. The site lies within the Porsuk water basin, where the underground water level is at 4.5 meters. Initially, we planned to implement a conventional heating and cooling system. However, during the early excavation phase, which began with preliminary consent, we encountered water at a depth of 4 meters. To proceed with construction, it became necessary to discharge the water and dry the site. This discovery prompted us to consider how this resource could be utilized, and our measurements



confirmed the presence of a substantial and valuable energy source.

Temperature measurements conducted at different times—one week in July and one week in December—consistently recorded a stable groundwater temperature of 16°C. For the first five years, we utilized this resource for cooling while relying on boiler support for heating. Over time, the groundwater temperature in the area increased to 21°C. With this shift, we began using the resource for both summer and winter operations, heating the water in summer and cooling it in winter. This approach allowed us to prepare for winter during the summer months and vice versa. In essence, we transformed the groundwater into a thermal reservoir, or as we like to call it, a "heat piggy bank."





Finally, I want to highlight the untapped potential within our existing industrial facilities. I strongly believe that these production centres harbour immense opportunities for energy efficiency improvements. With the growing emphasis on decarbonization in EU countries, implementing energy efficiency projects in our factories could not only align with international standards but also deliver substantial operational benefits.

**6- Which solutions do you recommend ensuring energy efficiency in mechanical installation projects?**

First and foremost, an engineer's approach is invaluable. The systems used in mechanical installations—including heat pumps, heating boilers, steam boilers, chillers (air source or water-cooled), open or closed cooling towers, circulation pumps, booster pumps, air handling units

with or without heat recovery, ventilation units, control valves, VAV boxes, and other similar components—must function cohesively as a team. Moreover, these systems must be internally optimized for maximum efficiency, a responsibility that lies squarely with the mechanical installation designer.

In Turkey, however, we often see contractors or mechanical installation consultants stepping into the designer's role, claiming, "I can do this job too," and taking over responsibilities. This practice undermines the integrity of the profession. To safeguard expertise and maintain respect for the discipline, I believe our colleagues should remain firmly in their designated roles. Typically, designers are sidelined once the project is complete, but this should not be the case. Designers should not only create the design but remain actively involved throughout the entire project lifecycle.







As many know, the ISKAV foundation offers a certification program to train experts in Test, Adjustment, and Balancing (TAD)—a critical and evolving field that holds immense value for the mechanical installations of buildings. Significant strides have been made in the TAD process, and ISKAV-accredited TAD companies are now well-equipped to handle these tasks.

It is essential to include the TAD specifications prepared by ISKAV in our project documentation and ensure that TAD processes are carried out by a third-party accredited company, rather than leaving them to the mechanical installation contractor. When Test, Adjustment, and Balancing are conducted by an accredited TAD company at the project's conclusion, the benefits become clear: designers can evaluate the performance of their designs, derive meaningful insights, and achieve substantial improvements.

Ultimately, through the TAD process, investors are guaranteed a properly functioning system and significant energy efficiency gains—a win-win for all stakeholders.

**7- What guidance would you offer to young mechanical installers and engineering students to help them succeed in this sector?**

In any line of work, it is impossible to become a master without first being an apprentice. With dedication and patience, we must recognize our starting point, begin as apprentices, and steadily progress to the roles of journeyman and master.

To our young engineers and students, I would like to stress that this profession is both invaluable and highly esteemed—it is one that demands passion and commitment to truly excel.

As the celebrated Turkish folk musician and songwriter Neşet Ertaş so beautifully said: “Aşk ile çalışan yorulmaz”—“Work done with love carries no burden.”



# Defining And Providing Thermal Comfort In Offices



Prof. Dr. Ş. Özgür ATAYILMAZ



Prof. Dr. Hakan DEMİR



Dr. Mustafa Kemal SEVİNDİR

*Department of Mechanical Engineering, Yildiz Technical University, Besiktas, 34349, Istanbul, Turkey,*

## ABSTRACT

In this study, thermal comfort in office buildings is investigated according to related international standards. Air velocity, radiant temperature, air temperature and relative humidity were measured to assess thermal comfort in cooled office spaces during summer. Calculations based on the ISO 7730 standard were made to predict the thermal comfort levels for office conditions. Measurements were taken at critical points in the offices located on the same floor of the building. ISO 7730 comfort category C, with average predicted mean vote (PMV) and predicted percentage of dissatisfied (PPD) values of 0.7 and 15% respectively are achieved most of the offices and measurement points in the open office.

## 1. INTRODUCTION

Scientists and engineers have always been interested in exploring more economical systems that can provide thermal comfort in buildings, due to the high energy consumption and inability to meet desired comfort levels in conventional air conditioning systems. In light of these studies, heating and cooling systems have been developed that provide higher thermal comfort in indoor spaces while achieving energy savings compared to classical systems. For instance, Lin et al. developed a multi-sensor HVAC control system operating based on PMV and PPD values. This system improved thermal comfort conditions instantly (reducing the PPD value from 30% to 20%) and decreased energy consumption by 17%.

Various studies have focused on integrating thermal comfort parameters into control systems to achieve comfort conditions with lower energy consumption.

However, thermal comfort cannot always be achieved solely by adjusting the ambient temperature to specific values. Therefore, especially in office environments where employees are present, other parameters affecting thermal comfort must also be considered.

In this study a procedure is described based on the ISO 7730 standard for measuring the parameters (air velocity, radiant temperature, air temperature and relative humidity) of the indoor thermal environment and prediction of the thermal comfort levels of office workers.

