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OCTOBER 2023

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WELCOME TO THE OCTOBER ISSUE OF MODERN BUILDING SERVICES

As an editor/publisher, this time of year is always extremely busy. I've received many invitations for product launches, open days, awards events, dinners, conferences and training sessions. I always find these types of face-to-face visits so beneficial and enjoy hearing and reporting on what's new for your businesses - I wish I could go to them all. Unfortunately, due to time constraints, this is not always possible but please do carry on sending out the invitations and I'll always do my best to attend.

As mentioned in the September issue, the next big event is the CSA (Commissioning Specialists Association) Awards being held in London on the 5th of October. I really enjoy being able to judge so many well thought out and interesting entries. Modern Building Services are long standing sponsors of this event and it was extremely positive to see record numbers of quality entries for 2023.

Swiftly on its heels, is the sixth BESA Annual Conference and Awards, being held on the 12th of October at the Novotel Hammersmith. BESA likes to hall it as the meeting space for industry professionals, future engineers, leading industry manufacturers and inspiring speakers and MBS (Modern Building Services) magazine are always keen to support both events as a media partner.

Next issue
Heating – technologies & techniques
Working buildings – maintenance, operation and refurbishment
Vertical focus – education, data centres and healthcare

If you'd like to discuss contributing, please contact me on **julietl@warnersgroup.co.uk**

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Published by WARNERS GROUP PUBLICATIONS PLC

PRINTED BY WARNERS 01778 395111

ISSN 1743-6931

BSRIA Member | BESA BUILDING ENGINEERING SERVICES ASSOCIATION

CSA EST 1990 in partnership with the Commissioning Specialists Association

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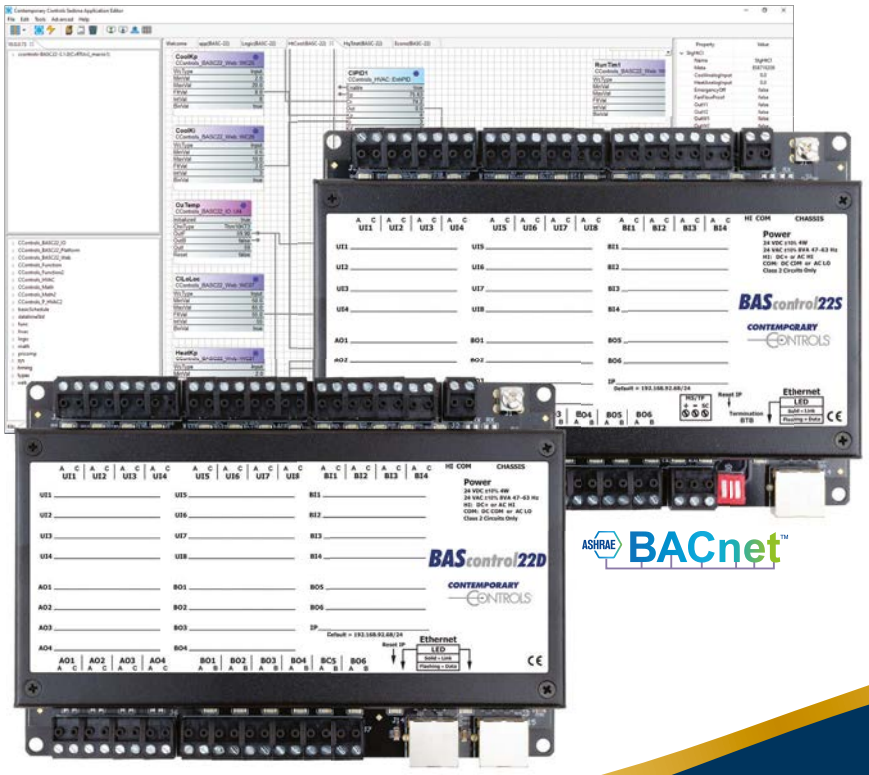

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BESA backs first WHO indoor air quality conference

The Building Engineering Services Association (BESA) sponsored the first ever World Health Organisation (WHO) conference on indoor air quality.

The event, which took place in Bern, Switzerland on September 20th was titled: 'Making a Step Change in Indoor Environments for Human Health' and was co-organised with the Geneva Health Forum.

The chair of BESA's Indoor Air Quality group Nathan Wood was invited to take part in the conference debates alongside other international experts in environmental engineering, health, and indoor environment research, as well as government officials and policymakers.

The BESA Indoor Air Quality group has produced three pieces of IAQ guidance which are free to download from their website, and is currently finalising a comprehensive guide to addressing mould and condensation in buildings with Mitsubishi Electric.

This is due to be launched at the BESA National Conference on October 12th – details of how to attend can be found at **www.thebesa.com**

BESA also offers an 'IAQ Basic Awareness' training course via its Academy, which provides a useful introduction to the subject. This short online course explains the importance of IAQ, the main airborne contaminants that affect buildings, their sources, the impact on the indoor environment caused by outdoor pollution, and some basic strategies for addressing poor ventilation. Please visit the BESA Academy website for more information.

Pump sector welcomes announcement on CE Marking

The British Pump Manufacturers Association (BPMA), on behalf of the £1.9 billion UK pump sector, has welcomed the recent announcement from the Department of Business and Trade regarding the indefinite extension to the use of CE marking for UK businesses.

The CE (Conformité Européenne) mark is used across Europe to certify that a wide range of items, including pumps and related equipment, meet stringent product safety standards. As a member of the European Union, the UK had for decades adopted the use of this safety marking for products being sold both within the UK and throughout the European continent.

However, as part of a wide range of proposed post-Brexit legislative changes, the Government had planned for this safety marking to be replaced by a new UKCA (UK Conformity Assessed) mark for all goods sold in Great Britain from the end of 2024; a deadline which had already endured several postponements and extensions.

UK businesses and their respective trade organisations have for many years been calling on the authorities to extend the use of the long-established CE mark, explaining that forcing them to meet the new UK rules, which simply duplicates EU product standards, would add a significant and unnecessary cost burden to UK industry. With the UKCA mark not being recognised in the EU, and only required for goods being sold in Great Britain, manufactures would have needed to adopt both conformity protocols for products destined for both marketplaces. Notably, this would have also been the case for all overseas manufacturers wishing to sell products into the UK.

The BPMA has been key among this growing voice of objection, having pushed for the retention of the CE Mark from the moment a UK replacement had been suggested.

www.bpma.org.uk

Building Safety Act: What you need to know ahead of 1st October

From 1st October 2023 a number of new regulations will come into force under the Building Safety Act 2022, and they don't only affect high-risk buildings. Alex Minett, Head of Global New Markets at CHAS highlights some of the key changes.

The Building Regulations etc. (Amendment) (England) Regulations 2023 covers a series of new reforms. However, while these reforms might seem more heavily weighted towards ensuring the safety of higher-risk buildings (HRBs), the new regime introduces fresh terminology, roles, responsibilities and other criteria that are important to understand for all projects that fall under building regulations.

Roles and responsibilities of the dutyholder

One of the most important changes is the dutyholder regime detailed under part 2a of the Building Regulations. It is designed to regulate and hold to account, those who are responsible for planning and executing the construction of new buildings and, the renovation of existing ones.

Under the regulations, the dutyholder is defined as the client (the person who is responsible for commissioning the building work), the principal designer and the principal contractor. Where there is more than one designer or contractor on a project, there must be an agreement and declaration in writing as to which holds the role of 'principal'.

Higher Risk Buildings (HRBs) and Building Control

In addition to the above, an extra layer of legislation applies to the construction and renovation of higher-risk buildings (HRBs), which are currently defined as:

- Buildings at least 18 metres in height or with at least seven storeys; and
- contains at least two residential units.

Furthermore, a series of 'gateways' have been introduced for HRB construction to strengthen regulatory oversight. Before any building work on an HRB commences, a building control approval application must be made to the overall authority, in this case, the BSR. Known as Gateway 2, key documentation must be provided to support the application, including a competency declaration and building regulations compliance statement. Once approved, any major changes to the design will require a change control notice made to the BSR. For further information on the new gateways and rules, refer to the HSE's guide Building Control: An overview of the new regime.

How to prepare

While these are some of the more headline changes to the regulations, there is more to absorb ahead of 1st October. For example, the provision of information around fire safety and proposals on scheduling and timelines. The onus is therefore on all those involved to ensure they read and understand how the legislation might affect them.

For further detail visit: **www.hse.gov.uk/building-safety/assets/docs/regime-overview.pdf**

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Pick Everard makes key appointment to support its national growth

Enhancing its consultancy services nationwide, Pick Everard has appointed a new National Director to its building services engineering team.

Joining the independent property, construction, and infrastructure consultancy, Justin Neil brings 24 years of experience to his new role. This includes a background in design and construction, including four years in Doha, Qatar, where he worked closely on its widely celebrated National Library.

Justin's responsibilities are to lead and develop an industry leading building services team, growing the 90-strong team nationally, and delivering a consultancy service fully aligned with the requirements of its clients.

Beginning his career as an M&E apprentice in 1999, Justin made the move into consultancy in 2006 and holds three degrees to his name; a bachelor's in building services engineering and two master's in electrical building services engineering and BIM and integrated design.

A Chartered building services engineer, Justin has most recently held appointments in single service engineering businesses but has chosen to make the move back to a multi-disciplinary consultancy to have greater agency on project delivery in a leadership role – a move that has been welcomed by his colleagues.

www.pickeverard.co.uk

Schneider Electric appoints Gwenaelle Avice-Huet as Executive Vice-President Europe Operations

Schneider Electric has appointed Gwenaelle Avice-Huet as its new Executive Vice President of Europe Operations, starting from September 4, 2023.

Gwenaelle will be responsible for Schneider Electric's full business portfolio across Europe Operations. She joined Schneider Electric in 2021 as Senior-Vice President of Corporate Strategy, before entering the Executive Committee as Chief Strategy and Sustainability Officer.

Before joining Schneider Electric, Gwenaelle worked at ENGIE (formerly GDF SUEZ) in various roles, from Senior Vice-President of European and Regulatory affairs, to leading the Renewables energy business. In her last role, she was on the Executive Committee of ENGIE, serving as the Chief Executive Officer of ENGIE North America and in charge of the Global Business Line on Renewable Energies.

Gwenaelle started her career at the French National Centre for Scientific Research and the French Atomic Energy Commission on nuclear energy before joining the World Bank in Washington D.C. as a consultant. She also worked for the service of the French Prime Minister within the General Secretary of European affairs with responsibility for energy and competitiveness matters, and as the advisor on energy and climate change for various ministers.

