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Essential Information for the Air Conditioning and Refrigeration Industry

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It was a pleasure to join the team on the ACR Journal and Heat Pumps Today stand at the recent InstallerSHOW at the NEC Birmingham. This year saw an increased focus on cooling alongside the customary heating topics and from those of you I spoke with, it is clear that the sectors are moving ever closer together. Domestic heating engineers are becoming more aware of air conditioning products as they get to grips with air-to-water heat pump technology and becoming F-GAS certified. Likewise, many air conditioning contractors are increasing their involvement with A2W heat pumps because of the growing market.

One thing is clear: the requirement for improving skills across the industry is still paramount. This edition's training supplement highlights some of those challenges.

The city of Leeds is hosting a number of ACR Journal and Heat Pumps Today events this year, with the Trainee Of The Year Awards (TOTY) taking place at the Marriott Hotel on 5 December. The deadline for entries is 21 September, so If you have an apprentice or trainee who deserves recognition, you can nominate them at: **https://www.acrjournal.uk/acr-trainee-of-the-year**

The ACR Journal and Heat Pumps Today Regional Expo, a significant event for local contractors and specifiers, takes place on 26 September at Elland Road, the home of Leeds United. This event, featuring presentations from British Refrigeration Association Chairman Neil Roberts and other industry experts, is a valuable opportunity to stay updated on the latest developments in the ACR and heat pump sectors.

For information on attending or exhibiting, please visit:
https://www.acrjournal.uk/regional-exhibitions-northeast

Andy

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Propane growth sparks safety warning

The Building Engineering Services Association (BESA) has highlighted what it says are the growing safety risks posed by increased use of flammable refrigerant gases in air conditioning and heat pump systems.

BESA's latest technical bulletin (TB57) points out that there are currently no UK regulations governing the purchase and installation of systems using R290 (propane) because, as a hydrocarbon, it falls outside the scope of the F-Gas Regulations.

However, propane use is already growing fast and will continue to accelerate in step with the phase down of refrigerant gases with higher global warming potential (GWP).

Under new European Union rules, stationary split air conditioning and heat pump equipment with capacities below 12kW will be required to use F-gases with a GWP below 150 from the start of 2027. For larger systems, the GWP will have to be below 750.

This means the most commonly used refrigerants in these systems will be phased out to be replaced by R290 in many smaller systems. While the UK is not bound to EU legislation, it is expected to adopt the same rules because of its commitments, under the Montreal Protocol and Kigali Amendment, to minimise the global warming impact of refrigerant gases.

BESA acknowledges that R290 is a highly effective refrigerant that provides low GWP, high heat transfer performance, and low-pressure ratios which in turn cause fewer leaks. However, its high flammability poses a significant safety risk during installation, maintenance, and retrofitting. It is, therefore, calling for all technicians and engineers working on R290 systems to receive appropriate specialised training for handling flammable refrigerants.

Working with R290 raises major concerns due to its highly flammable nature," said BESA technical engineer Keegan Farrelly. "It is classed as an A3 gas, which is the highest level of flammability and means it could even be ignited by static electricity.

"With a flammability limit of just 1.7%, even a very small amount of R290 in a room is enough to pose an ignition risk. Most properly qualified engineers could work perfectly safely with this gas, if they have undergone training that covers the specific technical challenges and risks of working with flammable gases."

BESA's technical bulletin highlights the specific risks from the growing number of heat pump installations that now use R290 and the need to carry out extensive risk assessments – both for new and retrofit applications. It also stresses the importance of making sure the area around the unit is well ventilated.

It highlights the particular risks associated with brazing and advises engineers to fully purge the system first. BESA also outlines the importance of installing some form of leak detection to minimise the risk of accidental leakage and ignition if the system is installed in an enclosed area.

Retrofitting R290 systems into pre-existing installations is a particular area of concern for BESA. The bulletin advises that any R290 unit should be positioned at least 1.5 meters from other electrical equipment to reduce the risk of ignition in the event of a leak.

"This hasn't been a consideration so far for existing systems that use A1 or A2L class refrigerants, but the ongoing phase-down of higher GWP refrigerants and the potential for more stringent future regulations, means that more system replacements may have to employ hydrocarbons like R290," added Farrelly. "This poses a real challenge when replacing systems where multiple outdoor units are mounted closely together."

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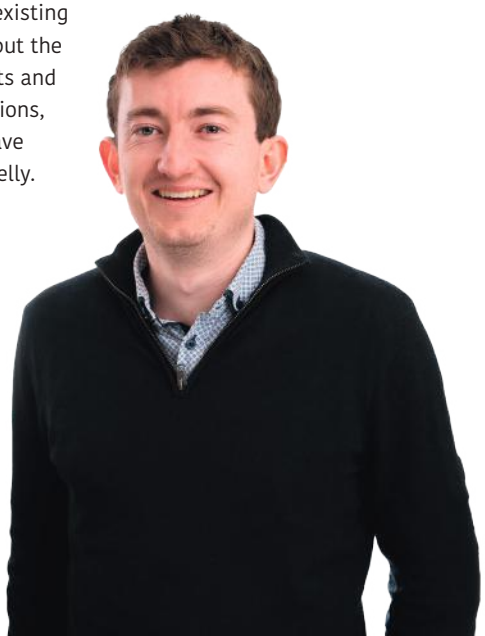

Although working with R290 raises concerns, Keegan Farrelly of BESA says that most properly qualified engineers could work safely with the gas if they have undergone training that covers the specific technical challenges and risks involved

Hayley Jackson

CambridgeHOK seals £1.5m Stourgarden deal

CambridgeHOK Refrigeration has secured a £1.5m contract to install a secondary glycol system for leading UK onion processor Stourgarden.

Based near Colchester, Stourgarden currently packs and processes 75,000 tonnes of red, brown and pink onions per year, mainly to supply a high-profile retailer, global restaurant chains and food manufacturers.

Already one of the biggest onion packers and processors in England, it hopes the installation of a secondary glycol refrigeration system at its new processing and storage facility will provide a further boost to productivity.

CambridgeHOK Refrigeration General Manager Hayley Jackson said: "We are immensely pleased to have secured such a prestigious contract with a family-run business which has been processing onions for many generations because it underscores our reputation for designing and executing highly sophisticated bespoke refrigeration systems.

"We are thrilled to collaborate on such an innovative venture and are confident we will deliver a system to meet their exacting standards and help achieve their long-term business growth aspirations."

The new project will provide Stourgarden with washdown and general use hot water through heat that is recovered from the refrigeration system. The design phase is already underway, with onsite works expected to commence in the autumn.

Refrigeration's role in adapting to rising temperatures

The Institute of Refrigeration (IOR) has announced the 1st IIR International Conference on The Role of Refrigeration in Adapting to Rising Ambient Temperatures. The in-person conference will be held from 10-12 August 2025 in Manchester.

As global temperatures continue to rise, the challenges faced by the refrigeration, air conditioning, and heat pump (RACHP) sectors are becoming increasingly complex. This conference will explore these critical issues and encourage the exchange of ideas and innovation among experts dedicated to developing sustainable and resilient solutions.

The conference will be inviting contributions to the programme that provide case studies, innovation, research, and expertise in addressing these issues. It is expected to attract a diverse international audience of academics, engineers, industry leaders, and policymakers, to focus on the intersection of refrigeration technology and climate change adaptation around the following themes:

- Managing Risk
- Environmental and Social Governance
- The Future Landscape of RACHP

Those taking part will have the opportunity to:

- Explore Technical Challenges: discover how various sectors, from air conditioning to commercial refrigeration and transportation, are uniquely affected and explore common solutions that could be applied across the board.
- Gain Sector-Specific Insights: with valuable insights into the specific challenges and opportunities each RACHP sector faces. For example, air conditioning systems encounter different issues than commercial refrigeration or transport cooling, each requiring tailored approaches and innovations.
- Build Networks and Collaboration: connect with leading experts, share knowledge, and explore collaborative opportunities. This conference offers a unique platform to compare sector-specific challenges, identify areas needing further research and development, and foster meaningful collaborations.

The conference is being organised by the International Refrigeration Committee of IOR, on behalf of the International Institute of Refrigeration (IIR). The IIR is an intergovernmental body representing over 60 national governments and involving global experts through its commissions and informatory notes.

For further information, register to receive conference updates at **www.adaptation2025.com**. Any business interested in sponsorship opportunities should contact the IOR at **www.ior.org.uk/about/contact-us**.

Quickfridge delivers Peak cooling

Wholesaler Beijer Ref gave charity fundraiser Daniel Fairbrother a welcome boost when he tackled the gruelling 100km Peak District Ultra Challenge with a domestic fridge strapped to his back.

The fridge was sponsored by Quickfridge, Beijer Ref's emergency cooling solution, as Daniel undertook the challenge in aid of Great Ormond Street Hospital Charity, in recognition of the treatment they have provided for his fiancée Hayley's eight-year-old twin sons' eye condition.

Daniel, from Stevenage, completed this year's London Marathon carrying the fridge (which he calls Tallulah) and decided to follow that with the equivalent of back-to-back marathons over the rugged Peak District terrain.

Howard Noble, Innovation and Marketing Director at Beijer Ref, said: "When we saw what Daniel was attempting, we just had to get involved. It's a magnificent effort for a wonderful cause and we are delighted to have helped him on his way."

For more information on Quickfridge, visit: **https://quickfridgecooling.co.uk/**

Double delight for Beech at TQ golf day

Wakefield-based gas detection specialist TQ Environmental welcomed ACR Journal and other industry guests to its annual golf day at Hollins Hall Golf & Country Club, Shipley. Regarded as a favourite on the golfing calendar, the event once again produced a fantastic day of golf.