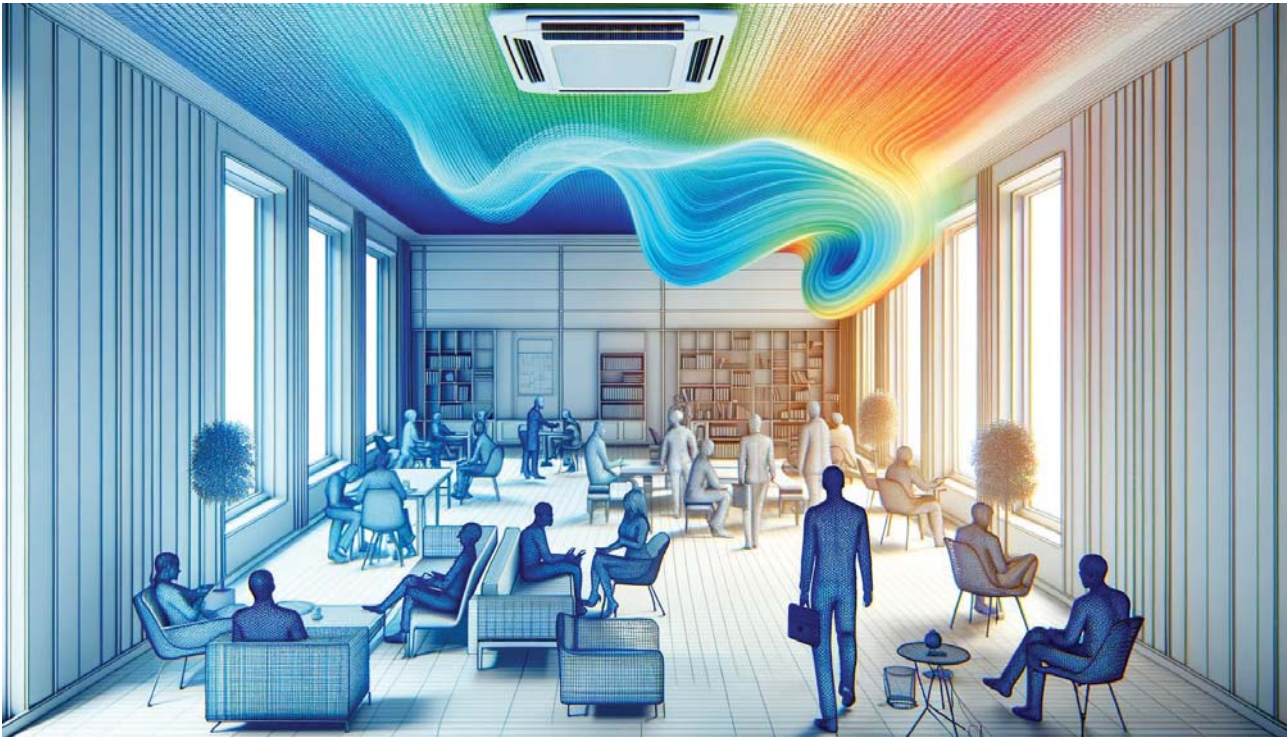
## 2. THERMAL COMFORT THEORY – THERMAL COMFORT IN OFFICES

### 2.1. Thermal Comfort

Two main concepts are involved in determining thermal comfort: PMV control and operative control.

**PMV Control:** The PMV (Predicted Mean Vote) value is an index representing the average level of thermal comfort felt by an individual. The PMV value developed by Fanger has a mathematical expression that can be used in control systems (referred to as "comfortstats"). Similar to a thermostat, a comfortstat keeps environmental conditions within acceptable ranges. However, unlike thermostats, comfortstats measure and control six additional parameters beyond air temperature. Consequently, devices capable of measuring radiant temperatures, air movement, and humidity are required in addition to air temperature sensors. Another PMV controller, known as a "model-based predictive control system," was developed by Freire et al. This system adapts comfort parameters to control systems,





ensuring thermal comfort conditions while also reducing energy consumption.

**Operative Sensor:** Control systems can also be designed based solely on operative temperatures. Operative temperature closely resembles air temperature. It represents a value influenced by the two most significant parameters of thermal comfort: air temperature and mean radiant temperature. Mean radiant temperature plays an essential role in determining thermal comfort in radiant heating systems and should be carefully analyzed.

Thermal comfort is defined as a state of satisfaction with the thermal environment. Achieving individual comfort is

influenced by physical, physiological, psychological, and other factors. Fanger combined psychological theories with statistical data to develop a mathematical model predicting thermal sensitivity. According to Fanger, six comfort variables—activity rate, clothing insulation, air temperature, mean radiant temperature, air velocity, and relative humidity—constitute the PMV index, which is used to determine comfort conditions. The PMV index is defined on a standard scale (Table 1) as a parameter that predicts the effect of any combination of thermal environment variables (air temperature, relative humidity, air velocity, mean radiant temperature) and personal variables (activity rate and clothing) on a large group of people.

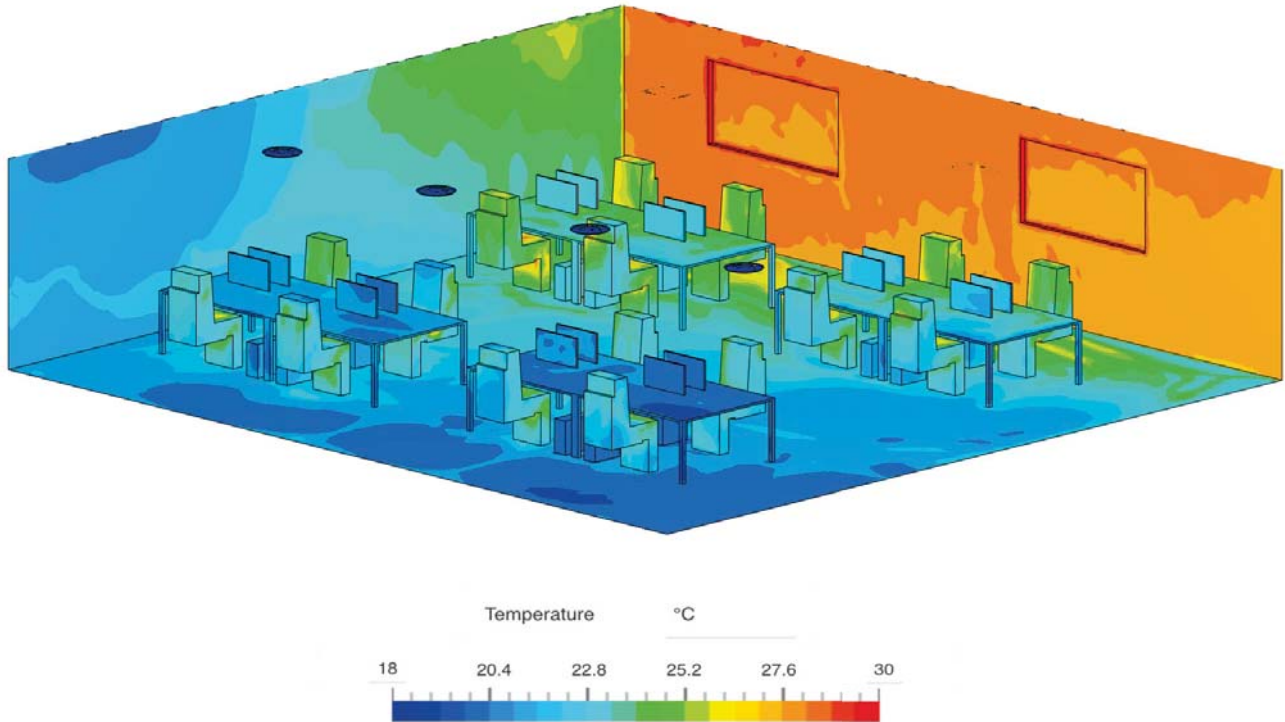
|      |      |               |         |               |      |     |
|------|------|---------------|---------|---------------|------|-----|
| -3   | -2   | -1            | 0       | +1            | +2   | +3  |
| Cold | Cool | Slightly cool | Neutral | Slightly warm | Warm | Hot |