She has been on the Board of Air France-KLM since May 2021. She holds a degree in Physics and Chemistry from the Ecole Normale Supérieure Paris-Saclay, a post-graduate diploma in Molecular Chemistry from France's Ecole Polytechnique and an engineering degree from the Corps des Ponts et Chaussées. She has also been nominated as a Young Global Leader by the World Economic Forum.

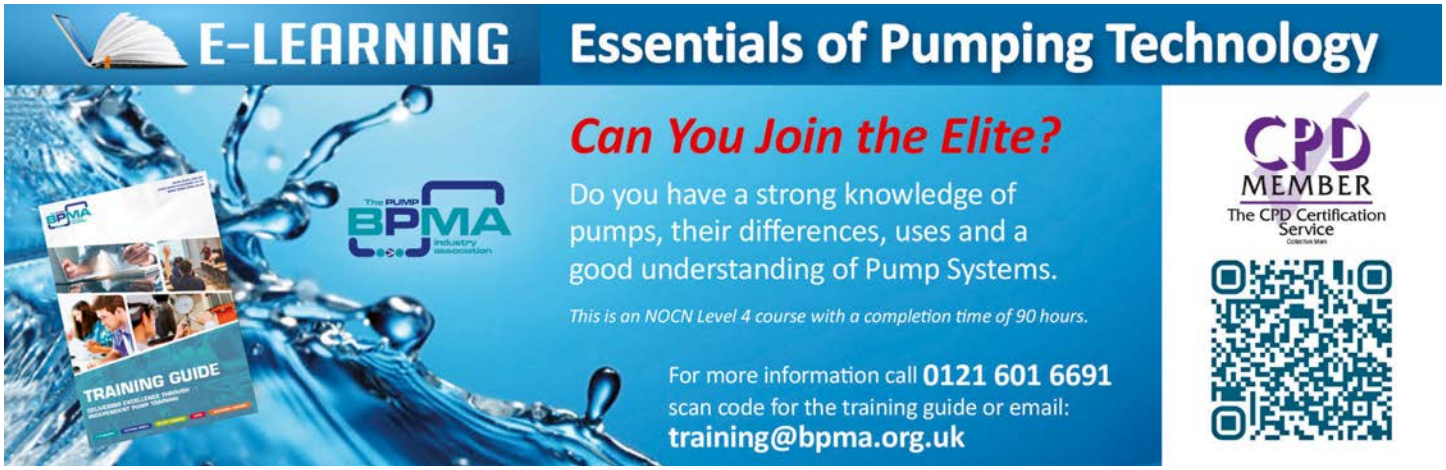
BEAMA announces change of leadership

BEAMA, the UK trade association for manufacturers and providers of energy infrastructure technologies and systems, announces that Dr Howard Porter, is stepping down from his role as BEAMA's CEO after 25 years with the business.

Dr Porter joined BEAMA in 1998, and during this time has helped the association to expand its expertise into a greater range of energy-related technologies, whilst playing a pivotal role in raising its status with Government and other key industry stakeholders. Over this time, he has held a number of UK and European senior roles including Chair of the ORGALIM board in Brussels and the EURIS group of associations through the BREXIT negotiations. He has also created a number of senior advisory groups including the BEAMA Senior Sector Council. Dr Porter will be remembered for bringing great energy and enthusiasm to BEAMA, which was seen particularly in his crucial role in helping the creation of the UK and European smart metering systems, and the assistance for industry during the Covid pandemic.

With Dr Porter stepping down, BEAMA is pleased to announce that Yselkla Farmer, currently Director of Public Affairs, has been appointed to the CEO role commencing the 4th September.

Although Dr Porter will be stepping down as BEAMA's CEO he will continue in an advisory role to the BEAMA Board and will represent BEAMA and the UK electrotechnical industry as a member of the IEC Market Strategy Board. He is also pursuing an independent role providing assistance and guidance for organisations in their transition to net zero carbon.



CIBSE embodied **carbon methodology** fast becoming global standard for building services

Anastasia Mylona, Technical Director at the Chartered Institution of Building Services Engineers (CIBSE), explains why embodied carbon is increasingly important in building services design and outlines CIBSE's calculation methodology which is rapidly being adopted internationally.

Building services engineers have been at the forefront of efforts to reduce operational carbon emissions in buildings through improvements in the design, specification and optimisation of building services.

Alongside design impacts, the increased focus on the electrification of buildings combined with a rapidly decarbonising electrical grid has further accelerated the reduction in operational carbon. Consequently, the focus is now shifting to the carbon embodied in the manufacture, assembly, transportation, deconstruction and maintenance of building services systems.

LETI, the voluntary network of zero-carbon, built environment professionals, estimates in its Embodied Carbon Primer document that MEP services account for approximately 15% of embodied carbon in a new office. However, because most services will be replaced two or three times over the building's lifespan, the real impact on a building's whole life carbon is likely to be much greater in practice[1].

Consultant Atelier Ten puts the proportion of embodied carbon attributable to building services systems even higher[2]; it estimates them to be responsible for up to one quarter of the carbon embodied in a typical, fully serviced office building

Whole life carbon emissions

The term whole life carbon emissions refer to both a building services system's operational and embodied-carbon emissions. Operational carbon is the carbon emitted by the energy consumed by the equipment in use. Embodied carbon includes emissions from the materials and systems used in construction of the equipment, such as those associated with the extraction of materials, their manufacture, repair, disassembly and even their disposal at the end of life.

Unlike operational energy, embodied energy savings have an immediate impact on a building's whole life carbon. The savings are also mostly independent of occupant behaviour.

One reason for the high proportion of embodied carbon in building services is the quantity of building services installed in a typical modern office. Another is that building services equipment is often made of metal and metal alloys with complex supply chains, often involving several manufacturing processes and sub-assemblies and long transport distances, all of which add to its embodied carbon.

A good starting point

A product's environmental product declaration (EPD) would be a good starting point for those looking to select equipment with lower embodied carbon. The problem with this approach is that very few building services equipment manufacturers currently offer EPDs because of the complexity of products and their supply chains.

TM65

This is where CIBSE's Technical Memorandum 65 Embodied carbon in building services: A calculation methodology is helpful.

TM65 provides a consistent approach to the calculation and reporting of embodied carbon for building services plant and equipment. In the document, embodied carbon is the greenhouse gas emissions associated with the manufacture of a product, its installation, maintenance, repair, replacement, and end of life. It covers the whole life cycle, excluding operational aspects and potential recovery, reuse or recycling of materials.

To be clear, CIBSE TM65 is not intended to replace a product's EPD. Instead, where no EPD is available, it will allow an engineer to estimate the amount of embodied carbon in that product.

A digital version

To support engineers and manufacturers in using TM65, CIBSE has published a digital version of the Embodied Carbon Calculator tool. To use the digital Em-bodied Carbon Calculator tool, a manufacturer must first complete the TM65 Manufacturer Form[3].

Using data from the manufacturer's form, a user is then able to complete either a basic embodied carbon calculation, when limited information is available, or a more robust mid-level calculation. Once the user has added contact details and completed consent to publication details, the result may be used as a self-assessed value for the embodied carbon of the product.

Industry benefit

A further benefit to the industry is that CIBSE is using the information generated by the document to facilitate the development of an embodied carbon database for building services products. This will make it easier for CIBSE members to accelerate progress towards achieving net zero carbon buildings.

Although TM65 is UK specific, the same methodology is applicable to air conditioning, refrigeration and MEP products manufactured and installed anywhere in the world.

To date CIBSE has published TM65ANZ Embodied carbon in building services: A methodology for ANZ to calculate embodied carbon for building services in Australia and New Zealand.

Sister organisation

CIBSE is also working with its sister organisation in the United States of America, ASHRAE, on adapting TM65 for the USA, Canada and Mexico. To this end CIBSE has published Embodied carbon in building services: Using the TM65 methodology outside the UK (TM65LA). While this document sets out how the embodied carbon methodology can be used outside of the UK, it is not a standalone document and cannot be applied without first understanding TM65.

More locally, TM65 has also been included in the GLA's whole life carbon calculation process as part of the London planning process.

CIBSE is also producing system specific publications. To date it has published:

- TM65.1 Embodied carbon in building services: Residential heating, which investigates the embodied carbon impact of heating and hot water equipment and strategies for use in residential buildings
- TM65.2 Embodied carbon in building services: Lighting, to enable lighting de-signers, specifiers, lighting engineers and manufacturers to understand the amount of embodied carbon that a light fitting contains.

When calculating embodied carbon, it should be remembered that not all the carbon impact of MEP systems is all down to the engineer. Premature replacement of some systems is attributable to retrofits and churn by tenants, which often result in systems being replaced earlier than is necessary. Similarly, the continued drive for fully repairing leases also means that it is common for land-lords to replace heating and cooling systems, far in advance of the systems' economic lifespan to help attract new tenants.

So, while TM65 will help engineers and specifiers select low embodied carbon options, the most effective way to reduce the embodied carbon associated with any building services system is clearly not to install it in the first instance. Or, if that is not possible, consider a simple and robust system, with reduced amounts of plant and equipment and/or a long lifespan.

While building services engineers have been at the forefront of efforts to reduce operational carbon emissions, the publication of CIBSE TM65 will ensure they are also at the forefront of efforts to reduce embodied carbon too.

Source

1. www.leti.uk/ecp
2. www.atelierten.com/articles/cibse-tm65-overview/
3. Available at www.cibse.org/TM65/manufacturerform

More information can be found at **www.CIBSE.org**

BESA welcomes first British Standard for indoor air quality

The Building Engineering Services Association (BESA) has praised the creation of the first British Standard for health and well-being in buildings.

BS40102 (part one) gives recommendations for measuring, monitoring, and reporting indoor environmental quality (IEQ) in all types of non-domestic buildings. It includes an evaluation and rating system for air quality, lighting, thermal comfort, and acoustics.

The evaluation will give building managers a benchmark score to help them identify areas of below par performance so they can plan improvements and include IEQ measures in any retrofit and renovation work to improve the health and well-being of occupants.

Swansea-based environmental and building services firm, EFT Consult, played a key role in the creation of the standard as it laid the groundwork through its development of a publicly available specification (PAS 3003) prompted by the 2015 Well-being of Future Generations (Wales) Act.

EFT, which is a member of BESA's Indoor Air Quality (IAQ) group, was developing the PAS with the British Standards Institute when the Covid-19 pandemic struck highlighting the role played by poor quality indoor environments in the spread of viruses and other airborne contaminants. As a result, BSi decided to fast track and elevate the PAS to a full British Standard.

The standard was also partly inspired by the widespread realisation that building retrofit work carried out to improve energy efficiency had, in many cases, led to poorer quality ventilation.

Impact

To meet the new standard organisations will need to tackle conditions that have a direct impact on human health including humidity, and excessive levels of CO2, CO, NO2, volatile organic compounds (VOC), airborne particulates and mould.