With prizes for the longest drive and multiple closest-to-the-pin competitions, everyone was in good spirits. Chris Beech of CDL won the putting competition and was also part of the victorious Texas Scramble team, which included Sam Pepper (DJ Assembly), Steve Harwood (HLR Building Services), and Iain Wright (Macwright Air conditioning).

SITE completes data centre upgrade at island hospital

Data centre design and build company Secure I.T. Environments Ltd (SITE) has completed mechanical and electrical upgrades to improve energy efficiency at the primary data centre of St Mary's Hospital, Isle of Wight NHS Trust.

The trust serves an offshore population of more than 140,000. Its data centre was originally designed and installed by SITE in 2008, but the trust wanted to take advantage of new energy efficient and sustainable technologies, whilst also redesigning the data centre to accommodate 14 racks, with a maximum data centre load of 80kW.

The upgrade recommendations specified and implemented by SITE will allow the trust to reach its data centre target cooling power usage efficiency (PUE) of 1.15 or lower and is projected to achieve its return on investment in less than 1.8 years.


Jake Gully, Digital Operations Technical Architect at Isle of Wight NHS Trust

Works included:

- Design new rack layout to support future load requirements
- Implement Cold Aisle Containment to new and existing racks
- Supply and install 4x DMA030D GEA Multi-DENCO Energy Efficient DX ai conditioning units with external condensers
- Replace UPS with a new energy efficient Riello MPW PWC 300 Multipower UPS solution capable of 40-minutes autonomy at 80kW load

Jake Gully, Digital Operations Technical Architect at Isle of Wight NHS Trust, said: "This has been a very successful project delivered on time and in budget, that will enable us to achieve our energy efficiency goals and sets the stage for our future technology aspirations. SITE care about the quality of their work, and it has been a real team effort from design to completion."

Chris Wellfair, Projects Director at SITE, added: "As the original designers of the data centre at St Mary's Hospital, this project has been a clear reminder, if one were needed, that the pace of development in data centre technology to improve energy efficiency shows no signs of slowing. We look forward to continuing to support the fantastic IT team at St Mary's Hospital with the ongoing maintenance of the upgraded data centre."

Elta partners with Euroclima to expand AHU offering

Elta is partnering with manufacturer Euroclima to extend its offering of bespoke air handling options.

David Millward, Group Product Manager at Elta Group, said: "We're predicting a huge demand for air handling units as there is an increasing need for better air quality and energy efficiency. It's no longer a viable option to simply move air around buildings, so working with Euroclima means that both entities are ideally poised to support ventilation professionals with the evolution of air quality."

Josef Prünster, Area Sales Manager at Euroclima, added: "We are excited about this collaboration with Elta Group which aligns perfectly with our mission to deliver superior air handling units that exceed industry standards. Together, we look forward to setting new benchmarks in air quality and energy efficiency across the region."

Registration open for Smart Building Show 2024

Registration remains open for Smart Buildings Show 2024. The UK's largest commercial smart buildings event will take place on 9-10 October at ExCeL London and is free to attend.

Last year's event attracted more than 2,000 visitors, with presentations from over 70 speakers underlining the show's ability to connect visitors to the latest information and technology in the smart buildings industry. It also aims to help key industry personnel gain the information they need to arrive at an informed decision on how to make their buildings more economic for owners and more functional for occupiers.

Ian Garmeson, Event Director, said: "Anybody interested in making buildings more economic and functional, seeing what's new in the industry and keeping up to date with the latest innovations and technologies should register to attend Smart Buildings Show 2024. The event promises to be another vital learning experience as well as a fantastic networking opportunity for existing - and potentially new - industry partners. We look forward to seeing you there!"

To register, visit: **https://eventdata.uk/Forms/Form.aspx?FormRef=SBSA4Visitor**

CIBSE and BESA form strategic alliance

Two of the UK's leading building services engineering organisations have agreed to work more closely to ensure progress on several key initiatives, including the push for Net Zero in the built environment and delivery of the Building Safety Act.

Contractors' trade body the Building Engineering Services Association (BESA) and the industry's professional institution CIBSE have drawn up a series of joint projects to help achieve their common aim of advancing and promoting the art, science and practice of building services engineering for the benefit of society.

The two organisations have a long history of collaboration but feel that the growing urgency to transform the built environment in line with the country's decarbonisation and healthcare aims calls for a more integrated approach.

"Talking about collaboration is one thing – doing it quite another," said CIBSE Chief Executive Ruth Carter. "The building services industry is in greater demand than ever as it increasingly accounts for a much larger proportion of the value of construction and facilities management projects.

"Therefore, our supply chains must be more closely aligned, and the different professions more joined up to deliver the higher levels of digital sophistication and integrated design necessary to meet growing client demand and legislative scrutiny."

The two organisations have agreed to provide deeper support for each other's key events including national conferences, seminars, and awards, while continuing their already successful collaboration on a range of technical guidance.

They will focus particularly on the Building Safety Act, developments linked to indoor air quality (IAQ), retrofitting and refurbishment of the existing building stock to advance decarbonisation, and the growth in heat networks. They will also work together to understand the implications of artificial intelligence (AI) for the industry and its potential to improve productivity.

"There is now far greater awareness of the role played by the building services profession in addressing some of society's most pressing challenges, so this is the right time to deliver a programme of joint initiatives" said BESA Chief Executive Officer David Frise.

"We have worked closely with CIBSE for many years and the two bodies have a huge amount in common, but our collaboration has always been somewhat 'patchy'. The sheer scale of the technical, legislative, and recruitment challenges now facing the industry calls for a properly concerted and joined up approach on behalf of the whole sector."

Ruth Carter of CIBSE and BESA's David Frise

Green Point responds to data centre crisis

Green Point UK, the compressor remanufacturing and services arm of BITZER UK, ensured critical cooling at a major data centre was maintained following the failure of a number of chillers at the site.

The loss of cooling capacity meant the data centre was vulnerable to a spike in ambient temperatures or an increase in intensity of server usage, which could have overloaded remaining cooling plant at the site, with potentially catastrophic consequences.

Will Pribyl, General Manager of Green Point UK, said: "Due to system issues, a number of chillers on site had gone down and the data centre was vulnerable. The work needed to be done immediately to ensure continuity of cooling, and the on-site contractor was under pressure to solve the problem."

Green Point UK fast-tracked full strip-down and remanufacture of five BITZER CSH95111 and CSH95113 semi-hermetic screw compressors. As part of the process, the compressors were upgraded to the latest BITZER specification.

Pribyl added: "The upgrade effectively took what were first generation units up to the same specification as BITZER's latest third generation units, improving energy performance and reliability, and ensuring spare part support for the foreseeable future."

Green Point UK is now supporting the contractor on improving the resilience of other data centre facilities it is responsible for, including use of monitoring via the BITZER Digital Network.

BCIA takes lead on development programme

The Building Controls Industry Association (BCIA) held a celebration lunch to mark the completion of its first Inspired Leaders programme. The initiative, started in February 2024 and developed in partnership with Inspired Leadership Solutions, was aimed at developing existing and future leaders in the BEMS industry.

The event saw the first 14 selected delegates come together, along with BCIA President Stacey Lucas and former President Graeme Rees, who oversaw the development of the programme during his tenure.

Led by Michael Holbrow, a professional coach, mentor, and facilitator who has spent more than three decades in the building controls industry, the programme was the result of a training gap identified during the development of the BCIA's corporate plan.

During this, it was discovered that people development and leadership training was suffering due to the pace of the market. In fact, it was found that often companies would be struggling to recruit and not able to set time aside to concentrate on people development.

The 16-week programme comprised of six modules that were designed to change the way in which individuals in the BEMS sector might approach situations, whether that's how they lead teams and client projects or understand the benefits of self-leadership.

Stacey Lucas said: "Michael was a brilliant coach and really helped those taking part to embrace the potential for leadership roles in the building controls sector and understand how to overcome any challenges along the way."

Trane UK earns certification double

HVAC rental specialist Trane UK has been awarded SafeContractor certification and Constructionline Gold verification.

Constructionline Gold membership enables the company to meet industry standards such as PAS 91 and the Common Assessment Standard, while SafeContractor certification from Alcumus SafeContractor recognises Trane UK's commitment to excellence in workplace health and safety.

Ross Giles, UK Equipment Leader at Trane UK, said: "Achieving SafeContractor and Constructionline Gold status gives all our clients complete confidence that a commitment to sustainability is at the core of all Trane UK's customer offerings, and that ensuring compliance with the latest health and safety standards has always been of the highest priority."

FEA adds refrigeration module

The Foodservice Equipment Association (FEA) has launched a refrigeration module for the Foodservice Carbon Professional course. This complements the core FCP course, which explains the science of climate change, what the government is trying to do about it through legislation, and how this applies to the foodservice sector as well as how equipment can play a significant role in improving sustainability.

FEA says it developed the FCP course in association with Hospitality Energy Saving to provide the foodservice industry with the skills they need to identify sustainable equipment and explain why it is good to pick it.

The individual core course costs £750, with individual sector specific modules costing £650. A combined core/category specific module deal is also available with core and one product module costing £1300 per person, a saving of £100.

More information on the course can be found on the FCP landing page, which is at fea.org.uk, under the learning and development tab (**https://www.fea.org.uk/learning-and-development/foodservice-carbon-professional/**).

SKILLcard gets connected with app launch

A digital version of the Engineering Services SKILLcard will enable users to access all their technical and health & safety qualifications via a mobile phone app.

SKILLcard, which is managed by the Building Engineering Services Association, has been operating for 22 years and provides over 50,000 building services engineers with evidence of the qualifications they need to access sites.