**Table 1.** Seven-point thermal sensation scale (ISO 7730)

The PMV and PPD values that are measured and calculated are compared taking into consideration the ISO 7730 thermal comfort standard that is presented in Table 2.

| Category | PPD (%) | PMV                        |
|----------|---------|----------------------------|
| A        | <6      | $-0.2 < \text{PMV} < +0.2$ |
| B        | <10     | $-0.5 < \text{PMV} < +0.5$ |
| C        | <15     | $-0.7 < \text{PMV} < +0.7$ |

**Table 2.** Categories of thermal environment (ISO 7730)



The PMV can be calculated for various combinations of activity rates, clothing insulation, air temperature, mean radiant temperature, air velocity, and relative humidity using Equation 1:

$$PMV = \left( 0.303 \cdot e^{-0.036 \cdot M} + 0.028 \right) \left[ \begin{aligned} & (M - W) - 3.05 \cdot 10^{-3} \cdot \{ 5733 - 6.99 \cdot (M - W) - p_a \} \\ & - 0.42 \cdot \{ (M - W) - 58.15 \} - 1.7 \cdot 10^{-5} \cdot M \cdot (5867 - p_a) \\ & - 0.0014 M (34 - T_a) - 3.96 \cdot 10^{-8} f_{cl} \{ (T_{cl} + 273)^4 - (T_{mrt} + 273)^4 \} \\ & - f_{cl} \cdot h \cdot (T_{cl} - T_a) \end{aligned} \right] \quad (1)$$

$T_{cl}$ ,  $h$ , and  $f_{cl}$  are calculated using Equations 2, 3, and 4 respectively. Equations 2 and 3 are solved iteratively.

$$T_{cl} = 35.7 - 0.028 \cdot (M - W) - I_{cl} \cdot \left[ \begin{aligned} & 3.96 \cdot 10^{-8} \cdot f_{cl} \cdot \{ (T_{cl} + 273)^4 - (T_{mrt} + 273)^4 \} \\ & + f_{cl} \cdot h \cdot (T_{cl} - T_a) \end{aligned} \right] \quad (2)$$

$$h = \begin{cases} 2.38 \cdot |T_{cl} - T_a|^{0.25} \Leftarrow 2.38 \cdot |T_{cl} - T_a|^{0.25} > 12.1 \cdot \sqrt{V_{ar}} \\ 12.1 \cdot \sqrt{V_{ar}} \Leftarrow 2.38 \cdot |T_{cl} - T_a|^{0.25} < 12.1 \cdot \sqrt{V_{ar}} \end{cases} \quad (3)$$

$$f_{cl} = \begin{cases} 1 + 1.29 \cdot I_{cl} \Leftarrow I_{cl} \leq 0.078 m^2 \cdot K / W \\ 1.05 + 0.645 \cdot I_{cl} \Leftarrow I_{cl} > 0.078 m^2 \cdot K / W \end{cases} \quad (4)$$



Where:

PMV = Predicted Mean Vote

M = Metabolic rate, W/m<sup>2</sup>

W = External work

I<sub>cl</sub> = Thermal resistance of clothing, clo

F<sub>cl</sub> = Ratio of clothed to unclothed body surface area

T<sub>a</sub> = Air temperature, °C

T<sub>mrt</sub> = Mean radiant temperature, °C

V<sub>ar</sub> = Air velocity, m/s

P<sub>a</sub> = Water vapor pressure, Pa

h<sub>c</sub> = Convective heat transfer coefficient, W/m<sup>2</sup>·K

T<sub>cl</sub> = Surface temperature of clothing, °C

The PPD (Predicted Percentage of Dissatisfied) index estimates the percentage of people likely to be dissatisfied with the thermal environment based on the PMV value. Using the calculated PMV value, the PPD can be determined through Equation 5:

$$PPD = 100 - 95 \cdot \exp(-0.03353 \cdot PMV^4 - 0.2179 \cdot PMV^2) \quad (5)$$

The relationship between PPD and PMV is illustrated in Figure 1, showing that thermal balance occurs when the PMV value is 0. Thermal comfort is achieved when the PMV value is zero, representing equilibrium.