Several other members of the BESA IAQ Group were invited to provide input into the standard and stressed the importance of following the latest World Health Organization (WHO) guidance on air quality. This was updated in 2021 to reflect the findings of five years' extensive research which revealed that particulate matter (PM) and nitrogen dioxide (NO2) harmed human health "at even lower concentrations than previously understood".

As a result, the WHO advised its 194 member countries to consider air pollution to be as big a threat to human health and well-being as climate change and adjusted almost all of its previous maximum target levels for airborne pollutants downwards.

It linked long-term exposure to even relatively low concentrations of ambient and household air pollution to lung cancer, heart disease, and strokes – putting the health impact of pollution on a par with poor diet and smoking.

"This new British Standard is an important step forward in our ongoing battle to get the government and building owners to focus more attention and investment on the indoor environment," said BESA IAQ Group chair Nathan Wood.

"Setting IEQ performance benchmarks will make it easier for facilities managers to target problem areas and demonstrate how conditions directly affect health and productivity. However, we must continue to keep pushing standards upwards as current government targets do not reflect the latest WHO guidance and lack real ambition.

"In time, we also hope to see the BS being tightened up to include the more stringent 2021 WHO guidelines so that we can start making real inroads into the IAQ problems that threaten the health of building occupants up and down the country."

BESA's campaign to turn buildings into 'safe havens' from pollution led to the production of three pieces of guidance, which it says could help more building owners comply with the new standard.

For example; the risk assessment template in the free to download 'Buildings as Safe Havens' practical guide complements Annex E of BS40102 which contains a staff survey template for assessing perceptions of IEQ levels. Using both in tandem would help building managers formulate a full picture of what is needed to improve the building's performance, the Association said.

More information can be found at **www.thebesa.com**

Delivering **good Indoor Air Quality** doesn't have to cost the Earth

By **Adam Taylor** B.Eng I.Eng MCIBSE, CEO ARM Environments

The Covid-19 pandemic drew everyone's attention to the importance of good indoor air quality (IAQ), but there is a danger that these advances in knowledge and action will be lost in the face of the energy and climate crisis. It is possible to deliver good IAQ without creating significant CO2 emissions, but it requires a data-led approach that has not been commercially viable until now.

In the height of the pandemic, the World Health Organization (WHO) released updated guidance on the acceptable levels of air pollution required to protect people's health. Approved document F – Ventilation (Part F), now requires building ventilation systems to limit the ingress of pollutants listed in the WHO guidance into buildings.

A typical ventilation system will be operated via a timeclock, with 100% of ventilation capacity being supplied during all core occupied hours. During the pandemic, building operators were advised to adjust their ventilation systems to run for two hours before occupation, and for two hours after in order to flush out potentially contaminated air. This is an inefficient way to run a ventilation system.

Demand Controlled Ventilation (DCV) is an effective way to reduce the costs associated with running an HVAC system in buildings with varying levels of occupancy. The extent to which the HVAC system runs is typically related to the Carbon Dioxide (CO2) concentration monitored within the building.

The CO2 concentration is closely correlated with the number of people in the space. The drawback of these types of systems is that people using the building outside of core hours, for example cleaners and security staff, can be put at risk from pollutants building up inside an unventilated building. This issue can be partially addressed by ensuring that the building has a minimum ventilation rate outside of core hours.

Decades old developments

Air Quality Controlled Ventilation (AQCV) is a development conceived decades ago that allows a buildings ventilation rate to vary according to multiple indoor air quality parameters. If IAQ levels are poor, the ventilation system will deliver a higher volume of outdoor air through the Air Handling Unit (AHU) to dilute the pollutants, this way of operating a ventilation has only recently become feasible due to the rise in availability of low cost IAQ sensors. The success of these systems is dependent on the filtered supply air containing lower levels of pollutants than the air already inside the building.

Air Quality Determined Ventilation (AQDV) is a recent development that allows a buildings ventilation system to modulate according to both the indoor and the outdoor air quality (OAQ). This innovation is only now possible due to the availability of both low cost IAQ sensors, accurate granular OAQ data and concessions made in Part F. OAQ varies day by day, and hour by hour, it cannot be assumed to be "fresh air" all the time. Section 2.6 of ADF states "where sources of pollution vary with the time of day, such as urban road traffic, it may be acceptable, for time-limited periods, to take one of the following actions.

A. Reduce the flow of external air into ventilation intakes

B. Close ventilation intakes when the concentrations of external pollutants are highest" ➜

If levels of OAQ are poor, and the IAQ is good, the ventilation system can switch to re-cycle a larger percentage of the air through the Air Handling Unit (AHU). Re-cycling the air for long periods of time with little dilution with outside air would typically result in unsatisfactory levels of odours and gaseous compounds. To address this, air cleaning technologies need to be deployed within the AHU to remove them including combined ePM10 and molecular filters. This "clean first" principle has been demonstrated in buildings built to ASHRAE 62.1 standards for decades.

Sensors

IAQ sensors form an integral part of this solution. For large open plan spaces, sensors in the supply and return ducts are sufficient to measure the air quality. In buildings with varying loads throughout the space, a higher density of sensors needs to be used in conjunction with volume control dampers. These will need to be retro-fitted in buildings that were previously operated on a timeclock.

The maintenance costs of running a ventilation system effectively can be significant. On top of the energy costs of heating, cooling and dehumidifying air, regular routine on-site inspections and replacement consumables also add to the operational expenditure (OpEx).

Filters

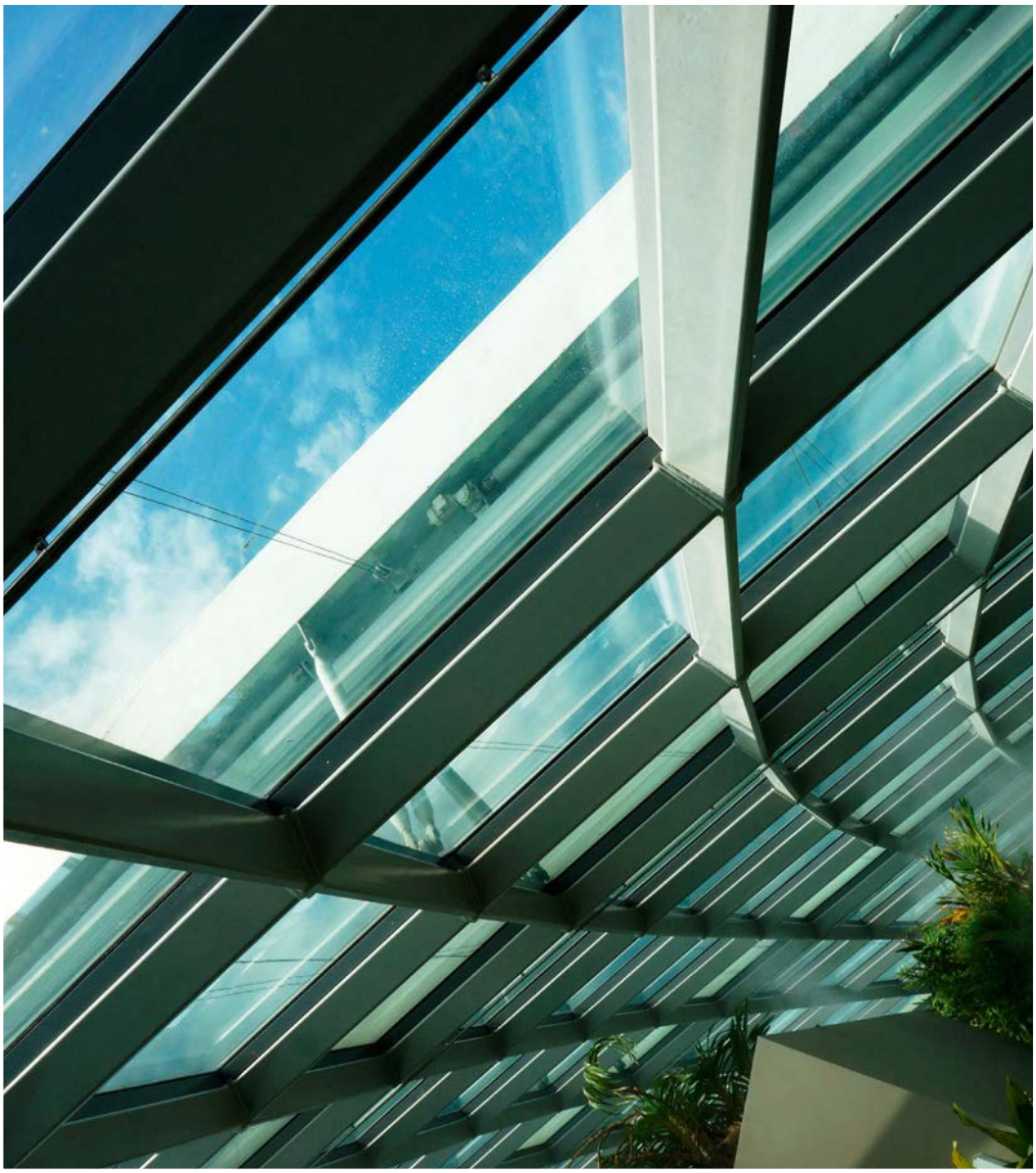
Filters used in AHUs are typically supplied by the manufacturer of the AHU in the first instance, these are likely to have been sourced from their preferred supplier, with EN779 classifications of G4 pre-filters and F7 final filters being the typical setup. On an ongoing basis, filters are likely to be sourced from the maintenance contractors preferred supplier, with the decision typically being made on Capital Expenditure (CapEx) cost only. Little thought is usually given to the filters particle removal efficiency (to ISO 16890), the lifespan of the filter or its Eurovent energy rating.

When a contract is in place for routine replacement of filters, building operators don't give this aspect of HVAC OpEx much thought, but there are significant savings to be made in both CO2 emissions and material waste. As an example, two "F7" filters (both rated at ISO 16890 ePM1 60%) from the same manufacturer can have wildly different energy ratings. Compare an 8 pocket bag filter with an annual energy consumption of >2,050kWh vs a compact V filter at 808kWh. The more energy efficient filter will also require replacement 50% less often. The higher performance filter is more expensive from a CapEx perspective, but the reduced OpEx will still give a ROI a couple of months.

Mitigate disparity

Pre-filters on an air handling unit require more regular replacement than final filters, but this disparity can be partially mitigated by fitting long life pre-filters. If due consideration is given during filter selection, the timing of pre-filter replacement can often be aligned with the need to replace final filters. If AQDV is utilized, then intake filters will have a longer service life, as they will not become loaded with dust during periods with high pollution levels. This saving on consumables will only be realized if the condition of filters is monitored, and their change frequencies being determined by their pressure drop rather than routinely being changed irrespective of their dust loading. Filter monitoring is particularly relevant when DCV, AQCV or AQDV systems are deployed in buildings where a hybrid-working culture means that buildings are sparsely occupied much of the time.