The new digital system gives users a single continually updated point of access to all their cards and the qualifications they hold in one place. It also enables site access via a QR code that can be scanned directly from the card holder's phone using the Construction Skills Certification Scheme (CSCS) 'Smart Check App'.

Providing a digital option will also allow SKILLcard to dramatically reduce the time between applying and being able to use the card, with access made available immediately after approval. It hopes this will encourage more applicants and ensure wider and more effective use of the cards.

The Building Safety Act is intensifying the scrutiny of competence and compliance across the sector as the government seeks to clamp down on sub-standard and unsafe working practices. The new digital SKILLcard is a direct response to this development and aims to move the industry closer to the ideal scenario where the skills of the entire workforce are instantly available, transparent, and constantly updated.

Reducing the amount of plastic in use is another major benefit of the gradual switch from physical cards. BESA said it was also investigating ways of reclaiming and recycling the plastic SKILLcards once they are no longer required.

For more information about engineering services SKILLcards and how to apply, visit: **www.skillcard.org.uk**

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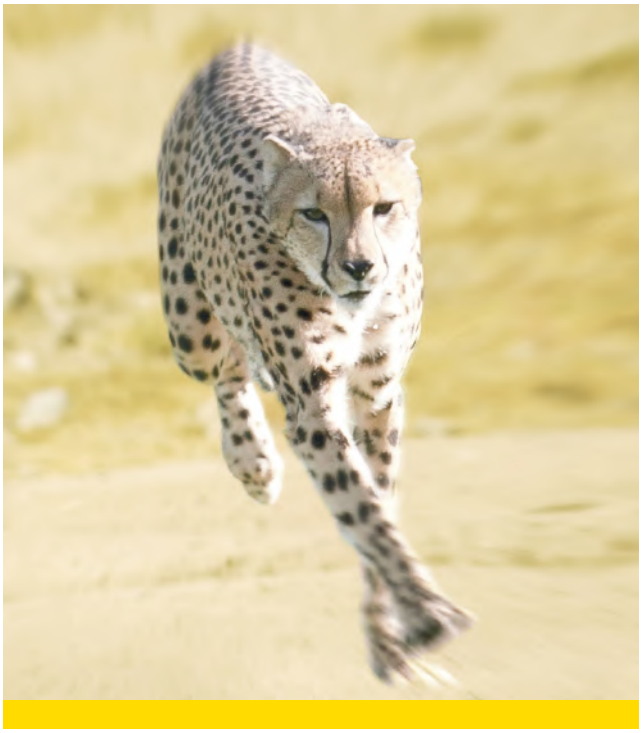

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- Dual voltage and dual frequency motor for use on 120/230 volts, 50/60 hertz power supplies which ensures global compatibility
- Locking power cord prevents accidental disconnection of lead
- 2-stage design which achieves lower ultimate vacuum – as low as 15 microns
- Gas ballast valve enables a deeper and faster high ultimate vacuum level
- Ergonomic and rubber-lined handle for easier handling, a skid resistant rubber base for stability and sealed and spark-free components ensure safe operation on A2L and A3 systems
- Dual inlet ports –1/4" MFL and 3/8" MFL

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The RA1500-A3 exhaust venting kit has been designed for use specifically with VacuMaster pumps and allows for the routing of evacuated gases to a safe area when servicing systems that use flammable refrigerants. A remarkable 10 metres of hose is standard.

SPECIFICATIONS	RA1530-A3	RA1550-A3	RA1580-A3
MAXIMUM CURRENT	115 V 50/60 Hz – 5,84 A 230 V 50/60 Hz – 2,84 A	115 V 50/60 Hz – 6,26 A 230 V 50/60 Hz – 3,2 A	115 V 50/60 Hz – 9,87 A 230 V 50/60 Hz – 4,75A
FREE AIR DISPLACEMENT	3 cfm (85 l/m) @60 Hz 2.5 cfm (71 l/m) @50Hz	5 cfm (142 l/m) @60 Hz 4.1 cfm (116 l/m)@50Hz	8 cfm (227 l/m) @60 Hz 6.6 cfm (187 l/m) @50Hz
ULTIMATE VACUUM	15 microns (2 Pa)	15 microns (2 Pa)	15 microns (2 Pa)
STAGES	2	2	2
MOTOR	300 watt	350 watt	660 watt
INTAKE PORTS	1/4" & 3/8" Flare	1/4" & 3/8" Flare	1/4" & 3/8" Flare
OIL CAPACITY	560ml	480ml	610ml
DIMENSIONS	348 x 140 x 272mm	348 x 140 x 272mm	382 × 160 × 285mm
WEIGHT	10.2kg	11.2kg	15.2kg

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System evacuation can be corrosive and damaging. Any debris entering the compressor can interfere with the vanes and compromise the desired vacuum. Most manufacturers recommend an oil change after every use (or 10 hours if you are on a big job). We recommend ROBINAIR Premium vacuum pump oil!

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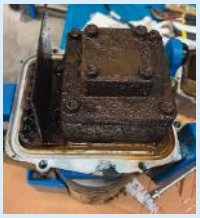

Why the reclamation of refrigerants is more important now than ever

As global temperatures rise, the role of refrigerants is becoming more important in daily society.

Both cooling and heating applications will become essential in keeping the planet hospitable for communities worldwide in the years to come, meaning that the RACHP industry has a vital role to play in creating a viable future.

Historically, many of the refrigerants installed in applications like air conditioning units were Ozone Depleting Substances (ODS), posing a significant risk if they were released into the atmosphere. The Montreal Protocol (MOP), signed in 1987, aimed to phase out these gases. They were replaced by (among other things) hydrofluorocarbons (HFCs), but while these are not ozone-depleting, they still have a high Global Warming Potential (GWP). The Kigali Amendment, signed in 2016, addressed this further, asking governments and institutions to commit to an 80% reduction in the production and consumption of HFCs over the next three decades.

Other initiatives, such as the recent EU F-gas Regulation, will speed up the phasedown. However, they do not provide a fulsome solution for the refrigerants already in use. Without a responsible lifecycle management programme, the risk of the gases being released into the atmosphere grows. Transitioning towards the circular economy is an important step in minimising that risk.

The circular economy is an antidote to the 'Take, Make, Dispose' model that has dominated our industry for decades, and the recovery and reclamation of used refrigerants are central to it. Reclaiming refrigerants to industry-accepted AHRI 700 standards and re-supplying them back to the market extends their lifetime and mitigates their potential impact on the environment. Simply put, the more refrigerant that is recovered, reclaimed and repurposed, the bigger the chance we have of reducing the cooling industry's Greenhouse Gas (GHG) emissions in line with net-zero targets.

Embracing these principles is not straightforward, however. Many national authorities currently lack the resources to properly enforce laws around refrigerants (something emphasised by the ongoing illegal trade of refrigerants). There are also some technical challenges; returned refrigerant waste is often too mixed to be effectively reclaimed, and the rules on reusing recovered refrigerants are not always clear.

The solution to these problems is an effective and wide-ranging Lifecycle Refrigerant Management (LRM) programme, and this is where A-Gas shines.

Circular economy

When the company started in 1993, it was a humble gas distribution company. Today, it is a market-leading LRM business that helps its customers embrace circular economy principles. Through services like its Rapid Recovery offering, A-Gas recovers legacy refrigerant gas in a way that is responsible, flexible, on-site and up to 10 times faster than traditional methods. Because reclaimed refrigerant functions just as well as virgin products, it provides its customers with a high-quality solution while mitigating emissions.

Increasing the circularity of refrigerants and limiting the need for virgin production supports customers with their own environmental goals.

While both reclaiming and recycling used refrigerant are good practice, they are not exactly the same thing and, as such, do not offer the same benefits. This is particularly true in the case of product quality; a recycled refrigerant will never meet the same level of purity as a reclaimed refrigerant.

Recovery and reclamation are more important now than ever and are at the core of A-Gas' business strategy. By ensuring that as much reclaimed refrigerant as possible is repurposed back into the market, customers are given greater choice and are consistently supported in adapting to any new rules and regulations. The more the industry adopts circular economy principles, the more it can contribute to enabling a viable future for the planet.

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Refrigerant choice in HVACR chillers

By Sajjun Lohia, Sales and Marketing Coordinator at Climalife in the UK.

In the heating, ventilation, air conditioning and refrigeration (HVACR) industry, chillers play a vital role. Commercial facilities such as offices, hotels, restaurants, and hospitals are areas where chillers play an integral part. For many years commercial buildings have used such systems as a method to cool and dehumidify buildings but increasingly they are also being used to provide heat as well. Like other areas of the industry, there is an increasing need for these systems to be both sustainable and efficient.

Legislation is driving and influencing the choice of refrigerant. With the HFC phasedown progressing and the next reduction step likely within the next couple of years, chiller manufacturers are already making moves to switch to lower GWP refrigerants.

There are several types of chiller, all different to each other. However, in terms of refrigerant they can be split into three types based on the pressure of the refrigerant.

Low pressure refrigerant chillers

Low pressure chillers increasingly use very low GWP R-1233zd (GWP = 4.5, AR4), which is an A1 safety class single component refrigerant as well as R 514A (GWP = 7, AR4), an azeotropic B1 safety class refrigerant blend.

Medium pressure chillers

R-134a has been widely used in chiller applications. In the larger end of the chiller market there are equipment manufacturers who are still offering a range of equipment with R-134a as the primary option.

Whilst R-134a has a GWP of 1430 (AR4) and isn't subject to any current bans in Great Britain (GB), the GB F-Gas regulation is still in the process of being revised and lower GWP alternatives are available.

Many of the leading manufacturers of chillers produce a range of air-cooled, water-cooled and remote condenser chillers that have a wide range of cooling capacities from 20kW up to 2MW. Most now have options designed for use with the refrigerants mentioned below.

