

HVAC&R NEWS

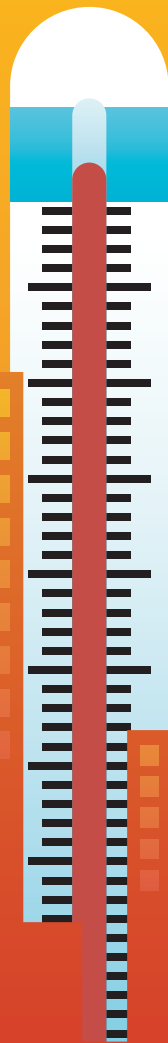
AN AIRAH PUBLICATION



Skills

WORKSHOP

Commissioning
AC systems



Life at the cold face

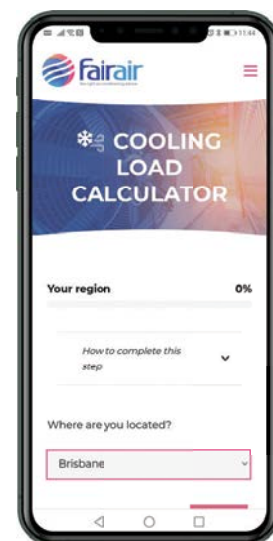
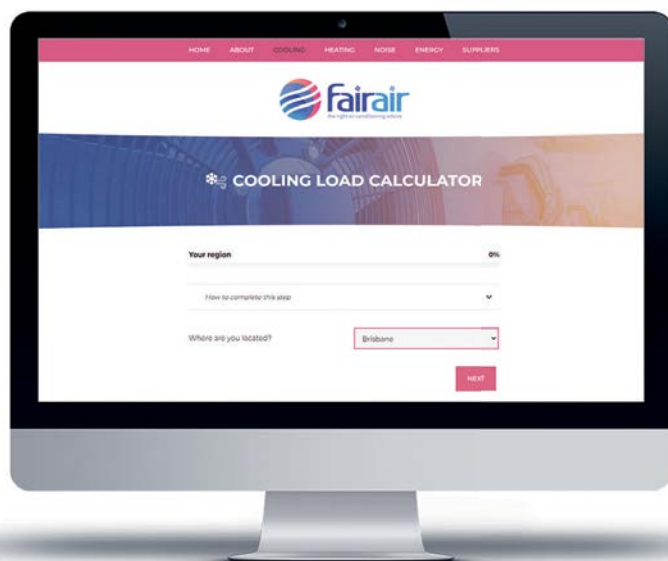
Small-to-medium
HVAC&R contractors
share their stories

TO THE EXTREME

How climate change will impact our cities
– and the people who cool them



Independent advice on cooling and heating homes



The FairAir website aims to provide in-depth, unbiased technical information about home cooling options and products. It includes interactive guides and calculators for cooling and heating loads, noise levels, and more.

fairair.com.au

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The FairAir calculators are an estimate only, based on a series of assumed default values and a series of user inputs. AIRAH recommends that experienced air conditioning contractors or designers are best placed to provide the most accurate estimates for the occupant's needs.

AIRAH recommends that installation and maintenance is always conducted by a fully qualified technician with an ARC licence: lookforthetick.com.au

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9,171
March 2023

PLEASE CONSIDER THE ENVIRONMENT AND RECYCLE THIS MAGAZINE IF YOU ARE NOT GOING TO KEEP IT.

To the extreme



10

As our world warms up, summer heat is becoming a life-and-death issue, especially in our cities. Louise Belfield looks at the implications for HVAC&R designs, equipment and workers.

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Exclusive to this issue



19 **Life at the cold face**

Over the past decade, conditions have changed significantly for small-to-medium HVAC&R contractors in Australia. Louise Belfield talks to companies across the country about their experiences in recent years, and the challenges ahead.

HUMBLE BUT VITAL

I write this column surrounded by mini-mountains of boxes and clothes as my family prepares to move house. After seven years, the owners of our rental are moving back in, and we are sorting our treasures from our trash (so much trash!) to relocate a couple of kays down the road.



Although I'm dreading the move itself, there are a couple of things I'm looking forward to at the new place.

First – and apologies if this is a bit un-Australian – the new house doesn't have a lawn, meaning no more weekends spent mowing, edging, and pulling relentless green tendrils out of cracks and crannies. It's a relief.

Second, our new cooling and heating set-up. We're moving from a big, drafty house with evap air conditioning and central gas heating to what feels like a better-sealed dwelling, with reverse-cycle splits. I'm looking forward to not forking out \$250 a month in gas bills next winter. And I'm looking forward to AC that can cool us down quickly this summer.

Here at HVAC&R News we often focus on the big installations: the cutting-edge industrial refrigeration plant, or the high-tech commercial HVAC system. And the trade itself sometimes takes a negative tone when talking about the resi work done by "split bashers". Yet even the small kit makes a big difference.

Last month I attended a meeting at Parliament House where Assistant Minister for Climate Change and Energy Jenny McAllister spoke to leaders from the building and construction industry. She shared two anecdotes, and it was notable that one of those was about air conditioning.