Newly available cloud-connected sensors can be incorporated into an HVAC system to allow performance and failures to be monitored from a remote location, even if there is no Building Management System (BMS). If only some parameters are remotely monitored, then the full reduction in OpEx cost cannot be realised, as routine inspections will still be required for some components, incurring travel and labour costs and the associated CO2 emissions.



Filter drop

In addition to filter load status, filter pressure drops, AHU runtime and airflow supplied, UVGI run-hours, fan energy consumption, fan status, outdoor air quality and indoor air quality can all be sent to the cloud to give a full picture of the system status.

Fitting a UVGI system to irradiate the cooling coil and drain pan removes the need for routine mould and biofilm inspections, deep cleaning of the cooling coil and improves the efficiency of the cooling coil. In accordance with Part F of the building regulations says that, in certain buildings and HVAC configurations, an Ultraviolet Germicidal Irradiation (UVGI) system should be installed within the AHU to protect occupants from the risk posed by re-cycled airborne pathogens.

Upgrading fans

Older style fans with belt drives need periodic inspections, lubrication and belt replacements. These should ideally be upgraded to energy efficient direct-drive EC fans. Some manufacturers offer cloud-connected fans that incorporate a number of sensors to report any issues ahead of failure, they also come with sealed-for-life bearings, and don't utilize drive belts.

All the components described can be incorporated into new air handling units, or as part of a comprehensive AHU refurbishment, which is around 25% cheaper than the cost of a brand new unit. The optimal time to upgrade to this modern way of operating is when an AHU reaches the end of its serviceable life, as the cost of replacing fans does not need to be included in the ROI calculation. Many of these upgrades can be fitted individually to certain AHUs and many have a short ROI, but when deployed together, combined with a different approach to maintenance, the biggest reduction in OpEx can be realised. Efficient operation of AHUs is seldom high up on the list when an organisation comes up with ideas to reduce its CO_2 emissions, but it should be. There are significant savings to be made, particularly if you consider whole life carbon emissions.

More information can be found at **www.ARM-environments.com**

Measurement is the key

By **Andrew Hamshere**, Managing Director, Sensing Precision

The new post pandemic world with new and different ways of working has set new requirements on building services. Not only to ensure the continuing safety of building users, but also to provide comfortable flexible workspaces to encourage workers to return to the workplace and to aid productivity when they are there. These are in addition to the ever growing need to address climate change through energy efficiency and reduced CO2 outputs. This has been further exacerbated by spiralling energy costs brought on by the Russian invasion of Ukraine.

All these new requirements are perhaps contradictory in some respects and the solution is a balance between these conflicting parameters: the need for good ventilation and comfort for building users, whilst minimising carbon output and energy costs. It is a significant challenge to get the balance right, but without accurate data it is near impossible. Airflow needs to be measured accurately and consistently.

Where do we need higher specifications

General office and retail applications have never needed to have these higher specifications; they are usually reserved for clean rooms, healthcare / life science applications and data centres. The push for energy efficiency has improved performance and specification to a significant degree in recent years, but it has been the reviewing of airborne risk following the pandemic which has led to greater changes. Designers, facilities managers and end users are looking more closely at existing and planned building services installations to see what can be done to provide the required ventilation rates to mitigate future infection risks whilst balancing the energy consumption of the ventilation system. The growth of hybrid working practices has accelerated demand for Variable Air Volume / Demand Controlled Ventilation systems which, while offering energy saving potential, leave the door open for Indoor Air Quality (IAQ) issues if not measured and monitored accurately.

A key issue is being able to demonstrate air flow and ventilation to reassure occupants, staff and visitors that they are safe. Measurement is key, but most building systems have levels of uncertainty of measurement as much as ±20% of volume flow, which is too wide a margin for this purpose. Higher specification measurement is required, such as Wilson Flowgrids (WFG) which provide levels of uncertainty to ±2% across multiple points. A standard 150mm radial WFG will take positive and negative readings from 36 specially located points within its unique design.

Alternative methods only rely on 12 points or less: the vagueness delivered by such means of measurement leads to poor system control and can have a massive impact on a building's running costs as well as indoor air quality. More and more clients are conscious of climate change and have been looking to significantly reduce energy consumption and carbon waste by installing WFGs in both new buildings and refurbishment projects, and at the same time enjoying the added life cycle and IAQ benefits.

Pressure signals

WFGs generate "enhanced" differential pressure signals which directly relate to volume flow within the duct, and when used with a pressure transmitter produce an instrument with 'real time' flow measurement accuracy usually associated with clean rooms and data centres. In general HVAC applications, apart from demonstrating required levels of ventilation, a WFG will greatly improve the effectiveness of building management systems and enhancing energy efficiency and IAQ.

It will also help with the adjustments and enhancements required to the HVAC system to combat poor IAQ: The ability to provide real time data and linking with 'smart' building technology allows for rapid adjustment of ventilation rates and outside air quantities to cater for situations such as spikes in CO2.

Demand controlled systems

The additional growth in Demand Control Ventilation systems provides opportunities to reduce operating costs in several ways, but ultimately without accurate measuring devices such gains are limited. A demand controlled indoor climate system is energy efficient as the system delivers exactly what is required. It ventilates and conditions neither too much (which costs energy) nor too little (which adversely affects comfort) but only as much as is needed. With the help of WFGs, the indoor climate is measured and controlled according to the exact needs, which potentially decrease energy bills and carbon footprints.

Having such levels of accuracy provides the real time assurance that the right airflow and ventilation is being achieved in all parts of the building. It also helps avoid low airflows and under ventilation which potentially reduces IAQ and impacts health and performance of building occupants, and the longevity of materials. Indeed, one factor that is frequently overlooked when discussing investments and savings is the productivity of the people who are in the building. Building occupants are more aware than ever of their working environment thanks to the availability of extensive data about temperature, air quality, lighting levels and more on smart phones and other portable devices, and this Indoor climate and air quality is strongly linked to human wellbeing and performance.

Employers appreciate consequences

With a demand controlled indoor climate and WFGs, the indoor climate can be adjusted on an individual level, which has a positive effect on performance. Historically, few employers would have given much thought to the quality of an indoor environment, but with the wide availability of data, they are starting to better appreciate the quality and productivity implications. A badly-ventilated office can severely impact an employee's cognitive ability, as studies have found that high levels of carbon dioxide have a significant negative impact on both cognitive ability and strategic thinking.

This makes a powerful business case for including measures for good air quality as early on in the project as possible, and requires the manufacturer to help with early-stage design, as a properly joined up approach is the only way to achieve the best results

The drive for SMART buildings and net carbon neutral targets is widening both the scope and necessity of accurately commissioning and monitoring airflows, as reflected in programs such as LEED, BREEAM and others. For example, with LEEDv4 (BD+C new construction), it is possible to obtain 1 Point under EQc1 Outdoor air delivery monitoring Indoor Environmental Quality. This requires provision of a direct outdoor airflow measurement device capable of measuring the minimum outdoor air intake flow. This device must measure the minimum outdoor air intake flow with an accuracy of +/–10% of the design minimum outdoor airflow rate.

These conditions can be achieved using WFGs even when combined with the error of the DP transmitter used.

Although high accuracy devices like WFGs can be more expensive to purchase than other volume flow or velocity measurement devices, they offer a rapid payback due to minimal maintenance requirements, reduced operating costs, a comfortable indoor climate, and increased employee performance. Other systems using less efficient measurement are costing their owners, and the world, dearly; proving that measurement really is key.

More information can be found at **www.sensing-precision.com**

Restoring the Balance: **Energy Saving vs Indoor Air Quality** in Schools

David Millward, Group Product Manager at Elta Group, discusses how schools must re-assess energy saving priorities and introduce quality-designed mechanical ventilation systems into these crucial buildings.

Good indoor air quality is a key pillar not just for better learning, but also general wellbeing. With the effects of the pandemic placing greater emphasis on ventilation, the high levels of CO2 across school building stock have become a prevalent concern. Yet, at the same time, saving energy remains a top priority in line with sustainability agendas.

With these two matters in mind, schools have historically relied on natural ventilation methods such as opening windows to maintain low energy usage. However, this approach does not guarantee good quality air. Many schools are located in suburban or heavily urbanised areas where a high count of nitrogen dioxide is in the air, along with harmful particulates such as car brake pad dust, fumes, sulphur dioxide and other pollutants. As such, ventilation is one of the building services that should be high on the priority list.

Proper ventilation aims to create a comfortable living environment while minimising energy usage. A well-designed and well-maintained ventilation system can help regulate indoor temperatures, reduce the need for excessive heating or cooling, and ultimately lower energy bills.

While conserving energy is important, this should not take precedence over peoples' wellbeing; especially as the young are more vulnerable. Furthermore, numerous scientific studies have highlighted that CO2 and harmful particulates directly hinder pupil's learning and concentration.

Coinciding with the introduction of the school rebuilding programme, now is the time for indoor air quality to be treated with greater importance through adequate ventilation.

The legislative landscape

While the Building Bulletin (BB101) is in place as a framework for ensuring effective ventilation, the changes to Building Regulations reflect growing concerns around management of indoor air quality. With updates to Part F, there is now a firmer guidance to adhere to. Namely that buildings must provide sufficient ventilation to keep CO2 levels below 800ppm (parts per million).

These regulatory measures highlight the need for measuring and controlling CO2 as part of ventilation strategy – placing further onus on schools to implement appropriate solutions.

Clearing the air

Alongside acknowledgement of regulatory guidance, there must also be an understanding of what good quality or 'fresh' air is. As outlined, good quality air isn't simply air brought in from the outside. Many harmful compounds can be present that affect both health and concentration levels in pupils.

Evidenced by the rising popularity of air purifiers, another misconception is that continuous recirculation and purification constitutes fresh air. In actual fact, this air becomes stale, allowing

for CO2 and VOC (volatile organic compound) levels to increase and subsequently be inhaled. While air purifiers do have their place in a ventilation system, they should not be treated as a comprehensive solution. Such applications will remove pollutants but have no impact on CO2 levels. As such, a good quality ventilation system is one that extracts all pollutants, brings air in from the outside and filtrates it before reaching the classroom.

Mechanical means

To ensure adequate ventilation, CO2 should be considered as a proxy for air quality. The CO2 level rises as a result of building occupants exhaling, while increasing the ventilation rate reduces it. On this basis, measuring CO2 can allow for effective control of both air quality and energy usage.