R-513A is non-flammable and has a GWP of 631 (AR4). It has been quickly adopted by various manufacturers and has a similar cooling capacity and performance to R-134a, meaning it can be used an easy option for retrofitting R-134a systems. R-513A has a GWP level less than half of the GWP of R-134a. This essentially means that twice as much becomes available compared to R 134a in terms of the F-Gas HFC phase-down.

R-1234ze is a very sustainable long-term refrigerant, as it is a is a single component HFO with a very low GWP of 7. Available since 2012, it has been used in chiller applications, where R-134a was previously used. However, due to a lower cooling capacity it is not suitable as a retrofit option for R-134a.

The positives of using R-1234ze is the good energy efficiency compared to R-134a, making it an ideal ultra-low GWP alternative to R 134a in new equipment. Increased energy efficiency translates into lower indirect emissions and lower operating costs. Since R-1234ze is non-flammable below 30°C, for transportation (ADR) and manufacturing (PED/PE(S)R) purposes, it can be treated as non-flammable, even though it is classed as A2L under the ASHRAE 34 and ISO 817 standards. In the past the switch to R-513A has been easier to implement. Despite that, Climalife advises to always look at longer-term solutions in new equipment, with many manufacturers offering equipment using R-1234ze.

In 2020, R-515B was new to the market. Due to the almost identical characteristics as R-1234ze, R-515B can be described as an A1 (non-flammable) version. This creates an ideal solution as R-515B offers a low GWP alternative (293, AR4) in applications where the long-term solution R-1234ze (GWP<1) cannot be used due to its A2L safety classification.

R-1234yf can be considered a long-term sustainable refrigerant due to it being a single component HFO with a very low GWP of 4 (AR4). In terms of performance R-1234yf is very close to R-134a, meaning there are some chiller options available using it. However, due to the safety class difference, R-1234yf is better suited for use in new equipment.

Under the Pressure Equipment Directive (PED) R-1234yf is in fluid safety group 1. Although it could be possible to retrofit from R 134a, any changes to the equipment PED classification need to be thoroughly considered as well as charge size restrictions from EN 378 and a suitable risk assessment will most certainly be required, which takes into account any possibility of the potential formation of flammable zones.

As both R-1234ze and R-1234yf have a very low GWP, this essentially means they both provide an unrestricted solution as the HFC phase-down tightens on higher GWP refrigerants in the years ahead.

High pressure chillers

R-410A has been extensively used in chillers, however due to its GWP of 2088 (AR4), it is not a sustainable solution in new equipment as the F-Gas HFC phasedown steps impact. The leading refrigerants are currently R-454B and R-32, neither of which are suitable as R-410A retrofit options and should only be used in equipment designed for these products. Some manufacturers are also looking at the medium pressure refrigerants previously mentioned as an alternative for this technology. For example, scroll compressors for R 1234ze are available and able to deliver the same capacity as for R-410A.

R-454B with a GWP of 466 (AR4) appears to be currently leading the way with a number of manufacturers as it is a close match to R-410A in terms of operating performance and properties and has the lowest GWP. We are seeing an increasing number of chiller manufacturers making this option available to the market.

R-32 with a GWP of 675 (AR4) has seen rapid growth as a replacement for R-410A in split AC systems and some manufacturers have also opted for R-32 in chillers. The properties of R-32 have meant that more equipment re-design may be required by equipment manufacturers.

Other refrigerants worthy of a mention are R-290 (propane) and R-717 (ammonia). Some manufacturers are offering HVAC systems using R-290 but the requirements for using an A3 highly flammable refrigerant can be a little more restrictive than using a lower or non-flammable option. Whilst EN 378 does not restrict charge sizes if the system is in the open air, suitable risk assessment taking into account the potential formation of flammable zones is required and likely to be significantly more restrictive than using a lower flammability option.

The use of R-717 is widespread in industrial chillers where the toxicity and flammability can be more easily managed but is rarely seen for general HVAC applications.

Looking to the future

Changing the refrigerant used in chillers is not always a fast process as there is range of criteria that it must meet. Criteria includes operating at the desired pressure and temperature, providing the appropriate levels of cooling and, of course, being more energy efficient than its predecessors.

New chillers installed now need to work efficiently over their lifetime, which can be 20-30 years, so choosing a sustainable refrigerant is important. The chiller manufacturers are moving quickly in the right direction and already have a number of lower GWP options available to them to be able to meet the restrictions F-Gas legislation creates.

There are many leading manufacturers that have released or are releasing equipment that is high performing, energy efficient and cost effective with the use of very low GWP refrigerants. These offer a long-term solution in order to future proof a building's air conditioning system and to take steps towards tackling the pressing issue of climate change.

As these chillers become more established in the market, it's important to make sure your refrigerant supplier is up to date on handling, use and performance of the new refrigerants and have availability. Climalife has a stock of all the refrigerants discussed.

Applying CO_2 leak detection in food retail

Tom Burniston, SAMON's Marketing Director and Group Product Management Lead for Safe Monitoring Group, says the choice of detection SYSTEMS should be guided by response time and operating temperature.

The developments and changes in regulations, the phase-down of HFC refrigerants, and the ongoing development of refrigeration technology see carbon dioxide (CO_2) increasingly being used as a refrigerant in a wide variety of applications. This includes applications such as:

- Supermarkets
- Convenience stores
- Cold rooms
- Walk-in freezers
- Industrial cold storage
- Food manufacturing
- Food processing

CO_2 has a significantly lower global warming potential (GWP) than HFC refrigerants, making it less environmentally harmful than many of the gases previously used in these refrigeration applications. Most of these gases, such as R134a and R404A, are beginning to be phased out of use due to their environmental impact. This is driven by regulations put in place to drastically reduce the use of HFCs and their associated impact on the Earth's climate. In Europe, the F-Gas Regulation (EU) 2024/573 has an ambitious goal to reduce the amount of HFCs placed on the market by 98% by 2050 (compared to 2015).

In the US, the refrigeration sector is addressed directly by the American Innovation and Manufacturing Act. The over-arching goal of the programme is to phase down HFC production and consumption by 85% from baseline levels by 2036.

This creates a great driver towards CO_2 becoming an increasingly attractive option for use when balanced against the requirements and limitations resulting from implementation of the regulations. Furthermore, the manufacturers of refrigeration systems continue to develop a growing range of ever more efficient and cost-effective CO_2 refrigeration system options, enabling their wider adoption into commercial applications.

Why are CO_2 detectors needed?

Although comparatively beneficial for the environment relative to HFCs, in high concentrations CO_2 can be dangerous to humans because it is both a toxic gas and an asphyxiant gas. Refrigeration systems using CO_2 also operate at high pressures, sometimes as high as 2,000psig, which means that if a leak occurs the gas can escape at a high rate, quickly creating a dangerous atmosphere.

The effects of CO_2 are shown in Table 1.

Table 1 *Time weighted average (TWA)

CO_2 concentration in air (ppm)	Effects
370	Atmospheric level
5,000	Long term exposure limit - 8 hours TWA
15,000	Short-term exposure limit – 15 minutes, some physical discomfort
30,000	Respiration difficulties, headache, dizziness, nausea
40,000	IDLH limit (Immediate Danger to Life & Health)
100,000	Loss of consciousness, death
300,000	Quick death

Refrigerant safety standards, such as EN 378-1:2016+A1:2020 and ASHRAE 34-2022, establish exposure levels critical for assessing the safety of refrigerant systems and determining instances where refrigerant leak detection becomes necessary. These standards typically encompass scenarios requiring detection in machinery rooms and refrigerated spaces like cold rooms and walk-in freezers.

Moreover, larger refrigerant charge sizes of the type typically found in a large supermarket escalate the likelihood of mandated leak detection in expansive areas, such as storage freezers.

Given the nature of refrigeration systems, leaks may occur over time due to various factors such as inadequate maintenance, mechanical wear, accidental damage, or improper installation. Highly pressurised systems (such as those using CO_2) are particularly susceptible to these issues, significantly heightening the risk of leaks.

The potential dangers of CO_2 in a food retail application are very real. For an example in a refrigeration system using CO_2 as a refrigerant, in a typical walk-in cold room with a volume of 25m^3 and a rate of one air exchange per hour we can calculate that a leak rate of 500g/hr will create an atmosphere containing 40,793ppm of CO_2 in just 250 seconds.

That surpasses the level of 40,000ppm at which CO_2 presents an immediate danger to life and health according to OSHA guidelines.

In addition to safety concerns, CO_2 refrigerant leaks pose significant economic risks, potentially leading to inadequate cooling that fails to meet essential food safety standards or, in extreme cases, complete system failure. Such occurrences can result in food spoilage, leading to significant waste and profound economic consequences. For high-value products like dry-aged beef or luxury ice cream, a single unaddressed refrigerant leak could incur costs amounting to tens of thousands of dollars.

Selecting an appropriate CO_2 leak detector

Carbon dioxide detection serves a multitude of purposes across diverse domains, spanning from ensuring indoor air quality (IAQ) to safeguarding occupational environments and monitoring refrigeration systems. However, the suitability of CO_2 monitoring devices varies significantly depending on the intended application, particularly when it comes to leak detection in refrigeration settings.

In navigating the selection process for a CO_2 leak detector, two pivotal factors demand particularly careful consideration: response time and operating temperature.

Given the potential for CO_2 leaks to rapidly escalate and create hazardous conditions, the responsiveness of a refrigerant gas detector becomes paramount. Instruments tailored for continuously monitoring gradual shifts in atmospheric CO_2 levels, commonly utilised in IAQ contexts, may lack the swift response required for effective leak detection.