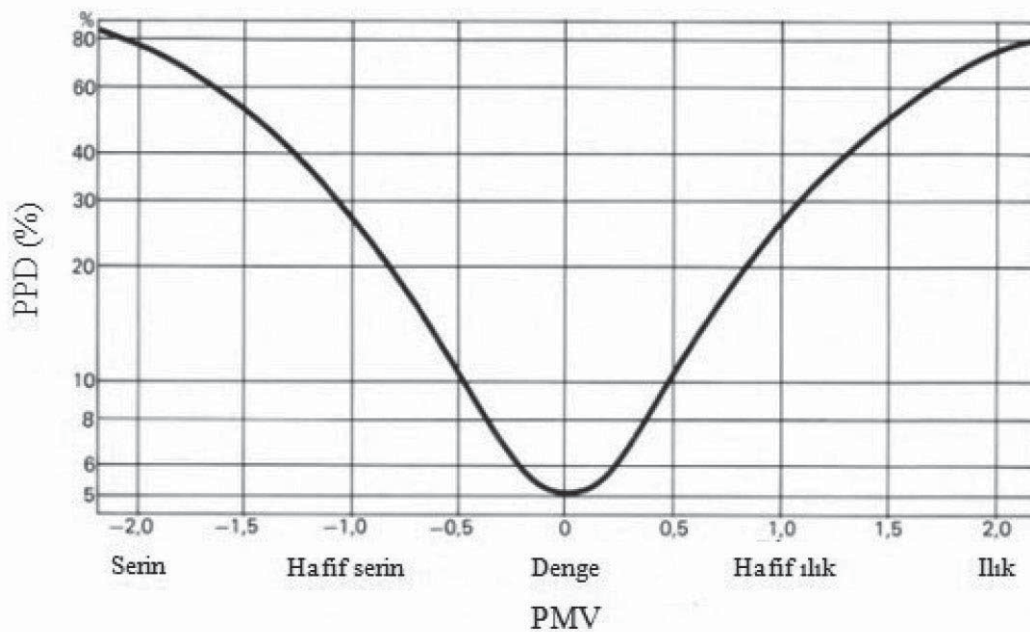
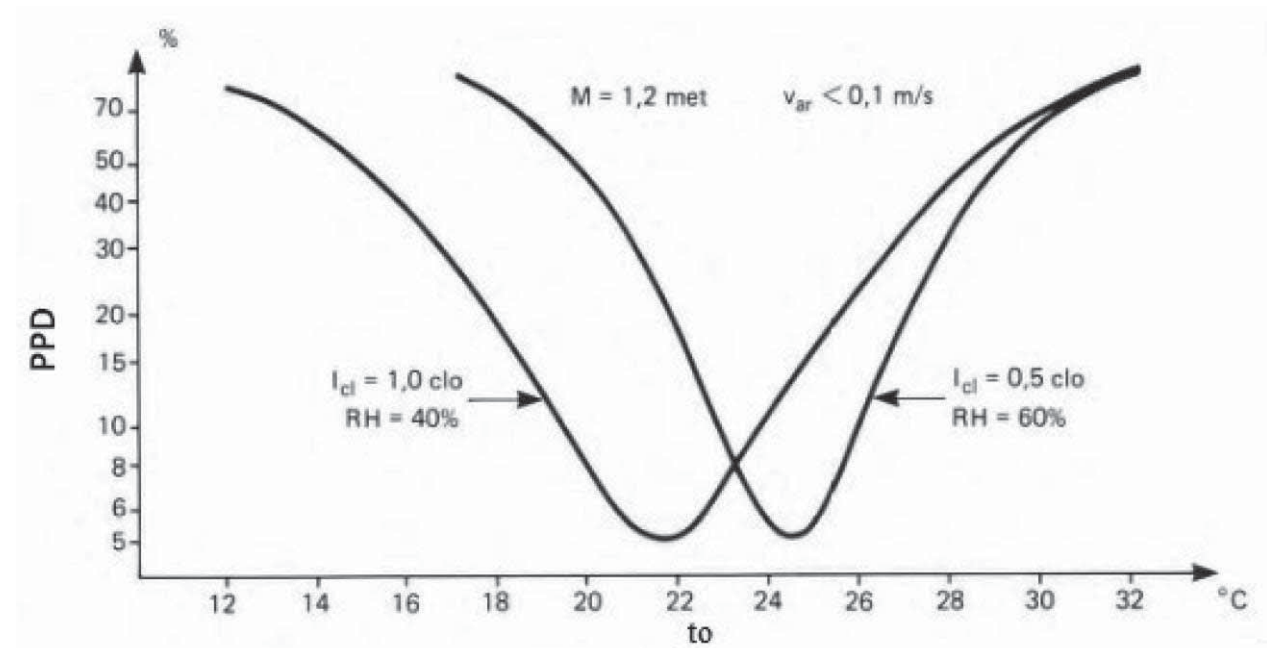


Figure 1. The relationship between PPD and PMV

The temperature felt by the human body (operative temperature, Top) does not equate to air temperature. Instead, the temperatures of objects and surfaces in the environment also affect perceived warmth. This perceived temperature can be expressed as Top.

The variation of PPD values with operative temperature (Top) during typical summer and winter seasons. (Figure 2).



**Figure 2.** The variation of PPD values with operative temperature (Top) during typical summer and winter seasons.

## 2.2. Importance Of Thermal Comfort in Offices

Thermal comfort is not determined solely by ambient temperature; it is influenced by multiple factors working together. Therefore, ensuring thermal comfort in offices requires considering all these factors. Why it is important to pay attention to thermal comfort can be explained in the context of these parameters.

Thermal comfort significantly affects cognitive performance. Extreme temperatures, high humidity, or inadequate air circulation can reduce focus and efficiency. Achieving thermal comfort requires optimizing not just temperature but also humidity, airflow, and radiant heat (e.g., heat from windows or walls).

Excessive humidity can lead to respiratory discomfort, while low humidity may cause dry skin and eye irritation. Insufficient air circulation creates a stuffy feeling, while excessive airflow can cause discomfort and muscle pain. Employees' individual needs (e.g., activity level, age, gender) should be considered to prevent health issues.

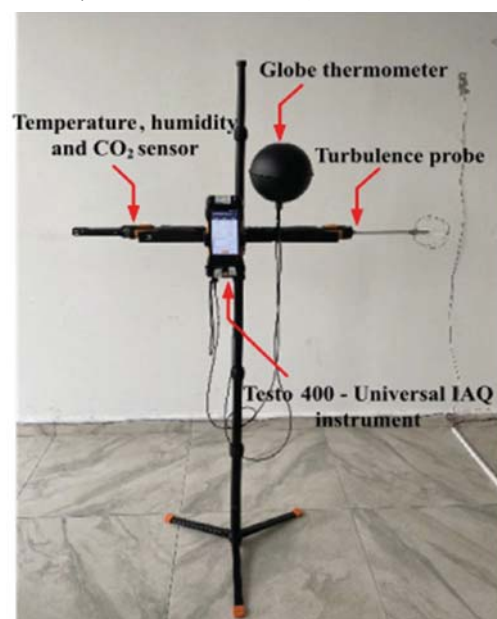
Employees who feel thermally comfortable tend to have a positive perception of their workplace, boosting job satisfaction and morale. A comfortable environment encourages employees to spend time in communal areas, fostering communication and teamwork.

Systems that cater to different thermal needs in various zones save energy. For instance, large meeting rooms and individual workspaces may require different temperature settings. HVAC systems that adjust automatically based on working hours and environmental conditions promote both energy savings and thermal comfort.

Many workplace regulations specify standards for temperature, humidity, and air quality (e.g., ASHRAE or local occupational health and safety laws). Adhering to these standards is essential for employee safety and organizational compliance.

## 3. DETERMINATION OF COMFORT LEVELS

In a prestigious office building constructed approximately 30 years ago, changes in layout and usage purposes were made over time, but the necessary adjustments to the mechanical systems were not implemented accordingly.



**Figure 3.** Testo 400 Universal IAQ system



For example, system capacities and duct revisions were not adequately updated to account for changes in internal loads and the number of employees in the spaces. Additionally, balancing operations were not performed in line with the additions and removals made to the ductwork.