Building ventilation systems often operate at constant or pre-determined ventilation rates regardless of the occupancy level of the building. Ventilation rates are normally based on maximum occupancy levels, resulting in consequent energy wastage. This is not only due to the fan operation, but also includes the energy used to condition the air for both heating and cooling modes.

Through MVHR (Mechanical Ventilation with Heat Recovery) solutions such as Elta Fans' energy recovery units, the amount of airflow can instead be controlled to suit occupancy levels and delivered through demand-controlled ventilation (DCV). DCV is recognised as a reliable method of ensuring a building is ventilated cost effectively, while maximising indoor air quality.

Closed loop speed control for both EC and AC motor options provides major energy savings as the fan power is proportional to the speed cubed. CO2 or temperature sensors are used to continuously measure and monitor ambient conditions in the conditioned space and provide real time feed back to the zone controller. From here, fan speed is adjusted – modulating the ventilation rate to match the specific use and occupancy of the building. Significant energy savings are made by effective DCV, which ensures that the ventilation rate continuously matches the current occupancy rate and varying ambient conditions.

Efficient energy conversion and recovery

With all ventilation solutions, it's important to consider the design properties of the ventilation system itself prior to making a decision. This is where small yet significant long term energy gains, and subsequently cost savings, can be made.

As an example, energy recovery units have a free running, backward curved impeller and special three-dimensional blade geometry that provides reduced rotational tone, which provides greater energy savings through higher performance.

Attention should also be paid to how much thermal energy can be recuperated. With energy recovery units, the thermal energy exchange is enhanced by the large surface area of the heat exchanger resulting in as much as 92% of thermal energy being recovered.

System support

When designing and specifying a mechanical ventilation system, it's important to always consult with the manufacturers as quite often they can offer best practice and guidance to achieve the desired performance.

For schools, there should be a particular focus on specifying high-quality filtration methods to restrict external pollutants. As an example; in line with requirements, all ventilation systems from Elta Fans come with ePM1 Filters that offer high filtration levels and follows the ISO 16890 Standard.

When specifying mechanical ventilation systems, it must be ensured that the fan has enough power output to overcome any pressure development drop due to the filtration solution. Layout and length of the ducting, as well as any other ancillaries involved in the design will also need to be considered.

Post-installation, any solution must also be well maintained and serviced to ensure they are operating efficiently. Here, consulting with a manufacturer can ensure the right maintenance schedule is created and followed.

The future learning environment

As the school rebuilding programme comes into effect, it's clear that ventilation and air quality must not be left behind as an afterthought. Schools must have a well-engineered system for ventilation (whether it is mechanical or hybrid) and receive the necessary support to realise such solutions. From designers to contractors, consultants to installers and beyond, the entire supply chain must consider how to deliver good indoor air quality and follow through to enable better learning environments for years to come.

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The power of **demand-controlled ventilation and smart technology** for more energy efficient buildings

By **Stuart Smith**, Commercial Director at Zehnder Group UK

The UK construction industry is in the midst of a groundbreaking transformation fuelled by efficiency, sustainability and decarbonisation. This sweeping change is in perfect sync with the industry's mission to attain net zero objectives by 2050 - igniting an intense scrutiny of every system installed within a building's fabric, leaving no room for under-performance.

As energy costs surge higher and emissions regulations grow ever more stringent, a seismic shift is underway in building construction. These developments are creating a pressing need for substantial improvements in the calibre of our constructed spaces and, unsurprisingly, digitisation and innovative technology is leading the way.

But despite these improvements, around 80% of existing buildings adhere to outdated construction regulations. Astonishingly, only one in five buildings adopts a Building Management System (BMS) to regulate and oversee their inner workings. Consequently, most commercial buildings right now operate at a mere Class C energy efficiency level.

2050 targets

A critical part of achieving our 2050 targets will be renovating and retrofitting these older structures. The incorporation of advanced controls as part of the BMS could prove pivotal in unlocking superior building performance.

Building regulations, Part L (Conservation of Fuel and Power) and Part F (Means of Ventilation), have established stringent standards for buildings and infrastructure, aimed at ensuring both existing and new structures are energy-efficient and environmentally responsible. However, addressing efficiency challenges in older operational buildings is a complex challenge, with issues ranging from overheating to ventilation effectiveness and heat retention.

When it comes to the balance between energy efficiency and air quality, the majority of buildings in the UK rely on natural ventilation through high levels of air permeability. Yet the strive for more airtight properties means that building developers must carefully specify natural and background ventilation methods to provide adequate levels of air movement throughout the building. ➜

However, if ventilation cannot be achieved to standard through these methods, a continuous mechanical extract ventilation system needs to be installed. When fitted and then controlled through the BMS of a building using current sensor technology, these systems can provide increased savings in energy and costs.

The switch to on-demand

Energy loss due to ventilation accounts for approximately one fifth of space-heating energy demand in an older, poorly insulated building, whilst in a new, energy-efficient building, the high insulation levels mean that the proportion of space-heating demand due to ventilation increases to around a third. However, natural air infiltration alone can result at times in too little ventilation.

This can lead to poor indoor air quality and other, more readily visible impacts such as condensation and mould on indoor surfaces. Therefore, the objective of a good ventilation strategy is to provide a balance between energy efficiency and indoor air quality.

Approved Document L

Approved Document Part L has been designed to accelerate progress toward net zero carbon buildings. It introduces higher performance benchmarks and places greater emphasis on low carbon heating systems. Additionally, the regulations stipulate that building services systems must incorporate suitable controls to achieve reasonable energy efficiency standards during usage.

Under these regulations, building systems are expected to respond to the specific energy requirements of the spaces they serve. Each space is treated as an individual control zone, equipped with independent timing and temperature control and, when applicable, ventilation and air recirculation rate control.

Wasted energy

Most traditional ventilation systems are mechanical and not connected to the Building Management System. They are either on or off, or work from timer controls to adapt the air flow into the building. This is problematic for two reasons; first, if the system is turned off, say at the weekend in an office space, air pollutants build up over time and the system must work harder when switched back on to purge and replenish the air within the building. And secondly, timed ventilation controls don't adapt to fluctuating building occupation. For example; if staff work from home during the week and the building is only half occupied, the system is still running at full power and wasting energy and money.

Modern ventilation method

The installation of Demand Control Ventilation (DCV), mapped into the Building Management System is now being hailed as the modern ventilation method. DCV doesn't just outperform traditional commercial ventilation systems; it completely redefines the game.

DCV systems employ a sophisticated array of sensors capable of monitoring an array of environmental variables within a building - think humidity, temperature, carbon monoxide, carbon dioxide, motion detection etc. The objective is clear; ensure that the ventilation airflow rate is always in perfect sync with the building's real-time demands.

A mind of its own

On-demand ventilation is the key here, it's like having a ventilation system with a mind of its own. It responds automatically to any ventilation requirement, whether it is generated by the building's occupants or arises from other sources of pollutants like furniture and appliances, which can create troublesome spikes in volatile organic compounds (VOCs) and other toxic contaminants.

A DCV system doesn't wait for instructions. It takes the initiative by pumping in more filtered air when it senses higher pollutant levels - for example, when more people enter a room. Then, when the foot traffic dwindles, it automatically reduces speed, optimising efficiency responsively.

This is dynamic ventilation at its finest, effortlessly adapting to the ever-changing demands of the environment. Even when not occupied, overnight for example, the system will keep running at a low energy level to maintain indoor air quality levels ready for a healthy environment for occupants the following day.

The ebb and flow of output in the system levels out to get an ideal balance in energy efficiency and occupant health and wellbeing. Utilising on-demand ventilation will not only maintain the right level of fresh air and improves energy savings, but also lowers maintenance costs, serves superior indoor air quality to occupants for enhanced climate comfort and allows for flexible installation in both new build and retrofit buildings.

Up to 30% savings

According to recent studies*, up to 30% savings are possible using demand-controlled ventilation in open-plan offices when an average 40% of the people who work there are present and increased savings are possible depending on the environment the DCV system is serving. These efficiencies can result in cost savings in the thousands.

UK is still falling behind

However, despite Europe being the third largest energy consumer in the world and the world's largest energy importer, the UK is falling behind in the installation of smart control technology. The consequences are both immediate and far reaching, with higher energy bills being faced by commercial consumers and significant emissions experienced across the globe.

Only 80% of commercial buildings are operating at class C energy efficiency with timer-based programming rather than sensor-based, demand orientated activation when it comes to ventilation and cooling. Smart controls can provide impactful energy efficiency and cost savings with networked connectivity and site-specific controls that monitor trends to adapt to meet site requirements.

As an example; at Zehnder, we invest in smart control technology to ensure our customers see these benefits. Our commercial HVAC systems are built to the Bluetech® concept, a solution that ensures the optimal use of the system to reduce energy expenditure and CO2 emissions.

These plug and play solutions include a powerful, efficient, communicating control system that contributes, on one hand, to active efficiency for buildings (EN 15232) and on the other to potential savings of thermal energy without neglecting the climate, acoustic comfort and suitable air quality specific to each type of building.

Embracing cutting-edge control systems for these critical operations, and adopting them into the BMS as standard, empowers buildings to consistently elevate indoor air quality and optimise performance year-round, effortlessly transitioning between each season, from summer through to winter, with systems adapting to the need of the occupied space.

As an ever-evolving industry, it's imperative that we future-proof our buildings by constantly scrutinising their usage patterns and anticipating potential changes over time. This forward-thinking approach is the key to maintaining and maximising efficiencies.

*** www.sauter-controls.com/wp-content/uploads/Import-PDM/757327.pdf**

More information can be found at **www.zehnder.co.uk**

Building Regulations **Part L Uplift**: one year on

With the transitional period now over, **Chris Caton**, Product Director – Commercial, at Ideal Heating revisits Approved Document L, Conservation of fuel and power, as a step towards Net Zero 2050

In December 2021, the government released an update to Approved Document L, Conservation of fuel and power, providing revised practical guidance on how to meet the requirements of Building Regulations for England. Approved Document L came into effect on 15th June 2022, but allowed for a transitional period, meaning work subject to a building notice, full planning application or initial notice submitted before that date, providing the work for each building started before 15th June 2023, did not have to comply with the revised guidance. As of 15th June 2023, that transitional phase is over. Now, the uplift to Approved Document L applies to all.

What is the driving force behind these changes and how might they impact heating systems in commercial buildings?

The road to net zero

The UK government has committed to reducing its greenhouse gas emissions by 100% from 1990 levels by 2050. Net zero, as the policy is referred to, would mean the amount of greenhouse gas emissions produced by the UK would be equal to or less than the emissions removed from our environment.