In leak detection scenarios, where swift action is crucial to prevent the onset of dangerous situations, a rapid response time is not only indispensable, but is mandated by refrigerant safety standards. Consequently, it is incumbent upon operators to thoroughly evaluate not only the stipulated response time of the sensor embedded within a leak detector but also, and perhaps more significantly, the overall response time of the instrument as a cohesive unit.

It's noteworthy that the design intricacies of detection devices can significantly influence the rate at which gas reaches the CO_2 sensor. For instance, configurations that afford direct exposure of the sensor to the monitored atmosphere typically yield swifter response times. Conversely, in certain instrument designs where gas must traverse a capillary tube before reaching the sensor, the response time may be considerably extended, potentially undermining the efficacy of the sensor's inherent responsiveness.

Therefore, ensuring a full alignment between the response time of the gas detector and the specific requirements of the application is of paramount importance to fully harness the intended benefits of the device. This necessitates a nuanced evaluation of the instrument's design and capabilities to ascertain its suitability for its intended use.

Furthermore, beyond response time considerations, the operating temperature range of the CO_2 detector warrants careful scrutiny. Given the diverse operational environments encountered in refrigeration settings, including extremes of temperature, it is imperative to select a detector capable of reliably functioning within the designated temperature range.

In essence, while CO_2 detection technologies offer invaluable insights and capabilities across a spectrum of applications, when selecting systems for leak detection in refrigeration systems, a discerning approach to device selection, taking into account factors such as response time and operating temperature, is indispensable in ensuring optimal performance and ensuring the safety of personnel working with and around the refrigeration system.

Implementing CO_2 detection: best practices and considerations

When it comes to effectively detecting CO_2, understanding the behaviour of this gas is essential. CO_2 is marginally denser than air, which means it tends to descend towards the ground over time. Consequently, for optimal detection, it's recommended to install gas detectors at lower levels, approximately 20cm above the ground. However, specific circumstances may warrant deviations from this standard approach.

For instance, in environments like cold rooms, where airflow dynamics differ, positioning the gas detector on a side-wall within the return air flow to the evaporator is often considered the most effective strategy. This positioning ensures that any CO_2 present is promptly detected, safeguarding the integrity of stored goods.

Strategic placement of gas detectors near potential leak sources is another critical aspect of effective CO_2 detection. These sources include valves, flanges, joints, and pressure reducers, where leaks are more likely to occur. Additionally, positioning detectors in close proximity to areas with a high concentration of refrigerant, such as compressors, storage tanks/cylinders, pipes, and conduits, enhances detection sensitivity.

Incorporating considerations for airflow patterns and ventilation is also vital. Both natural and mechanical ventilation systems can impact the dispersal of leaked gas into the environment. Since CO_2 disperses relatively slowly, especially in confined spaces, ventilation plays a crucial role in moving gas clouds and aiding detection. Placing gas detectors within airflow paths ensures comprehensive coverage and maximises the likelihood of early detection.

It's worth noting that determining the optimal number of sensors and their precise locations for a given application is not governed by universal rules or standards. Instead, it requires careful consideration of the specific environmental factors and potential risks present. Therefore, the guidance provided serves as a framework to support installers in making informed decisions tailored to each unique situation.

Ultimately, adherence to all relevant local, state, and national regulations is paramount. Compliance ensures not only the safety and security of the premises but also safeguards against potential liabilities. By implementing CO_2 detection systems in accordance with best practices and regulations, businesses can mitigate risks effectively and maintain operational continuity.

Effective CO_2 refrigerant gas detection

The use of CO_2 in food retail applications presents challenges for operators, some of which are akin to those faced when using HFC refrigerants, and some of which are new. One clear way to hep mitigate the safety risk posed by CO_2 leakage is the implementation of a well-designed, correctly implemented refrigerant gas detection system.

This begins with the selection of appropriate sensors integrated within a refrigerant gas detector designed for the application. A well-planned installation, taking into account the behaviour and characteristics of CO_2 when it leaks, can deliver a fully effective refrigerant leak detection system forming part of the wider refrigeration safety system design.

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This is more than just a game

I recently spent three days at the NEC in Birmingham at the Installer Show and I was delighted with the amount of interest we got in our Ecodan heat pumps on the stand.

We also had quite a bit of interest in our 'beat the trainer' challenge but I'm not allowed to reveal who our masked trainer was. All I will say is that it was rather hot in that helmet and boiler suit!

The event has grown steadily over the years, but this was the first time I really noticed significant growth in the number of 'traditional' heating engineers asking about heat pumps, which for me shows the way the industry is going.

One of the biggest attractions we had was our virtual reality tours of our equipment, which brings gamification to heating and HVAC, and helped to attract younger members of the Installer Show – those that are more used to using VR for alien shooter games!

Seeing inside equipment

We went down the route of using virtual reality to 'climb inside' our equipment as part of the process of redesigning our training after the pandemic.

The first thing we did was put as much of our training online, in easy-to-learn modules that people can complete in their own time.

Then we developed a sophisticated webinar system that allows us to talk to up to 90 engineers at a time, where me and my fellow trainers can talk through a piece of equipment and test what the engineers have learnt in their online pre-sessions. (I say up to 90, but we could do far more

than that. 90 just seems to be the limit in ensuring everyone can fully take part and get value out of the session).

The next step was to open our physical training courses again and we have completely revamped our training suites so that, having learnt a lot online, the engineers who do come into our training centres can get straight into being 'hands-on' with the equipment.

Added benefits of VR

I may be biased but I would say that our training centres are some of the best in the industry but even here there are limitations, which is why we have gone down the VR route.

Firstly, there is a limit to how many engineers we can get in our centres at any one time and, although we now have revamped training in Hatfield, Manchester and Livingston, with more to come at our other offices, there is a physical limit to how many engineers we can train face to face.

Secondly, whilst coming into the training room allows engineers to physically touch equipment, virtual reality allows them to go deep inside the equipment in a way that would be impossible in the real world.

This also has the advantage that we can create 'dangerous' situations in the virtual world that would have more serious consequences in the real one, such as loose electrical connections or other potential hazards.

Gamification of HVAC

And it also means we can show off much larger equipment that we would simply never be able to get inside our training rooms.

We have been over to Italy to one of our Chiller factories and filmed inside an IT Cooling system, and we plan to do more with Chillers, Heat Pump Chillers and Air handling Units.

And the one, really exciting thing about all of this for me, is the fact that we had so many young people coming onto our stand at the Installer Show.

We've already taken the VR system out and about in other areas as well, such as the recent WorldSkillsUK event in the centre of Birmingham and we're looking at other STEM events where we can show students and other young people that there is a meaningful career for them that can help to make a real difference.

This is where VR is really coming into its own and showing that it was a really good investment.

Chris Thornton-Riley is a Technical Trainer at Mitsubishi Electric

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MHI Projects helps Modo's smooth delivery

Dedicated support from the MHI Projects team has helped provide a major climate control upgrade for the UK home of global glass processing specialist LiSEC.

Two MHI KXZ2 Heat Recovery outdoor units were chosen for the project

The 4-way cassettes blend in with the surrounding tiling

Lizzy Holmes, Sales Engineer for MHI Projects, worked closely with Matt Everall, Engineering Manager at contractor and MHI 3 Diamond Dealer Modo Cooling, to ensure smooth delivery of a high efficiency VRF solution.

Austrian-based manufacturer LiSEC has been in its UK premises in Telford since 2008 and was initially looking to improve the efficiency of its office operations by moving to an LED lighting system. Service Manager Vinney Kirkland contacted Modo Lighting regarding an energy survey, and it was suggested that the air conditioning system should also be considered for replacement.

Sister company Modo Cooling was able to demonstrate a potential saving of 40% in running costs compared to the existing system using the Mitsubishi Heavy Industries (MHI) flexible 3-pipe heat recovery VRF solution, with a predicted return on investment (ROI) period of 3 years. Another significant advantage of the 3-pipe system was the capability to provide simultaneous heating and cooling when required, something which had not been possible with the previous system. This allows different offices, and areas within an office, to be cooled or heated at the same time.

These projections, coupled with the poor reliability record of the old equipment, led to the project being given the go-ahead, with MHI Projects, Modo and LiSEC working to identify the best possible combination of equipment and the preferred location for the outdoor units.

Two MHI KXZ2 VRF outdoor units were selected, one for each floor of the building, along with 11 indoor four-way cassettes. Installation took four weeks, two weeks for each floor, with Lizzy Holmes and MHI Projects able to support the process every step of the way.

Commenting on why MHI equipment was chosen, Matt Everall said: "I just like the kit. I know how to use it, it's easy to set up and is very reliable." He also feels that MHI offers the best balance of 'cost v quality' compared to other high-end brands, adding: "In my experience as a service engineer, I've only ever been to one MHI breakdown, whereas other 'premium' products have proved far more unreliable."

Vinney Kirkland said the extended MHI warranty, providing peace of mind for up to seven years, had been a factor in getting the project over the line, and said that the system was already exceeding expectations in terms of performance.

He said: "Overall, the system provides all that was expected and the reduction in power usage will enable a return on investment sooner than predicted.

"The cassettes blend in with the surrounding tiling and the neat appearance of the external units are a definite upgrade from our old system.

"The controllers for each unit are neat and modern with a system that allows for easy access to the major control requirements and access through password for additional information. This ease of use allows for individual sections to have the desired temperature without affecting other users.

"Modo offered a convincing solution to our needs and the team worked diligently and showed a great work ethic."

MHI Projects offers support through the Beijer Ref branch network of DW, HRP, RW and DWG.

https://mhi-hvac.co.uk/

Riding the skills challenge

Located opposite the Gulliver's Valley Resort theme park in Sheffield, Force Contracts is an HVAC solutions provider on one hell of a ride. ACR Journal editor Andrew Slater met the team committed to delivering quality service and developing the industry's skills.