Due to these issues, studies were conducted to determine thermal comfort in the current situation for open and closed offices as well as executive rooms. Measurements were taken at critical points, including air temperature, mean radiant temperature, air velocity, and relative humidity, to determine comfort conditions based on

the aforementioned parameters. PMV calculations were performed under the assumption of typical office work and light clothing.

PMV values are calculated using relative humidity, globe thermometer, temperature, CO<sub>2</sub> probes, and turbulence probes attached to the Testo 400 Universal Indoor Air Quality (IAQ) equipment. Table 3 summarizes the key technical details of the instruments used for the measurement parameters in the test room. With an adjustable tripod, the Testo 400 Universal IAQ equipment, represented in Figure 3, is used to collect measurements at the height of 1.1 m.

| Instruments                   | Range                               | Accuracies                   | Measured values                           |
|-------------------------------|-------------------------------------|------------------------------|-------------------------------------------|
| Temperature sensor            | 0/100%RH<br>-20/+70°C<br>0/10000ppm | ±2 %RH (5/90 %RH)<br>±0.5 °C | Humidity, temperature and CO <sub>2</sub> |
| Testo turbulence sensor       | 0/5 m/s                             | ±0.03 m/s                    | Velocity                                  |
| Testo black globe thermometer | 0/+120 °C                           | Class 1                      | Globe temperature                         |
| T-Type temperature sensor     | -20/+200 °C                         | ±0.3 °C                      | Air and surface temperature               |
| RTD                           | -200/+800°C                         | ±0,15+0.0002 °C              | Water temperature                         |

**Table 3.** Instruments used for measurement parameters

The comfort device, which measures radiant temperature, air temperature, air velocity, humidity and CO<sub>2</sub>, was placed to take measurements from different points of the office space for 10-minute periods.

#### 4. RESULTS AND DISCUSSION

Measurements were taken at critical points in the office spaces located on the same floor of the building. The open office, being significantly larger and accommodating more employees compared to the other offices, had measurements taken at 17 different points. In the other offices, measurements were conducted at 2 points each. Measurement points, measured parameters and values are presented in Table 4.

Calculated PMV and PPD values are given in Figure 4. ISO 7730 comfort category C, with average predicted mean vote (PMV) and predicted percentage of dissatisfied (PPD) values of 0.7 and 15% respectively are achieved most of the offices and measurement points in the open office.

Comfort curves were created for the spaces on the second normal floor (Figure 4). It was determined that the PPD value in similar closed offices on the same floor varied between 5.3% and 17.2% (Table 4). In this floor, dissatisfaction generally remains in the slightly warm zone where the PMV is on the positive side. In the open office on this floor, the PPD value varies between 10.1% and 21.1%, remaining in the slightly warm zone where the PMV is on the positive side and above the

acceptable limit values. In addition, the PPD value should not be this different in an open office. Differences at these levels in the spaces on the same floor and within the spaces themselves are unacceptable and by determining the parameters that affect thermal comfort negatively, necessary changes and improvements should be made in the mechanical installation to eliminate them.

In Figure 4a, category C of the relevant standard (ISO 7730) are provided at most of the measurement locations in open office, while category A and B cannot be achieved. In individual offices, category A and B can be achieved in a few locations while most of the locations drops into category C (Figure 4b).

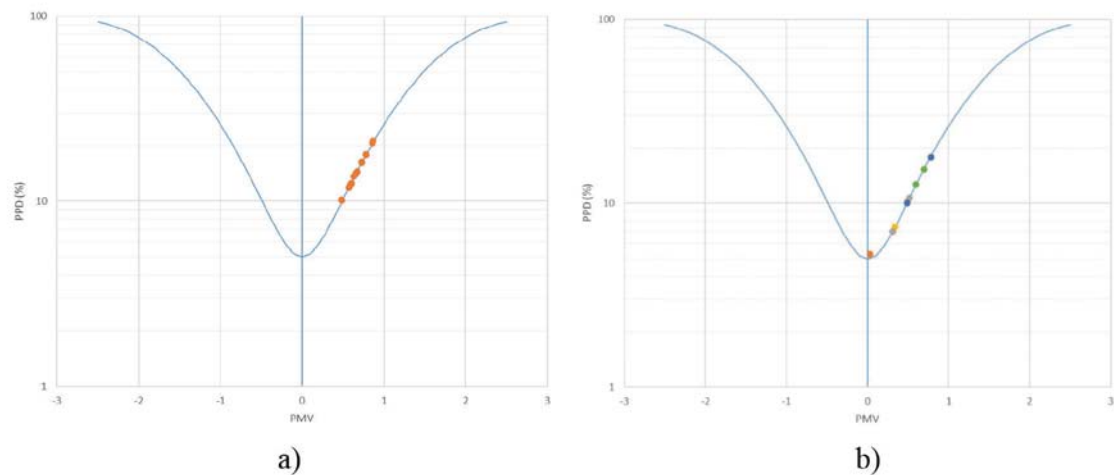
#### 5. CONCLUSION

In this study, indoor thermal environments in open and individual office rooms were experimentally studied under summer conditions in Istanbul. Air velocity, radiant temperature, air temperature and relative humidity were measured to assess thermal comfort in cooled office spaces. Calculations based on the ISO 7730 standard were made to predict the thermal comfort levels for office conditions.

Calculated PMV and PPD values are given and ISO 7730 comfort category levels are determined according to calculated values. Seven-point thermal sensation scale indicates neutral to slightly warm conditions.