Achieving net zero is not going to be easy, but decarbonising our heating has a significant contribution to make. Heating and hot water in buildings are responsible for a fifth (21%) of total carbon emissions in the UK. The key aim of the recent changes to Approved Document L is to reduce CO2 emissions by 31% for dwellings and 27% for other buildings, whilst improving the overall energy efficiency of buildings.

Energy efficiency improvements

Under the revised Approved Document L, a new building's energy efficiency must be measured, using 'Primary energy' in combination with CO2 metrics to assess compliance with Part L.

Primary energy calculations use several factors, including the efficiency of the building's heating system and the energy used to produce fuel and deliver it to the building. In the case of natural gas boilers, the Gross Seasonal Efficiency (GSV) has increased by 2 percentage points in new buildings to 93% for single boilers with less than 2MW output and to 88% to those with more than 2MW. For oil boilers, the increase is considerable, going from 84% GSV to 93%.

When it comes to existing buildings, compliance to the uplift is required in buildings with a floor area greater than 1000m2, where the proposed extension is both greater than 100m2 and more than 25% of the total useful floor area of the building. It also applies to existing buildings where new fixed building services are being installed, or where there is an increase to the capacity of fixed building services.

Lowering the temperature

The most fundamental change for anyone specifying or installing a heating system in a commercial building is a new maximum flow temperature of 55°C set by Approved Document L for wet space heating systems: "all parts of the system, including pipework and emitters, should be sized to allow the space heating system to operate effectively and in a manner that meets the heating needs of the building, at a maximum flow temperature of 55°C or lower."

There are two very good reasons for this 55°C figure

The first is that it will enable condensing boilers to operate at their most efficient. Condensing boilers can recover heat via the flue and use it for pre-heating purposes. They can only do this when the temperature of the water returning to the boiler is less than 54°C; it's even more efficient if the temperature is 45°C. Most boilers, however, are set up to output at 80°C and return at 60°C so, whilst the boiler works, it does not condense and that valuable extra heat is not recovered and reused.

The second benefit of a reduced flow temperature is that it paves the way for heat pumps, which achieve maximum Coefficient of Performance (COP) at a flow temperature of 45°C. Heat pumps, such as our Ecomod commercial monobloc air source heat pumps, work by using a refrigeration cycle to transfer heat from the air or ground outside a building to the inside, where it is used for heating and hot water. They use a small amount of electricity to power the transfer of heat from the environment to the building, and as a result emit significantly less CO2 compared to traditional systems. Since heat is transferred rather than generated, heat pumps can operate up to four times more efficiently than traditional methods, and have the potential to produce four units of heat for every one unit of electricity that they use. When fitted in non-domestic buildings, this can lead to a 65-70% reduction in carbon emissions, compared to traditional gas boilers or direct electric appliances.

Of course, not every building will be able to accommodate this lower temperature and in these instances Part L does allow for the heating system to be designed to the lowest design temperature possible that will still meet the heating needs of the building. Examples of exemptions given are buildings where there is insufficient space for larger radiators (necessary for systems operating at lower temperatures), or the existing distribution system is provided with higher temperature heat from a low carbon district heat network.

A further specification of Approved Document L is that all space heating and domestic hot water boiler installations in existing non-domestic buildings must now include controls to improve the effective efficiency of the system.

Thermal efficiency gains

Of course, in order for heating systems to operate at low temperatures whilst still delivering the warmth required, the building itself must be thermally efficient to retain the heat that is being generated. The Approved Document L uplift therefore has set new minimum efficiency standards for both new and replacement thermal elements, windows and doors.

Delivering on the uplift and beyond

The heating sector is in a transitional state, as we move towards a decarbonised future. The uplift to Approved Document L, Conservation of fuel and power, is the beginning of that transition, paving the way to net zero. Just around the corner, in 2025, the Future Buildings Standard is set to come into effect. Currently at consultation stage, the aim of the Standard is to produce highly efficient non-domestic buildings which use low-carbon heat and have the best fabric standards possible. The buildings should be zero carbon ready, with the ability to decarbonise over time alongside the national grid without any further energy efficiency retrofit work. Whilst we don't have a crystal ball to see into the future, it is clear that it will be a future with low carbon heating and energy efficient buildings.

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More information can be found at **www.idealcommercialboilers.com**

The New Standard for **Building Services Insulation**

By **Marc Nickels**, Business Development Manager, Kingspan Technical Insulation

Installing the correct thickness of insulation around building services is essential to ensure they perform as expected, and that the overall project meets its energy targets. In most cases, specifiers will use the minimum or indicative insulation thicknesses provided within BS 5422 to achieve this.

This standard has recently been updated, introducing new tables covering applications such as secondary pipework for heat networks and setting revised insulation thicknesses, including enhanced thicknesses for certain applications. It's important for installers to check that the insulation you install meets these new requirements. Additionally, by fitting more thermally efficient insulation, it should be possible to meet the revised targets with a slim thickness of insulation.

BS 5422 explained

BS 5422 covers insulation applications on pipes, tanks, vessels, ductwork and other equipment operating at temperatures between -40oC to +700oC. It offers a range of best practice guidance around insulating building services including addressing condensation and fire risk. The core of the document, however, is a range of tables which provide minimum insulation thicknesses for a range of different systems and scenarios.

The tables within BS 5422 offer minimum or indicative thickness for a wide range of different systems based on factors such as operating temperatures, ambient air humidity and the dimensions, location and orientation of services. The thickness of insulation that is required will change based on its lambda values (also known as its thermal conductivity). The lower the lambda value of an insulation material, the more effective it is at preventing heat loss. This means it may be possible to fit a slimmer thickness of insulation without compromising on thermal performance.

In practice, the thermal performance of building services insulation products can vary a lot. For example, phenolic pipe insulation products can achieve aged thermal conductivities as low as 0.025 W/mK. By contrast, mineral fibre lagging typically only achieve thermal conductivities of 0.033 W/mK or worse. This can have a significant impact on the thickness of insulation which is needed and knock-on effects on how close together services can be fitted, and how easy they are to lag in compact areas.

All pipe insulation products should be supplied with clear information about their thermal conductivity.

This value will be affected by the mean temperature of the insulation. To find the correct mean insulation temperature for an application, you add the operating temperature of the system to the ambient temperature and then divide this value by 2; this produces a curved graph.

Key Updates in BS 5422:2023

BS 5422: 2023 introduces several key changes which installers need to be aware of.

The pipe insulation tables have been greatly simplified. There are no longer separate tables for steel and copper pipework and all pipe sizes are indicated as "less than or equal to". In addition, many of the rarely used thermal conductivities have been removed. This should make it easier to identify the correct system and insulation thickness.

New tables have been added, one of which covers requirements for secondary systems as part of heat networks. These should be read together with the guidance in CIBSE CP1 – Heat Network Code of Practice. However, it is important to note that they are also applicable to non-residential schemes, unlike CP1.

A number of tables with enhanced insulation thicknesses are also provided. This incorporates the standards from the Energy Technology List, and can support efforts to achieve net zero operational emissions, or to reach a desired level in voluntary standards such as LEED. The standard signposts use of these enhanced standards by stating that unless there are specific instructions from the specifier, insulation levels from the enhanced tables should be used. Use of pipe insulation materials with lower thermal conductivities, such as phenolic insulation, can result in more notable thickness savings when reaching these enhanced values.

In addition, references regarding reaction to fire performance now solely use the Euroclass system and single wall plastic pipework is now considered to have no insulative value of its own.

Further Revisions Expected

It's important to note that the updated standard has been released based on the 2008 edition of the BS EN ISO 12241 calculation standard. This has now been superseded by a 2022 edition. It's therefore expected that the tables within BS 5422: 2023 will be recalculated once a calculation tool becomes available. The updated standard has a significant impact on calculating thicknesses for condensation control, and will lead to some widespread thickness changes when incorporated.

As mentioned, building service insulation manufacturers should be able to provide tables with recommended thicknesses for their products to meet BS 5422: 2023. When requesting or receiving these – check they're using the 2023 version of the document.

Delivering on Expectations

As the fabric of buildings are insulated to higher standards, energy losses from poorly insulated building services can take on increased significance in the overall energy demand of the building. By ensuring the insulation you install meets the updated requirements within BS 5422, installers can be confident that specifications are meeting good practice.

More information can be found at **www.kingspantechnicalinsulation.co.uk**

Young engineers awards shortlist leading the pack

Engineering undergraduates, apprentices and graduates have demonstrated their passion and dedication to the industry to be shortlisted for the CIBSE Young Engineers Awards (YEAs) 2023. They are joined in the lineup by nine companies leading the way in nurturing and supporting industry talent.

The CIBSE Young Engineers Awards recognise and reward the innovative thinking, hard work and skills of graduates, apprentices, and undergraduates whilst also showcasing employers who are truly committed to developing and encouraging young talent.

New for 2023, the Undergraduate award sees five undergraduates shortlisted for their final year project. The award has been brought within the YEAs to better showcase those making exceptional starts on their very early paths to careers in building services engineering and is open to students in their final year of a BSc. MSc and MEng study.

In the Apprentice of the Year award, 12 apprentices across two categories – Degree (level 5-7) and Technician (level 3-4) - have been shortlisted, following submissions of a three-minute video focusing on an aspect of their experience as building services apprentices.

Nine young engineers have made it through to the Graduate of the Year finals, each of which will demonstrate their presentation skills in front of a panel of industry judges at the Awards night in October, with the overall winner receiving a fully paid trip to the ASHRAE Winter Conference.

In the Employer of the Year award, nine companies have been shortlisted across three categories for small, medium and large companies, for their commitment to placing the growth of their employees at the heart of their business.

Adrian Catchpole CIBSE President said: 'These shortlisted young engineers are at the heart of our industry's ability to meet our commitments to cutting global emissions and retrofitting buildings for net zero. It is their passion and talent that we will be relying on to lead the way in driving innovation and change. To enable them to reach their full potential we need companies committed to developing their skills. Our employer shortlists are doing just that.'

The Awards are taking place on 12 October at the Royal College of Physicians, London, and are sponsored by ACV, BCIA, Eaton, ideal Heating, Panasonic and Swegon.