From the outside, you might assume that Force Contacts is a typical contractor. Its unassuming office hosts a management team at the forefront of the business, with directors Andrew James, Claire Archer and Adam James answering phones to customers, looking at screens full of emails and making the tea. But there is much more to this company than simply servicing and installing equipment.

A family-run business established in 1982, it employs 14 people and serves commercial and domestic clients, including nationally recognised restaurants Nando's and Wagamama and several schools.

"A modern company that instils family values and provides a service with transparency and honesty," is how Operations Director Adam enthusiastically describes it. "We are also passionate about encouraging and supporting the next generation of HVAC engineers and encouraging younger people, especially women, into our industry," adds Commercial Manager Victoria Roberts. "We have a management team comprising 50% women, and we launched the Force Contracts Plumbing Employer Skills Academy with The Sheffield College, which we believe is the only HVAC skills academy in the country within a further education college."

The Employer Skills Academy is an innovative teaching and learning programme that sees The Sheffield College partner with businesses. According to the college, it "aims at providing outstanding technical and professional education for students".

Force Contracts Managing Director Andrew and his team support students studying level 3 BTech qualifications – soon to become T Levels, in their branded workshop at the college's Olive Grove site. Monthly curriculum-led sessions and a range of hands-on workshops, some with manufacturers, take place for fault-finding and installation practices, with students even obtaining manufacturer-certified qualifications in the process.

"Further to teaching core industry skills alongside the college, we also have employability sessions where we teach skills such as how to specify work, create quotes and manage customers and suppliers," said Andrew. "We hope that students will be better prepared to join businesses when they complete their education or even start their own business in the future."

The passion for giving back to the industry is evident, and it is no surprise that taking extra interest is voluntary and usually comes at a financial loss. Additional commitments recently included installing manufacturer-donated air-to-water heat pumps and providing and installing the ancillaries required for each system, so students learn face-to-face with modern equipment. "We try to participate as much as we can," said Victoria. "I have presented at the college's Women in Construction events, to the Level Two Plumbing students and we have participated in See It Be It events at schools for excluded children. For a small company, the investment we make is significant."

This community educational approach is based on past experiences, with Adam explaining: "We offer apprentice roles, but have found in the past that away from academic learning, something was missing from the educational system: a link between the academic and real world. That's why we became involved and launched the Plumbing Employer Skills Academy with the college."

Force Contracts' next step in its educational crusade is a three-year commitment to Skills Street at Gulliver's Valley, an age-appropriate, fun-filled, careers-focused educational learning centre with activities for school children and park visitors alike.

www.forcecontractsltd.co.uk

l-r: Andrew James, Claire Archer, Adam James

The Force Contracts branded workshop at The Employer Skills Academy, The Sheffield College

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Please contact commercial@hubbardproducts.com for any further information

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Making the right choices for data centre cooling

By Richard Creber, Regional Head of Data Centre Operations, Pulsant.

The cold containment aisle in Pulsant's new Manchester data centre

It's hard to overstate modern society's reliance upon data centres. The remote working revolution, the international supply chain, and literally the entire internet all depend upon a healthy network of data centres to underpin them.

Of course, both this reliance and the sheer volume of use makes data centres a huge producer of emissions. The IEA has estimated that 1-1.5% of global electricity goes to data centre usage alone, with the UK using around 2.5% of its electricity output on data centres according to the National Grid ESO – with 90% of that potentially being wasted as equipment idles while awaiting command.

That makes data centres an incredibly important target for sustainability measures. A data centre's performance is quantified through its Power Usage Effectiveness (PUE) ratings – essentially a calculation between the total amount of power a data centre uses, divided by the amount of IT power it uses.

The 'holy grail' of sustainability is a PUE of 1.0; if a data centre had 0 energy needed for anything except IT, it would be as lean as possible, and therefore wasting the least energy.

The question thus becomes how close to that perfect score a data centre can get. The Climate Neutral Data Centre Pact aims to deliver a PUE of 1.4, while some countries are more stringent; the Germany Energy Efficiency Act, for example, will require a PUE of 1.2 for new data centres from 2026.

Given that 40% of total energy requirements for a data centre are generated by cooling, according to Deloitte, a reduced energy output requires a cooler data centre. Temperature is fundamental to both keeping machinery operating at optimal temperatures, and in protecting the wider environment from all the heat that such an energy-intensive operation produces.

It's at this point that we turn to the importance of air containment – a fundamental part of treating air in the data centre, both in terms of maximising the efficiency of the air being used to cool, and in avoiding the recirculation of hot air.

Blowing hot and cold

Just as it sounds, air containment in a data centre means isolating air between the inlets and outlets of a server rack. Ensuring that hot and cold air doesn't mix in the data centre is extremely important – you can imagine the reaction a client might have if you're accidentally firing warm air into the front of their expensive server rack!

There are two approaches to this:

1. **Hot air containment.** This method involves funnelling hot air from the racks into cooling heat exchangers, so that a much larger volume of cold air can be drawn in by the rack at its own pace. The hot air travels through purpose-made trunking, before being cooled using 'free cooling' to its fullest extent, rather than employing more energy-demanding methods.

2. **Cold air containment.** This approach involves the trunking of cold air from those same cooling heat exchangers, it into the inlet side of the server rack or data cabinet. The equipment is thus isolated from hot air being exhausted from the rack, with that heat being funnelled away.

Generally speaking, hot air containment is considered the more effective option. If hot air can be contained, the remainder of the space around the racks and servers provides an abundance of conditioned air for those racks to pull in as required, protecting them against any localised 'starvation' of cool air. But that's in a perfect world – and data centre management is very often about working with what you have, rather than what you would like.

So, what are the factors we need to consider when choosing how to cool our data centres?

Raise the roof?

Well, for one, most data centres are in buildings that already exist. When you think about the number of buildings that will be in use between now and 2050 – when most net zero targets are supposed to have been met – the vast majority have already been built. Given how carbon-intensive construction can be, there's a pragmatic and moral obligation to see how far we can stretch what we've got.

Depending on the circumstances, that can necessitate hot or cold containment purely based on the structure of a building itself.

For example, it was standard practice for decades to have a raised floor in data centres. They were included to accommodate cables rather than air distribution, which is now common place to provide conditioned air to the inlet side of the server/racks. An accident of infrastructure suddenly looks purpose-built for cold aisle containment, representing both a cost-saving opportunity, and a means of sidestepping intensive construction.

On the other hand, a raised floor inevitably means that it can support less weight. Large companies can expect to simply wheel in an entirely pre-populated server rack that weighs in excess of a ton straight off the truck. A hot aisle containment data centre with a floor of solid concrete would have no problem – but if the loadbearing weight of a server room with a raised floor is maxed out, the limitations of a cold containment strategy could be incredibly expensive!

So the preference/choice between hot or cold aisle containment is often dictated by construction constraints. From there, it's about finding ways to tighten up the chosen method in order to deliver the most effective results.

Consider all the variables

There are plenty of variables in that process. While the building itself might necessitate some choices, data centre providers are much more likely to have agency over the equipment they choose to use.

Fans are imperative to hot and cold air containment, but modern solutions bring more control and versatility – for instance, fans that can increase or decrease depending on the temperature of the equipment they're cooling, balancing the need to cool this equipment, right now, with the wider need to save energy.

That's not just true of the equipment around the racks being cooled, but also right across the facility. Imagine a 1,000sqm hall – and then fill it with strip lights every 4 feet or so. Those 800 strip lights, all of which are radiating heat onto a set spot and burning energy to boot, will have an impact on how cool and how sustainable a data centre can be. Deploying passive infrared sensor (PIR sensor) or the more recent and more effective, microwave-controlled lights in these spots, so they're only on when they detect movement within a certain timeframe, could drastically reign in both the overall energy cost and the heat from each individual light.

The same applies to the materials and the fuels that data centres use. Insulation is the name of the game when it comes to data centre design, so operators are looking for sustainable materials that also achieve the level of insulation required. AWS is using lower-carbon steel to construct new data centres, while here at Pulsant, we've committed to transitioning to Hydrotreated Vegetable Oil (HVO) and phasing out diesel. These can be small changes – but they're also a corporate responsibility we must own.

It's equally important to consider the actual location of the data centre, too, and what that means for cooling considerations. A data centre in Iceland, for example, is blessed with both cold ambient temperatures and access to a real wealth of renewable energy, particularly when it comes to hydropower. Compare that to data centres in Southern Europe, where climate change is pushing temperatures beyond 40°C with alarming regularity – and data centres not designed to function in that climate might need greater volumes of less environmentally friendly energy to function.

Hotter periods and more frequent winds and storms present increased demand on building fabric, and network and power resiliency, so cooling systems must be designed to avoid regularly falling back on emergency measures.

Lower the impact

Individual site action plans to achieve required improvements are crucial. These should include work required to infrastructure as well as strengthening site team skills and processes. People are powerful in embedding sustainability into the way sites operate. While introducing Cooling Procurement Standards can be an effective way to ensure early adoption of low global warming potential (GWP) systems when appropriate and available.

The gist of all this, in simple terms, is that data centre operators have to take a huge amount into account when choosing between hot and cold air containment. From the fuel of choice to the country itself, many of the deciding factors are often out of their immediate control.

That reflects the challenge we face as an industry when it comes to sustainability. With data centres only becoming more important as we move forward, we have to be able to maximise the effectiveness of what's available to us – both in the data centre, and with the planet at large.

https://www.pulsant.com/

External chillers at the Manchester facility

Opex vs Capex:
flexible hire options for manufacturing

Dave Palmer, General Manager for the UK at ICS Cool Energy, on how to run the latest, most efficient and technically up to date temperature control equipment without the need of capital investment.