| Measurement Point | Office                                  | Air Temperature<br>$T_a$ (°C) | Relative Humidity (%) | Hava Hızı $V_{ar}$ (m/s) | Radiant Temperature<br>$T_{mrt}$ (°C) | CO <sub>2</sub> (ppm) | PMV  | PPD   |
|-------------------|-----------------------------------------|-------------------------------|-----------------------|--------------------------|---------------------------------------|-----------------------|------|-------|
| 5-1               | Open Office<br>(Tedarik, İK, Satınalma) | 25,4                          | 45,4                  | 0,06                     | 25,6                                  | 850                   | 0,67 | 14,39 |
| 5-2               |                                         | 25,3                          | 44,2                  | 0,07                     | 25,4                                  | 734                   | 0,57 | 11,9  |
| 5-3               |                                         | 25,5                          | 44,7                  | 0,06                     | 25,7                                  | 810                   | 0,66 | 14,27 |
| 5-4               |                                         | 25,6                          | 46,4                  | 0,06                     | 25,7                                  | 820                   | 0,67 | 14,4  |
| 5-5               |                                         | 26,1                          | 43,8                  | 0,1                      | 26,2                                  | 760                   | 0,73 | 16,14 |
| 5-6               |                                         | 26,3                          | 43,5                  | 0,12                     | 26,8                                  | 790                   | 0,87 | 21,19 |
| 5-7               |                                         | 26                            | 44                    | 0,1                      | 26,8                                  | 820                   | 0,86 | 20,61 |
| 5-8               |                                         | 25,7                          | 44,5                  | 0,37                     | 26,4                                  | 980                   | 0,49 | 10,09 |
| 5-10              |                                         | 25,7                          | 48                    | 0,07                     | 26                                    | 850                   | 0,78 | 17,82 |
| 5-11              |                                         | 25,6                          | 46,1                  | 0,09                     | 25,9                                  | 840                   | 0,73 | 16,35 |
| 5-12              |                                         | 25,6                          | 44,4                  | 0,09                     | 25,8                                  | 770                   | 0,66 | 14,21 |
| 5-13              |                                         | 25,6                          | 43,9                  | 0,09                     | 25,8                                  | 780                   | 0,65 | 13,92 |
| 5-14              |                                         | 25,7                          | 45                    | 0,19                     | 25,8                                  | 790                   | 0,48 | 10,15 |
| 5-15              |                                         | 26                            | 42,4                  | 0,18                     | 26,1                                  | 760                   | 0,6  | 12,47 |
| 5-16              |                                         | 26                            | 42,7                  | 0,11                     | 25,8                                  | 740                   | 0,63 | 13,59 |
| 5-17              |                                         | 25,8                          | 43,2                  | 0,07                     | 25,4                                  | 750                   | 0,59 | 12,25 |
| 11-1              | 1. Office                               | 23,5                          | 41,8                  | 0,07                     | 25                                    | 700                   | 0,31 | 6,99  |
| 11-2              |                                         | 22,8                          | 46,5                  | 0,19                     | 24,6                                  | 700                   | 0,03 | 5,32  |
| 12-1              | 2. Office                               | 24,9                          | 42,6                  | 0,09                     | 24,4                                  | 550                   | 0,31 | 7,02  |
| 12-2              |                                         | 25,2                          | 43,6                  | 0,08                     | 25,2                                  | 600                   | 0,52 | 10,67 |
| 13-1              | 3. Office                               | 25                            | 41,2                  | 0,08                     | 25,3                                  | 590                   | 0,5  | 10,27 |
| 13-2              |                                         | 25                            | 42,6                  | 0,19                     | 25,4                                  | 620                   | 0,34 | 7,44  |
| 14-1              | 4. Office                               | 26                            | 39,2                  | 0,15                     | 25,6                                  | 500                   | 0,49 | 9,98  |
| 14-2              |                                         | 26,1                          | 42,3                  | 0,05                     | 26,1                                  | 560                   | 0,78 | 17,75 |
| 15-1              | 5. Office                               | 25,6                          | 39,5                  | 0,11                     | 26,1                                  | 490                   | 0,6  | 12,6  |
| 15-2              |                                         | 25,5                          | 40,4                  | 0,07                     | 26                                    | 500                   | 0,7  | 15,22 |

**Table 4** Measurement points, measured parameters and values



**Figure 4.** PPD-PMV values for a) Open office b) Other offices in the same floor

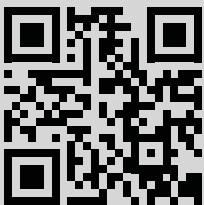
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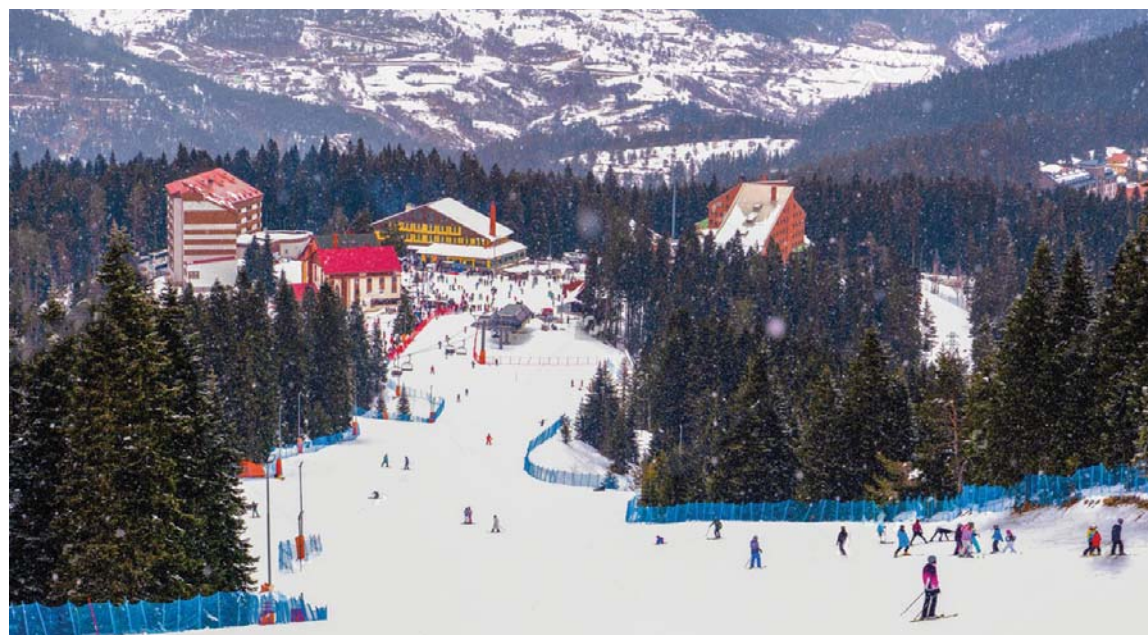


# TURKIYE'S ENCHANTING WINTER TOURISM DESTINATIONS

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*For those looking to explore the magical atmosphere of winter, Turkiye offers unique opportunities with its extraordinary tourism hubs.*





*Thanks to its mountainous terrain, Türkiye boasts immense potential for winter tourism and features a rich landscape influenced by diverse climate types. This varied geography, ranging from high mountain peaks to expansive valleys, provides an ideal foundation for ski resorts, winter sports, and nature tourism. With stunning natural beauty, snow-covered vistas, and an array of enjoyable activities, these ski resorts promise visitors an unforgettable vacation experience. If you're seeking a getaway that combines nature and sports, be sure to add these enchanting destinations to your itinerary.*



## ULUDAĞ THE GEM OF WINTER TOURISM



Standing at an impressive altitude of 2,543 meters, Uludağ is one of Türkiye's most popular winter sports destinations. Located approximately a three-hour drive from Istanbul and just an hour from Bursa, Uludağ ski resort offers ideal terrain for Alpine and Nordic skiing, as well as ski touring and heli-skiing. Notably, the first traces of the Ice Age in Türkiye were discovered here. The northern slopes of Uludağ feature formations shaped by glaciers and intriguing rock masses. Beyond skiing, visitors can enjoy activities such as snowboarding, bigfoot, ice skating, and snowmobiling. The resort boasts 15 mechanical lifts, including 8 chairlifts and 7 surface lifts, and currently operates 13 different slopes.