For more information and to book your place: **www.go.cibse.org/yea-2023-shortlist-pr**

FULL SHORTLIST

UNDERGRADUATE OF THE YEAR

1. Erin Cullen, Heriot Watt University
2. Ruairi Devlin, University of Nottingham
3. Lam Tsz Kai, Leeds Beckett University
4. Fraser Nicoll, Glasgow Caledonian University
5. Roana Pavia, The Malta College of Arts, Science & Technology

APPRENTICE

Level 3-4

1. Ryan Beary, CPW
2. Callum Doyle. Vertex Services Group Ltd
3. Sidney Hargreaves, HDR
4. Dan Herridge, Vertex Services Group Ltd
5. Sean John, University of Warwick
6. Mikey Nagle, BGIS

Level 5-7

1. Finley Bowdidge, Venables Associates
2. Mitchell Holland, Hawden MEP Ltd
3. James McLarnon, SCC MEP
4. Lauren McNaughton, Arup
5. Owen Sayers, Atkins
6. Jess Sergeant, Atkins

GRADUATE OF THE YEAR

1. Brianna Barrow, WSP (Houston, Texas) and Texas A&M University
2. Lawrence Bramall, Scotch Partners and LSBU
3. Phil Holker, Fosters and University College London
4. Francesca James, Fairheat and Cambridge University
5. Tom McGovern, Arup and Liverpool John Moores
6. Hiba Talmoust, Waterman Group and Queen Mary
7. Lewis Turner, Arup and Leeds Beckett
8. Matthew Yates, Atelier Ten and De Montfort University
9. Hannah Yorwerth, AECOM and Warwick University

EMPLOYER OF THE YEAR

Small Company:

1. Fairheat
2. InTandem
3. Whitecode Consulting

Medium Company:

1. Integrated Environmental Solutions
2. Introbat
3. PM Group

Large Company:

1. AECOM
2. Atkins
3. Hoare Lea

BESA launches training to spread the word about IAQ

The Building Engineering Services Association (BESA) has launched a 'basic awareness' training course for indoor air quality (IAQ).

It was developed by the Association's online training Academy and is based on a series of guides produced by BESA's Indoor Air Quality group promoting the concept of buildings as 'Safe Havens' from polluted outside air.

The training provides a useful introduction for anyone interested in the subject including those with some working knowledge of building services but who need to have a deeper understanding of IAQ. It is also suitable for people from a non-technical background keen to expand their knowledge so they can make better informed decisions about their indoor environments.

This short online course explains the importance of IAQ, the main airborne contaminants that affect buildings, their sources, and the impact on the indoor environment caused by outdoor pollution.

It is not designed to lead to a technical qualification but will help anyone who needs to put together an IAQ strategy for their building and be more aware of the threats to health, well-being and productivity posed by poor air quality.

It should also equip them with enough knowledge of the topic to be able to ask informed questions, establish the kind of technical intervention required, and appoint IAQ/ventilation specialists to carry out improvement or remedial work.

Polluted

The launch of the course follows the most recent national Clean Air Day (CAD) which highlighted the growing threat to health and well-being posed by polluted indoor air, and last month's publication of the first British Standard for health & well-being in buildings.

BESA reported that more studies confirming the links between health problems and airborne ultra-fine particulate matter had been published, and the World Health Organisation (WHO) had identified air pollution as the biggest environmental risk to health – blaming it for around one in every nine premature deaths annually.

A survey for CAD carried out by Zehnder Group found that 83% of UK residents wanted to know more about the air quality inside their homes, but while a sixth said they worried about outdoor pollution just one in ten had the same level of concern about the indoor threat.

Adam Taylor, vice chair of BESA's Indoor Air Quality group, urged the government to mount a public awareness campaign similar to those that featured celebrities highlighting the risks posed by car crashes and household fires, which account for fewer deaths than pollution.

"The annual mortality of human-made air pollution in the UK is roughly equivalent to between 28,000 and 36,000 deaths every year," he said. "Globally, household air pollution was responsible for an estimated 3.2 million deaths per year in 2020."

Taylor said lack of public awareness was at least partially due to the way that IAQ information is presented. "We gather lots of data but that has to be translated into actionable insights."

The BESA awareness course provides a series of practical measures that building owners and operators can take to address IAQ concerns including measuring and monitoring airborne contaminants, checking and improving ventilation systems, and understanding the role of filtration and regular maintenance of air systems.

Convenience

It takes around 45 minutes to complete the course online and it can be undertaken in a series of manageable 'bite sized' chunks at the user's convenience from home or work. It costs £15 plus VAT for BESA members and £25 plus VAT for non-members.

BESA intends the training to support its messages to contractors, developers, designers, manufacturers, builders, occupiers, and maintenance engineers about how they can act positively on buildings and their systems to improve occupant comfort, health, and well-being – and also strengthen their businesses in the process.

The Association also wants to step up pressure on the government to be more ambitious in its target setting for reducing air pollution, which currently lags behind the latest WHO Air Quality Guidelines (September 2021). For example: the Environment Act 2021 in secondary legislation sets a concentration target for fine particulate matter (PM2.5) of 10 µg/m3 by 2040 against a WHO target of 5 µg/m3.

For more information and to register for BESA's Basic Awareness training for IAQ visit **www.thebesa.com/besa-academy**

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To book, go to: www.aeme.co.uk
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Course: The importance of effective filtration and water treatment for heating and cooling systems

The seminar focuses on water quality requirements for modern HVAC systems. Highlighting the key issues which threaten new build and refurbishment projects and how to reduce these risks. The positive impacts of effective water treatment and filtration on performance, resilience and lifespan illustrated through case studies. The role of automation, effective control and management and how short comings in design and procurement can adversely affect project commissioning, completion, warranty and legacy stages. The impact on life cycle costs, energy efficiency and the environmental implications of failing strategies.

To book, go to:
www.enwa.co.uk/cibse-accredited-cpd-seminar/
Telephone: 01530 830 354

CIBSE CPD

Indoor air quality (iaq) - Tools to enhance indoor environments

About the CPD course

When it comes to IAQ, which is complicated, there are no silver bullets.

This presentation introduces and explains soft ionisation and the important role it has in delivering Indoor Air Quality. The presentation also explores, how Needlepoint Bi-polar Ionisation can be applied in a real-world as part of a multi-layered approaches to improving the IAQ and optimise the performance of ventilation systems in removing particulates from occupied spaces.

Course offered by: GPS Air

Contact: **atrivedi@gpsair.com**

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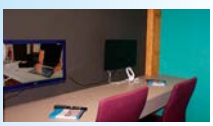

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www.aeme.co.uk

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MBS WHAT'S NEW

A guide to new products and services for **MBS** readers.

Introducing the Gen 3 Room Sensors

Titan Products are proud to announce the launch of their all-new Gen 3 Room Sensors. Applying their mantra of 'Simplify the Complex' Titan have totally re-developed their room sensors to create a new era of smart, modern, slimline sensors which bring design and functionality together like never before.

Covering temperature, humidity, and CO2 sensors, the redesign encompasses the sensor's plastics, PCBs, and firmware, resulting in improved aesthetics and usability of the sensors. Combining modern aesthetics with Titan Products' high product quality and reliability, the Gen 3 room sensors set the standard for office, retail, education, hospitality, and residential sensing applications.

Gen 3 features:

- Modern, slimline design: The Gen 3 sensors feature a sleek, modern design creating Titan's slimmest room sensors to date.
- CO2 Halo LED: Designed as a clean, simple, yet informative interface that aids the understanding of both the sensor status and its environment. The Halo LED is the ideal companion for understanding CO2 levels within a space allowing action to be taken to maximise and maintain occupant comfort and well-being.
- Anti-microbial properties: All room housings within the Gen 3 product line incorporate certified Polygiene® product protection, designed to pro-actively inhibit the growth of bacteria on the sensor surface. Titan are passionate about the wellbeing of their end users and this is their next step in offering the smartest sensors on the market when it comes to clean living and healthy environments.
- Enhanced user experience: Designed for easy installation and maintenance, the sensors incorporate user-friendly features, such as pluggable terminals, improved mounting features and quick release mechanisms.
- Flexible compatibility: The Gen 3 sensors have multiple output options across the product range that include; resistive, 0-10V, 4-20mA, wireless, and BACnet/Modbus communications, ensuring seamless integration with different systems and options no matter the application.
- UK designed, developed, and manufactured by Titan Products.

Speaking on the launch of the new Gen 3 sensors, Iain Twiss, Business Development Director at Titan states, "At Titan we recognise the need to evolve and to provide all stakeholders across the product life cycle with the best possible user experience. Whether an installer installing the product, a building manager looking for reliable and accurate products, or a building occupant requiring a clean and productive environment to work or learn within, the Gen 3 sensors encompass this perfectly and really do set the standard for environmental monitoring across temperature, humidity and Co2 applications".

www.titanproducts.com/control-solution/gen-3-room-sensors

Copeland innovates Integrated Scroll Compressor solution to enable quieter heat pumps

Low noise emissions critical to encouraging more widespread adoption

Heat pumps play a central role in moving away from fossil fuels to heat buildings and homes. As a more sustainable alternative, they bring ambient heat to the required temperature level with minimal energy input. However, a decisive factor for their legal conformity, acceptance and adoption is noise, especially in urban residential areas. At the 20th European Conference on Refrigeration and Air Conditioning in Milan, Italy, Copeland™ presented innovative technology and complete compressor solutions that enable exceptionally quiet operation. With the help of the new Copeland YHV*RG and YHV*RT scroll compressors, original equipment manufacturers can develop efficient heat pumps that meet the particularly high requirements for low noise in the residential sector, but without the need for elaborate sound insulation.

Copeland solution combines low noise with efficiency and sustainability

The core of Copeland's complete solution is a new type of variable speed scroll compressor designed specifically for heat pumps with R290 (propane) or R454C refrigerant. These scroll compressors generate a lower sound pressure than other scroll compressors: Compared to a standard Copeland compressor, the newly developed scroll compressors of the YHV low-sound series operate at full power with a 10 dB(A) lower sound pressure.

The low sound scroll compressors are complemented by the highly efficient Copeland EV3 drive and the advanced superheat envelope controller (SEC). They continuously monitor performance and ensure that all operating parameters are within their defined safety margins. Because the Copeland low-sound solution package combines quietness with the highest energy efficiency (A+++) and refrigerants with low global warming potential, it also ensures compliance with the F-Gas regulation, thus making it a future-proof investment.

New Copeland scroll compressors are the key to less noise, lower system costs

"The Copeland package with scroll compressors, perfectly matched components and advanced control technology allows for the design of very quiet and compact heat pumps," explains Enrico Fraccari, director marketing residential comfort, Europe for Copeland. "For manufacturers, this also combines great potential savings in material and labour costs – lower system costs in turn improve their competitiveness."

Further technical information on the innovative range of Copeland low noise scroll compressors is available for download at

www.copeland.com/TheSilentRevolution

Ideal Heating launches CIBSE accredited Heat Networks & HIU CPD

Ideal Heating – Commercial Products has introduced a new CIBSE accredited CPD to its collection, on Heat Networks and Heat Interface Units.

The new CPD provides an overview of the benefits of heat networks and the role that Heat Interface Units (HIUs) play in ensuring the thermal comfort of the end user and the efficient operation of the network.