Process cooling and heating play a crucial role in manufacturing, directly influencing overall operational efficiency, cycle times, and product quality. These systems are integral to production and should not be taken lightly. Typically, however, they require a substantial upfront investment and are treated as fixed assets or fixed costs. Moreover, in today's rapidly changing business landscape manufacturers frequently scale up and down, and cooling and heating needs follow suit. The static nature of a fixed, installed asset and investment often poses challenges for manufacturers in the evolving and dynamically changing markets.

It is clear that with rising energy prices, improving energy efficiency of manufacturing operations can provide real savings, ensure superior process performance and real financial outcomes. Constant innovation in process cooling and heating systems has led to innovative designs that offer significant performance and environmental benefits compared to systems that they are designed to replace. Unfortunately, capital expenditure budgets are often put on hold, or placed under increased scrutiny. This turns the attention to the traditional alternative to capital investment in a way of purchasing and installing new equipment - hire.

Maintaining financial equilibrium

Hiring equipment means its associated costs can be kept off the balance sheet as the equipment doesn't technically belong to the business. This can go a long way to finding a fast solution, especially when budgets are tight. Hiring equipment avoids capital expenditure which is an attractive option for businesses lacking the funds for large upfront costs of equipment. What's more, hire packages tend to cover the cost of maintenance and repairs (in most circumstances). All in all reducing the burden on businesses, allowing to allocate their financial resources to other critical areas.

But what about the agility to adapt and scale operations to meet changing or seasonal demands? What about adopting innovation and new technologies coming into the market?

Along with the traditional long-term hire, there are now more flexible options, which not only take into account that manufacturing needs can fluctuate due to seasonal variations, market demands, or unexpected events but also that innovation and new technologies change quickly. A membership or subscription type of a long-term rental agreement offers access to the latest temperature control technology, maintenance, and equipment exchange or upgrade– all with the flexibility of an operating expense.

Agility, scalability, access to the latest technology and tailored support

This type of complete temperature control packaged solution can include new equipment vs. existing rental stock units, preventative and 24/7 emergency maintenance, replacements and upgrades. The elements of the all-inclusive, monthly rate contract are tailored to the business' needs and based on a detailed assessment by the service provider's engineers.

Manufacturers get bespoke systems installed– with no upfront cost and capital investment – and only pay for the temperature control they need and when they need it.

Additionally, unlike in the case of traditional long-term hire, they benefit from the flexibility to exchange and upgrade the equipment as the requirements change or technology improves. All this with the peace of mind of complete maintenance and contingency plans - crucial for optimal performance, minimising downtime, and preventing costly repairs.

By opting for flexible temperature control hire solutions, businesses can reduce the risks associated with equipment ownership. Equipment breakdowns or failures can have severe consequences, leading to production delays, lost revenue, and reputational damage. Included contingency plans give access to backup equipment and rapid response times ensuring that manufacturers are well-prepared to handle unexpected events, minimising their impact on operations.

Environmental sustainability

Beyond cost savings and efficient management, flexible approach to temperature control hire also contributes to sustainability efforts. By adopting the latest, designed for energy performance, and more environmentally friendly temperature control systems, manufacturers can contribute to their sustainability goals by promoting energy efficiency and reducing carbon emissions.

Conclusion

More often than not, our customers are interested in the subscription, membership type of a long-term rental agreement. With benefits ranging from cost efficiency to tailored solutions, equipment upgrades and energy savings, membership subscription options like our ICS Flex ensures that manufacturers can keep meeting their temperature control needs efficiently, worry free and stay ahead in the market.

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Hydratech Services

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FIONA COUSINS, PRESIDENT, CIBSE

Fiona Cousins has been appointed as the new President of CIBSE. Cousins has held several senior roles at Arup and is currently chair of the company's Americas Region.

In this role, she has contributed to critical climate legislation and held advisory roles, including her appointment to the advisory board for Local Law 97, which requires large buildings in New York City to meet progressively demanding energy efficiency targets from this year onwards.

The new president's vision for CIBSE includes building on the traditional view of building performance by putting more emphasis on occupant wellbeing, air quality, acoustic performance, and resilience to climate change.

She said: 'Much of the work of building services engineers has been very sharply focused on energy use, where the relationship with climate change has long been clear. It's time to broaden that view to put more emphasis on other things. We spend most of our lives indoors, and buildings can support our wellbeing through air quality, acoustic performance, lighting design, or environments that support biophilia.'

Cousins takes over the presidency from Adrian Catchpole and said his efforts to promote STEM Ambassadors in schools and certified practice initiatives will continue to be a priority for CIBSE under her leadership. She also extended 'heartfelt' thanks for Catchpole's 'significant contributions'.

https://www.cibse.org/

SALLY PARKER, AREA SALES MANAGER, CONDAIR

Condair has appointed ***Sally Parker*** as its new Area Sales Manager for the Midlands and South Wales. She joins Condair with a wealth of HVAC experience having previously worked at ACR wholesaler TF Solutions and Wolseley Climate Centre.

Dave Marshall-George, Sales Director at Condair, said: "We are really delighted to have appointed Sally as Area Sales Manager. She's a very experienced sales manager with a proven track record in the industry and we feel lucky to have her join us."

Parker commented: "I'm really looking forward to getting to know Condair's existing clients and helping new potential customers get to grips their humidity control issues. Condair is well known as the leading manufacturer in the humidifier sector, with outstanding engineering quality. They operate across so many end-user sectors, it's really astonishing. I'm keen to get to know all the different industries and start supporting consultants, contractors and FM's with their humidifier, dehumidifier or evaporative cooling projects."

The Condair Group is represented in the UK by Condair Ltd, which offers system design, manufacture, supply, installation, commissioning, maintenance and spares.

www.condair.co.uk

LEWIS HARRISON, NATIONAL SALES DISTRIBUTION MANAGER, FUJITSU

Lewis Harrison has been promoted to National Distribution Sales Manager at Fujitsu General Air Conditioning UK.

Harrison joined Fujitsu a year ago as a Distribution Account Manager, having spent the previous three years at Wolseley Climate in branch manager and area sales manager roles. Prior to that, he worked at Aspen Pumps as an account manager.

He said: "It's great to be a part of a company that promotes from within and I am delighted to accept the role. We have some ambitious plans and goals for the next couple of years and I am looking forward to working closely with our distribution partners in the UK & Ireland to achieve these."

Fujitsu General Air Conditioning UK Sales Director Stuart Eagleton said: "Lewis's experience of working in distribution (Wolseley) and in the distribution supply chain (Aspen) makes him the perfect candidate to work closely with our distribution partners at a senior and local level in growing Fujitsu's market share.

"In his first year, Lewis has shown a good understanding of the market and of each of our distribution partners' route to market, developing and implementing strategies to ensure the continued success of the Fujitsu brand.

"Lewis's key objective in his new role is to encourage growth whilst ensuring that the strong relationships with our partners are maintained."

https://www.fujitsu-general.com/uk/

KRISTIN HANLEY, SCHNEIDER ELECTRIC

Schneider Electric has appointed ***Kristin Hanley*** as Vice President Global Marketing and Sales Excellence for the UK and Ireland (UK&I).

She has spent 18 years with the business and was previously Vice President of Customer Operations for the UK&I, where she spearheaded initiatives to improve the customer experience through process efficiency, business development and digitisation. Hanley also remains the executive sponsor of the UK and Ireland's employee-led women's resource group, the focus of which is diversity and inclusion in the workplace, including gender diversity.

She said: "The only constant in business is that change is inevitable. Brands like ours must make an impact in the market by creating collaborative, robust and flexible strategies to meet ever-changing customer requirements. We have brought together digital marketing, sales excellence, and data visualisation to meet demand, foster leads, and drive growth. This allows us to deliver a holistic approach that will ensure the information our customers need is just a few clicks away.."

Kelly Becker, Zone President of Schneider Electric UK and Ireland, Belgium and The Netherlands, said: "It's a pleasure to welcome Kristin to her new role where she will continue her excellent track record of sales excellence and superior customer engagement with omnichannel marketing and data insights."

https://www.se.com/uk/en/

WOMEN IN THE ACR INDUSTRY

Meet Klaudia Szweda-Adelaja, Air Conditioning Product Manager at Samsung Climate Solutions.

Can you give us a brief overview of your career experience?

After graduating with an engineering master's degree in Poland, I decided to move to the UK. It was hard to enter the HVAC industry and I first got a job in the automotive industry, working for Jaguar & Land Rover for two years. I finally got a chance to start my journey in the HVAC industry and joined SAV systems as a Product Support Manager in heat networks. I gained a lot of knowledge there, working across different departments from heat networks, metering and central plant that really made me passionate about minimum energy usage and sustainability. After 5 years, I decided to expand my portfolio and I joined Samsung Climate Solutions as a Product Manager for Air Conditioning.

Klaudia Szweda-Adelaja

Klaudia with some of her colleagues at the 'Samsung Spotlights: high tech, lower carbon homes of the future' event

What does your current role involve?

My current role varies from day to day. My main responsibility is to feed back to the headquarters the needs of the UK market. Samsung is a global manufacturer so it is crucial that each subsidiary provides market information in order to build a strong product line-up. I work closely with the sales team to make sure they have the latest updates on the product range, as well as receiving customer feedback and market needs. I also attend sales meetings occasionally to discuss product developments and make sure that we are meeting the expectations of the end client. I also collaborate with the marketing team and the presales team to create product information materials, presentations and promotions.

What attracted you to the industry as a university graduate?
I wanted to be a doctor but I am afraid of blood so I chose my career in engineering. It was my second choice as it felt this could be another way to help people. There is something about HVAC industry that makes me feel that we are making a difference in the way we heat and cool our homes.