Uludağ is also home to diverse wildlife within its national park, including wild boars, foxes, jackals, wolves, badgers, wild cats, moles, squirrels, martens, and a small number of bears. The bearded vulture (*Gypaetus barbatus*), an endemic bird species, also resides in the area.

With its modern ski slopes, comfortable hotels, and thermal facilities, Uludağ is an ideal destination for both professional skiers and beginners. Visitors can also ride the chairlift to the summit and take in breathtaking snow-covered landscapes.

## ERCIYES THE PINNACLE OF NATURE AND SPORTS



Located in the province of Kayseri, Mount Erciyes is a prominent center for winter sports and mountaineering in Türkiye. This volcanic mountain, standing at an impressive 3,916 meters, features ski slopes ranging from 2,200 to 3,400 meters in altitude, combined with facilities that meet European standards. The slopes have gradients varying between 10% and 50%. The facilities are conveniently located just 25 kilometers from Kayseri city center.





Thanks to its modern infrastructure, Erciyes has become one of Türkiye's internationally recognized winter tourism destinations. The mountain is also a vital ecosystem, offering stunning natural beauty and rich biodiversity. The alpine zones, starting at 2,500 meters, are home to herbaceous plants, meadows, and rare plant species. Birds of prey, such as eagles and hawks, are commonly seen in the region.

Kayseri Erkilet Airport, located only 30 kilometers from the ski facilities, is easily accessible with a flight from Istanbul lasting just 1 hour and 20 minutes.

## PALANDÖKEN THE WHITE PEARL OF THE EAST



Located in Erzurum, Palandöken Ski Resort boasts the longest ski slopes in Türkiye. With its 3,185-meter peak, these mountains offer an ideal environment for winter sports. Stretching in an east-west direction, they cover approximately 70 kilometers in length and 30 kilometers in width. The elevations range from 2,000 meters to 3,176 meters. Palandöken is particularly favored by professional skiers and stands out for its exceptional quality of crystal snow. With snow depths exceeding 2 meters under typical winter conditions, the dry powder snow provides significant advantages for winter tourism enthusiasts.



The Palandöken Kandilli Ski Center has hosted the 25th Winter Universiade Games. The ski resort is located just 5 kilometers from Erzurum city center and 25–30 minutes from the airport. It's also accessible via a 1.5-hour flight from Istanbul to Erzurum Airport.

With comfortable accommodation options at nearby hotels, don't miss the opportunity to explore the richness of winter tourism at Palandöken!

## KARTALKAYA A QUICK ESCAPE NEAR ISTANBUL



Bolu, renowned for its lush greenery, forests, natural beauty, lakes, mountains, and plateaus, holds a significant place in Türkiye's winter tourism scene. Situated at an altitude of approximately 2,200 meters in the Koroğlu Mountains, Kartalkaya Ski Resort has become an indispensable destination for skiing and snowboarding enthusiasts, thanks to its breathtaking beauty adorned by pine forests and its growing popularity in recent years.

As one of Türkiye's most important winter tourism centers, Kartalkaya Ski Resort is located 38 kilometers southeast of Bolu city center. Its proximity to major cities makes it an excellent getaway for weekend trips. The resort features two main ski areas with a total of 18 mechanical facilities and 25 ski slopes of varying inclines and difficulty levels. The combined length of the slopes reaches up to 40 kilometers.



Kartalkaya Ski Resort is easily accessible from Istanbul via a 3.5-hour drive. Surrounded by pine forests, this white paradise offers enjoyable experiences for visitors of all ages with its snowboarding and skiing activities.

### SARIKAMIŞ A BLEND OF HISTORY AND NATURE



Sarıkambiş Ski Resort is located on a plateau at an altitude of 2,200 to 2,900 meters, surrounded by the renowned yellow pine forests. Situated in Kars, Sarıkambiş holds a distinguished place due to the quality of its snow. The resort is home to rare crystal snow, found only in the Alps and Sarıkambiş, making skiing here an extraordinary experience.

The area is particularly well-suited for Alpine and Nordic skiing disciplines, as well as activities like “ski safaris” and sled tours.

Sarıkambiş also offers options for history enthusiasts. While visiting, you can explore the enchanting Katarina Hunting Lodge, a stunning Russian structure that seems straight out of a fairy tale. Nestled in the forest, this 28-room wooden mansion with a stone foundation spans 500 square meters and is one of the finest examples of 19th-century Baltic architecture. Remarkably, it was built without the use of nails and has withstood Sarıkambiş's harsh weather conditions over the years.

The lodge was commissioned by Russian Tsar Nicholas II as a rehabilitation center for his ailing son, adding another layer of historical significance to this captivating destination.



### ILGAZ THE PEACEFUL EMBRACE OF NATURE



Ilgaz Mountain National Park in Kastamonu is an ideal destination for those seeking a tranquil winter getaway surrounded by snow-covered nature. Here, you can enjoy skiing as well as nature walks in a serene, forested setting. The Ilgaz Mountains belong to the Euxine sub-region of the Euro-Siberian phytogeographical zone. Declared a national park in 1976, the area boasts a rich forest diversity dominated by black pine, red pine, and fir trees. The Ilgaz Ski Resort is located within the Ilgaz Mountain Range, with the top station of the facility situated at an altitude of 1,995 meters. Within the National Park, the Ilgaz Winter Sports Tourism Center offers an 800-meter-long ski slope and two ski lifts and T-bars with a total length of 1,500 meters.