Predominantly a beginner's guide to heat networks, aimed at those who have a basic knowledge but little first-hand exposure, the new CPD describes the concept of heat networks and their key benefits. It goes on to focus on HIUs, explaining their role as the appliance that transfers the thermal energy from the network to provide heating and hot water for the end user. The basic principles of HIU operation, along with common components and some typical mechanical and electronic functions for HIUs are addressed.

To ensure the network and the HIUs are operating in harmony, at their optimum, there are aspects that installers should consider when choosing an HIU, as well as things to avoid. The new Heat Networks and Heat Interface Units CPD provides invaluable advice on these, gained from Ideal Heating's extensive experience in heat networks with its own POD HIU range.

The hour-long Heat Networks and Heat Interface Units CPD can be delivered online or in person, either at a customers' premises or at one of Ideal Heating's Centres of Excellence in Hull and Leeds. These premises have recently been completely refurbished to convert them into state-of-the-art training facilities, with Ideal Heating's commercial products installed so attendees can get interactive, hands-on training. The CPD can also be tailored to suit specific businesses and their requirements.

The CIBSE accredited Heat Networks and Heat Interface Units CPD is detailed in Ideal Heating's new Commercial Products Training Courses brochure, which also includes other CPDs and training courses offered by the company.

To view /book any of the Ideal Heating CPDs available, go to
www.idealcommercialboilers.com/cpd-courses

EnviroVent expands its range with sap 10 & building regulations-compliant ventilation units

EnviroVent, one of the UK's leading ventilation manufacturers, has released two new and improved Decentralised Mechanical Extract Ventilation (dMEV) units, which are SAP 10 compliant and meet the latest Building Regulation requirements.

The ECO dMEV+ range, includes the ECO dMEV+ and ECO dMEV+LC. Both are SAP 10 listed, which means they meet the requirements of Approved Document L, Conservation of fuel and power, Volume 1: Dwellings, 2021 edition incorporating 2023 amendments.

The two fan ranges offer housebuilders and developers a constant volume, continuously running fans with an intermittent control option for the LC version. These decentralised extract fan solutions have been designed to achieve the lowest power, noise, running costs and installed performance

Ultra quiet and eco-friendly, the new ECO dMEV+ and LC units feature a low watt DC motor mounted on silent elastic blocks, to deliver incredibly quiet running below 20 Db(A).

Both fans have also benefited from EnviroVent's in-depth research and development into the design of the ECO DMEV+ which incorporates a high-powered forward-curved impeller, with sensorless constant volume technology. Its centrifugal fan works in direct correlation with any resistance in the ductwork, to ensure it auto adjusts to perform at the desired airflow rate and prevents excessive noise.

These two fans are easy to install and commission and can be set at variable trickle speed settings to exactly meet the airflow requirements for specific applications. They offer constant volume technology, with a choice of continuous or intermittent operation, including an adjustable trickle speed.

The ECO dMEV+ and LC units have been designed for ease of maintenance, achieving the lowest life-cycle costs. Both units are fitted with low watt DC motors to enable minimum energy consumption down to 1 Watt.

The ECO DMEV+ is also available in a low voltage 17v version, which can be boosted by an external switch. This version offers a timer option and humidity sensor option with timer.

Unique to ECO DMEV + LC is an adjustable run-on timer, which allows the fan to run on boost mode for between one to 30 minutes. In intermittent operation, the timer allows the fan to continue to operate for the selected period after the switch has been turned off.

www.envirovent.com

Passivent's Aircool range provides a breath of fresh air

Passivent's comprehensive range of Aircool® wall and window ventilators offers solutions across a wide variety of sectors, providing controlled air intake and extract in natural ventilation systems to create healthy internal environments. The range comprises four core products to give specifiers the full spectrum of solutions. The Aircool works with all forms of wall construction, curtain walling and window profiles with the external weather louvre providing excellent weather protection and an insulated internal damper which minimises heat loss.

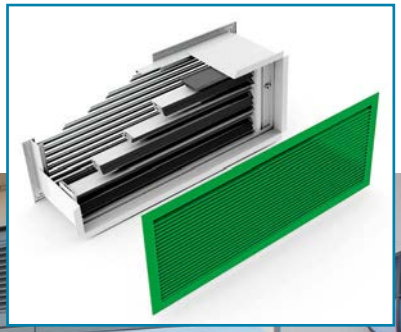
Passivent Aircool can form part of a natural or mechanical ventilation strategy and with its electrically-actuated low-voltage dampers, is virtually silent in operation. It is particularly suitable for use as part of a night cooling strategy, where daytime heat build-up is dissipated from the structure via the Aircool during the night, reducing the need for daytime cooling or air conditioning.

As well as the standard Passivent Aircool option, Passivent also offers an Acoustic Aircool® Ventilator with additional acoustic attenuation features plus its Thermal Aircool® Ventilator with a heater coil to temper the temperature of the fresh incoming air during cooler weather. The hybrid air-mixing variant - Hybrid Plus2 Aircool – combines the features of the Aircool with an innovative air tempering and mixing unit with three distinct operating modes to satisfy cool and warm conditions – passive, cooling and mixing. The Hybrid Plus2 Aircool meets BB101 (ventilation) and BB93 (acoustics) for use in the education sector, but is equally suited to general commercial applications as well as modular construction.

The whole range is manufactured by Passivent to ISO 9001, and has been rigorously tested to ensure it provides superior thermal insulation and excellent airtightness as well as meeting weather resistance requirements.

Passivent's experienced technical team can provide support with bulk airflow calculations or thermal modelling and all products within the range are available as BIM objects.

www.passivent.com



Passivent no leak guarantee protects year after year

Passivent, one of the UK's leading manufacturers of natural ventilation solutions, has unveiled a market-leading 15 year no leak guarantee, available as standard across three of its most popular roof ventilation terminal products.

The Passivent Airscoop, Airstract, and Hybrid Plus Airstract roof ventilation terminals are all covered by the 15-year guarantee, which starts from the date of installation, rather than the purchase date.

Central to all three products is Passivent's patented double-bank louvre system within the terminals. The unique design means buildings relying on these products will be 100 per cent ventilated all year round, regardless of external weather conditions. And so robust is the design that Passivent is able to guarantee no leaks for 15 years, provided the roof ventilation terminals covered have been installed in accordance with Passivent fixing instructions.

What's more, there is no requirement to undertake a regular servicing programme for the roof terminals to quality for the guarantee. As the Airscoop, Airstract, and Hybrid Plus Airstract do not include mechanical or electrical items, such as actuators, within the terminal, no regular maintenance is required which in turn means no need to allow for external roof access.

The guarantee is granted to the product and so is transferable to any future building owner for the remainder of the term.

A lot can happen in 15 years but Passivent's Airscoop, Airstract, and Hybrid Plus Airstract roof ventilation terminals will keep buildings well-ventilated with no leaks – guaranteed.

www.passivent.com

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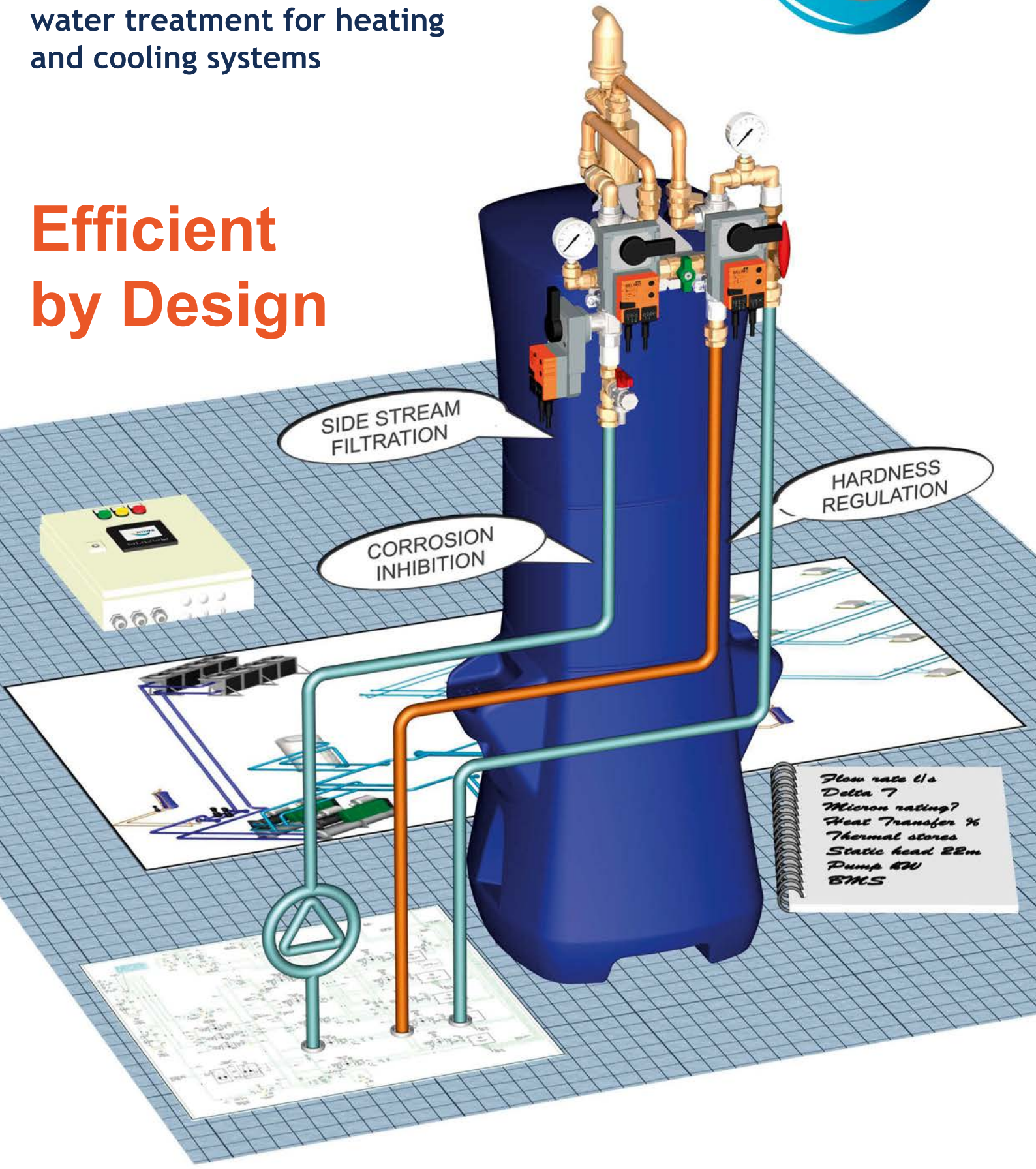

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