Were there any challenges you have experienced as a woman in this industry?
Unfortunately, yes. There were many instances in previous roles where I needed to prove that I am as good as my male counterparts. Sometimes, when I picked up the phone to provide technical advice, I hear "Oh, I didn't want to talk to reception, I need technical support!" There is a stigma that engineering is for men and I really worked hard to be heard and seen as an 'equal' engineer.

Klaudia and Evie Vennix celebrating International Women's Day at Samsung

How does Samsung Climate Solutions empower females?
It is honestly refreshing to see so many females in the team! Females in Climate Solutions are strong individuals with 'go-getter' attitudes. There is always a space for us to share opinions and be heard and there is a lot of respect and encouragement for us as professionals. What can I say? Girl power!

Do you have any advice to new starters in the industry who have a similar background to you?
My favourite Confucius quote is 'If you are the smartest person in the room – you are in the wrong room.' Never stop learning, show up. Collaborate and learn from people who are willing to share their experience. There is always a point of view that you did not think of before. If someone underestimates you – let them. Only you know what you are capable of.

What's a fun fact outside of work that not many people know about you?
I am completely obsessed with dancing - play some music and you won't see me seated. I dance Zumba regularly and I used to be a Zumba teacher in my past life!

The Innovation Zone

The guide to what's new for ACR Journal readers, offering vital industry news.

To advertise your product in 'The Innovation Zone' section please contact **victoria.brown@warnersgroup.co.uk**

CLIVET LAUNCHES FRESH LARGE EVO AIR RENEWAL SOLUTION

Clivet says it has underlined its commitment to indoor air quality (IAQ) with the latest addition to its range of innovative solutions for air renewal, purification and sanitisation. Fresh Large EVO is a full fresh air unit with active thermodynamic recovery, R32 refrigerant, full inverter technology and electronic filtration.

Available with air flow rates from 300 to 2500 m3/h, Fresh Air EVO is said to be ideal for commercial, tertiary and large residential applications. It is characterised by:

R32 refrigerant, which has a low GWP (Global Warming Potential) and ensures excellent performance in extreme conditions, low refrigerant charge and high coefficient of thermal exchange

Efficient energy recovery of exhaust air with low fan consumption thanks to active thermodynamic recovery

Full inverter technology, which optimises the unit's performance even at part load ensuring high efficiencies all year round

Maximum filtration efficiency with iFD electronic filters (ISO 16890 ePM1 90%), guaranteeing high air quality and low ventilation consumption

Extended operating range down to -20°C in heating mode

Clivet Product Manager Damiano Rossi said: "The new Fresh Large EVO represents a further step forward in the HVAC world in the direction of air quality and efficiency.

"Thanks to its distinctive thermodynamic recovery with full inverter technology and iFD filtration, it is the ideal solution for applications such as schools, offices, small retail outlets, restaurants, banks, car dealerships; be they new buildings, or existing ones.

"Its use is a guarantee of plant simplification, year-round efficiency, and high air quality, benefiting not only the plant operator but also, and above all, the people who can live, work, study, efficiently and comfortably in a healthy and safe environment.

"It was thanks to these distinctive features that Fresh Large EVO was chosen for the MCE Awards 2024."

www.clivetgroup.co.uk

PODCAST: HOW TO SELECT AND SIZE A COMMERCIAL HUMIDIFIER

Condair has released a new podcast for HVAC professionals on how to select and size a commercial humidifier. In a 15-minute interview with BusinessNet Explorer, Dave Marshall-George, Sales Director at Condair, explains what should be considered when setting out on a humidifier project.

Dave said: "This podcast will be really helpful for any building services consultant, contractor or FM who needs to understand more about humidification of a commercial premises. Humidifiers are essential in many applications, but projects of this type don't come along very often. So it can be difficult for HVAC engineers to get the experience needed to successfully design a humidification system. In this podcast, I describe the main elements that determine whether a humidifier should be used in an AHU or directly in a room, which type of humidifier fits what type of application and how to correctly size a unit for an area."

This latest Condair podcast is available at www.condair.co.uk/podcast as well as on Spotify, SoundCloud and YouTube. Also, available on this Condair webpage is Condair's back catalogue of podcasts. The series of bite-sized, informative audio episodes cover topics like how to use humidifiers for evaporative cooling in AHUs, how to combat static with humidity, humidity's impact on health and how to use dehumidifiers to reduce ice in commercial freezers.

EFFECTIVE APPLICATION OF ADIABATIC HUMIDIFICATION

CAREL has published a white paper looking at energy efficiency and cost reduction in adiabatic humidification.

Energy Saving in Adiabatic Humidification: Principles, Applications, and Benefits explores the potential of adiabatic humidification, a process that adds moisture to the air without the need for external heat sources.

The document illustrates how adiabatic systems not only optimise indoor air quality conditions but also promote energy savings, reduce operational costs and meet the sustainability criteria required by current regulations.

The white paper first introduces the fundamentals of adiabatic humidification, explaining what it is and how it works. It then analyses various types of adiabatic humidifiers, including pressurised water humidifiers, ultrasonic humidifiers, compressed air humidifiers, and centrifugal humidifiers, comparing them with traditional isothermal humidifiers. A particular focus is dedicated to comparing the energy and water use of these systems, highlighting the significant benefits of adiabatic humidification.

The document also examines specific applications of this technology in data centres, where efficient humidity control can lead to substantial energy consumption reductions.

Download the white paper at:

https://www.carel.com/-energy-saving-in-adiabatic-humidification-white-paper

FUJITSU UNVEILS NEW 'SOFT-BLACK' WALL MOUNT

Fujitsu General Air Conditioning UK has added a new 'soft-black' version to its AIRSTAGE wall mount range.

Operating on lower GWP R32 refrigerant and available in capacities from 2 to 4.2kW, the new unit has a compact chassis depth of just 220mm, thanks to the design of its high-density multipath heat exchanger.

Built-in Wi-Fi capability makes it controllable via the AIRSTAGE Mobile app, with service and maintenance improved due to refrigerant cycle data being displayed on a compatible wired controller.

Cooling is available between -10°C and 50°C, with heating from -15°C. The large louvre design enables the unit to achieve a Seasonal Energy Efficiency Ratio (SEER) of up to 8.4 in heating mode and a Seasonal Coefficient of Performance (SCOP) of 4.6 for cooling.

The large cross-flow fan aids efficiency and ensures effective airflow, which is achieved with quiet operating levels as low as 20dB(A) in cooling.

A 20m pipe length and 10m elevation is possible on all models, which are pre-charged for 15m of pipework. This removes the potential additional installation cost of refrigerant charges on site.

The unit contains an ion deodorising filter and an apple catechin filter, which breaks down odours and uses static electricity to capture fine dust particles.

Martyn Ives, Commercial Director at Fujitsu, said: "The soft-black unit certainly attracted a lot of attention on the stand at InstallerSHOW. The matt texture of the fascia means that it doesn't reflect ceiling lights as the mirror-style units do and it fits in with what customers are demanding in terms of interior design."

https://www.fujitsu-general.com/uk/

Fujitsu says the new unit's soft-black fascia aims to meet the interior design demands of customers

PANASONIC'S SOLUTIONS FOR A GREENER UK

Panasonic Heating & Cooling Solutions used InstallerSHOW 2024 to introduce its latest innovations, new partnerships and significant investments in UK training centres.

Enrique Vilamitjana, Managing Director of Panasonic Heating Ventilation & Air-Conditioning Europe, outlined the company's commitment to a sustainable future, highlighting Panasonic's commitment to reducing global CO2 emissions by 200 Mt by 2050 through its Green IMPACT initiatives.

Panasonic unveiled the new Aquarea M Series range of air source heat pumps with TCAP technology, developed to meet the decarbonisation challenge. The new range uses R290 refrigerant which has a low GWP of only 3. It comes with capacities 9, 12, 16, 20, 25 and 30kW with the option of 300kW in cascade configuration. The M Series is said to be ideal for installations in individual domestic homes, multifamily or light commercial buildings.

The Aquarea M Series range with T-CAP technology can operate in outdoor temperatures as low as -15°C and maintain capacity without a backup heater. One T-CAP unit can provide the same capacity at low temperatures as two other units without T-CAP technology, reducing the cost of materials and installation, and saving space.

Panasonic also announced new strategic partnerships with smart control leaders Tado and Wiser to enhance home energy management and help reduce energy bills. "These partnerships allow us to offer our customers greater choice in their heating controls," added Vilamitjana.

https://www.aircon.panasonic.eu

Panasonic's new Aquarea M Series is designed for installations in individual domestic homes, multifamily or light commercial buildings

CONDAIR ACQUIRES KUUL

Humidity control specialist Condair has acquired US-based Kuul, a leading manufacturer of glass fibre and cellulose media used in evaporative cooling systems and adiabatic pre-cooling for chillers and turbines.

Rebranding as Condair - Evaporative Technologies, the organisation will be extending its distribution of evaporative media solutions through Condair's global network of sales and service offices in 23 countries, and its wider distribution partners around the world.

Alongside the acquisition, Condair is also investing in a new production facility in Richmond, Virginia, to strengthen its production capabilities and improve its supply chain efficiency for the key regional US data centre market. The new 400,000ft² facility is planned to open in 2025, and is estimated to employ 180 individuals.

The company already operates production facilities in Europe, North America and China, and manufactures a comprehensive range of humidification systems. This includes the Condair ME, in-duct evaporative cooling and humidification system, that is used extensively around the world in data centres, offices and industrial manufacturing.

Condair is represented in the UK by Condair Ltd, which offers system design, manufacture, supply, installation, commissioning, maintenance and spares.

https://www.condair.co.uk/

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