The National Park also features special areas for birdwatching. Birds of prey such as black kite, griffon vulture, cinereous vulture, short-toed snake eagle, red kite, golden eagle, lesser spotted eagle, and imperial eagle are frequently observed in the region, which also serves as a breeding ground for these species.

Ilgaz Mountain is approximately 200 kilometers from Ankara, accessible by car in 2-3 hours. For visitors from Istanbul, the distance is around 400 kilometers, requiring a 5-6 hour drive. Regular bus services to Kastamonu are also available from Ankara, Istanbul, and other major cities.





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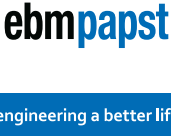
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|  <p><b>niba</b><br/>cooling towers</p>                                                  | <p><b>NİBA SU SOĞUTMA KULELERİ SAN. VE TİC. A.Ş.</b><br/>Gürsel Mah. İmrahor Cad. No:7/4 34400 Kağıthane İSTANBUL / TÜRKİYE<br/>Tel: +90 (212) 295 65 24 Fax: +90 (212) 295 65 82<br/>www.niba.com.tr / niba@niba.com.tr</p>                                                                         |
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|    | <p><b>RESTERM ENDÜSTRİYEL ISITMA EKİPMANLARI SAN. VE TİC. A.Ş.</b><br/> Girne Mah. Irmaklar Sk. Küçükyalı İş Merk. A Blok No:72/28A Maltepe İSTANBUL / TÜRKİYE<br/> Tel: +90 (216) 366 10 80 Fax: +90 (216) 366 10 81<br/> www.resterm.com / info@resterm.com</p>                     |
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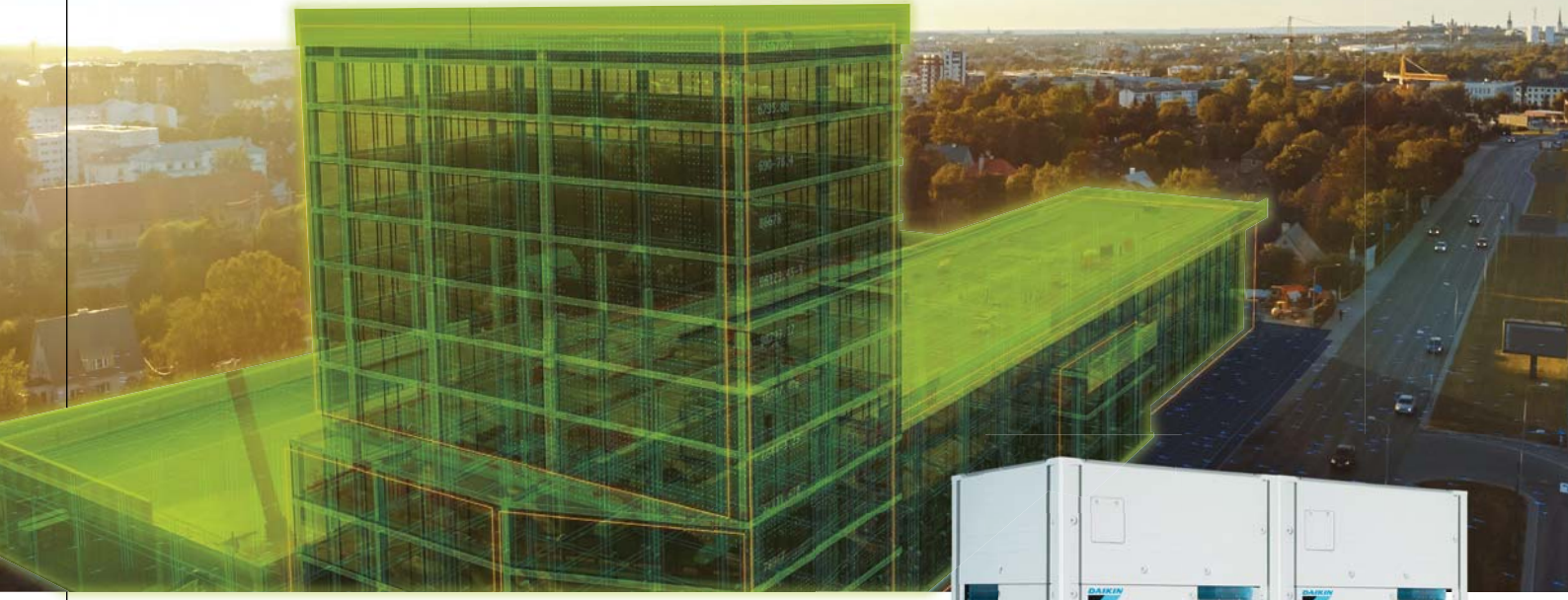


## TÜRKİYE HVAC&R INDUSTRY STATISTICS 2024

|                                                                       | PRICE LIST     |
|-----------------------------------------------------------------------|----------------|
| 5 Years Summary                                                       | 1.295 EURO+VAT |
| Full Report                                                           | 6.210 EURO+VAT |
| 4 Months (Split-VRF-Heatpump) Report                                  | 520 EURO+VAT   |
| 8 Months (Split-VRF-Heat Pump Report)                                 | 1.035 EURO+VAT |
| Split-Multi Split                                                     | 1.295 EURO+VAT |
| VRV Systems                                                           | 1.295 EURO+VAT |
| Heat Pumps                                                            | 1.295 EURO+VAT |
| Close Control Air Conditioner                                         | 520 EURO+VAT   |
| Rooftop Air Conditioner                                               | 1.035 EURO+VAT |
| Fancoil                                                               | 1.035 EURO+VAT |
| Heating Units                                                         | 520 EURO+VAT   |
| Heat Recovery Ventilation Units                                       | 1.035 EURO+VAT |
| Air Handling Units<br>(Moduler-Pool-Hygenic-Standart)                 | 1.295 EURO+VAT |
| Chillers                                                              | 1.295 EURO+VAT |
| Water Cooling Towers                                                  | 520 EURO+VAT   |
| Heat Exchanger (Battery)                                              | 1.035 EURO+VAT |
| Steam Humidifier                                                      | 520 EURO+VAT   |
| Fan                                                                   | 1.035 EURO+VAT |
| Filter                                                                | 520 EURO+VAT   |
| Air Distribution Companents & CAV+VAV Units & Fire and Smoke Exhaust" | 1.035 EURO+VAT |
| Cold Room & Central Cold Room                                         | 520 EURO+VAT   |
| Air Purifier (Last 4 Years)                                           | 1.035 EURO+VAT |
| Condensing Unit                                                       | 520 EURO+VAT   |

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