She described her visit to an accommodation facility in Brisbane for men in danger of homelessness,

where government funding had supported the installation of air conditioning in the rooms. She spoke to the men living there, and was struck by the change that humble split systems had made to their lives. The men could sleep more comfortably, with the windows closed if they wanted, keeping out the traffic noise. This meant they woke up feeling rested, with energy to go to work or look for jobs.

To an experienced fridgie it might seem like child's play to install a split system, but it can have a massive impact.

As it happens, this month is our residential special. Our cover feature looks at how extreme heat is changing the game in HVAC&R, for both end-users and contractors. In our other feature we chat to small and medium-sized businesses about the challenges they're facing on the ground.

And on page 24 you'll find an interview with Hacia Atherton, founder of Empowered Women in Trades (EWIT). Big thanks to our new editor and staff writer, Nick Johns-Wickberg, for pulling this awesome story together. You will be seeing a lot more of Nick in coming issues, so please join me in welcoming him onboard. ■

 @AIRAHnews

Mark Vender
Editor

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1 Performance under pressure

SWEP has launched the ultra-pressure B285H product, offering a solution for transcritical CO₂ refrigeration systems.

Targeting applications with single-phase fluids, high heat loads and demanding pressure requirements, the B285H complements SWEP's existing transcritical refrigeration product portfolio. It has a new plate pattern optimised for high heat load capacities of up to 550kW as a gas cooler and for a flow capacity above 50m³/h.

According to the company, by applying SWEP B285H in a system, the large capacity range combined with a compact size supports a reduced footprint and lower cost of ownership. For businesses using natural refrigerants, the double-plate design delivers a frameless solution that uses less material while withstanding ultra-high working pressures.

SWEP says it is committed to meeting its customers' demands for innovative and sustainable product solutions that support the transition to environmentally friendly refrigerants. The B285H has been designed for applications such as supermarkets, supermarkets, heat recovery and heat pumps.

Go to www.swep.net

2 GPI extends warranty

Global Pacific Imports (GPI) is now offering an "Australian first" five-year warranty on BlueDiamond condensate pumps.

"For over 15 years, GPI has distributed the product range into Australia, achieving great success with an industry leading three-year warranty," says GPI.

"Now we are leading the way again with the first five-year warranty on condensate pumps – a three-year manufacturer's warranty plus additional two-year distributor warranty."

GPI says the new five-year warranty offers peace of mind for purchasers of the range of BlueDiamond products.

Originally founded and trading as Charles Austen Pumps, BlueDiamond has been manufacturing pumps for almost 75 years.

"All BlueDiamond products are designed, tooled, developed and manufactured in-house," says the company, "meeting our strict approach to quality, stemming from our UK heritage and a wide skill base."

Go to www.gpipimport.com.au

3 R32 multi systems from Fujitsu

Fujitsu General Australia has released three- and four-room Multi Systems, engineered with R32 refrigerant technology.

According to Fujitsu, the new outdoor unit design not only delivers space-saving advantages, but also a streamlined installation process, empowering homeowners to connect up to four distinct indoor units to one compact outdoor unit.

"We are proud to introduce our new R32 Multi System units as part of our ongoing commitment to expanding our R32 product offering and increasing the range of available compatible indoor units to give the end consumer more choice," says Kyle Rafter, head of product ANZ, Fujitsu General Australia.

Fujitsu notes that the system is built on R32 refrigerant technology, and has been designed for easy installation, featuring service access from the side and a centralised valve method for quicker evacuation of all connected pipes and indoor units.



A commissioning mode has been built into the outdoor unit to conduct automatic wiring and piping checks. Fujitsu says this automatically corrects errors, saving time for trades without compromising the unit's peak performance capabilities.

The range comprises 23 indoor units across six distinct styles, with individual or centralised control options that support up to nine different languages. Fujitsu says the systems are not just user-friendly but also highly functional, fitting seamlessly into a variety of residential layouts.

Go to www.fujitsugeneral.com.au

4 Camfil gets hard-COR

Camfil has launched a corrosion control monitor called the Airmage-COR that monitors corrosion in real time. The technology uses electrical resistance (ER) sensors to help mitigate the risk of corrosion.

Data centres, wastewater treatment facilities, petrochemical refineries and renewable energy plants all rely on electrical equipment for smooth operations. Corrosion can lead to unscheduled downtime, costly repairs, loss of revenue and increased safety risks.

Thi Quynh Nguyen Mazo, Regional Product Manager for Industrial Molecular Filtration at Camfil, says monitoring corrosion requires accuracy and reliability – and the Airmage-COR offers both.

"The Airmage-COR ER sensors have been qualified in a corrosion chamber to the ISA standard by injecting corrosive gases at different environmental conditions," she says.

"The most accurate sensors were selected. The selection was based on the evaluation of a variety of sensors with different non-conductive substrates and metal track deposition technologies."

The Airmage-COR has been designed to offer a user-friendly solution that accurately monitors corrosion, temperature, relative humidity and pressure in real time via remote access through the progressive web application.

Go to www.camfil.com

5 Stylish indeed!

Daikin Australia has launched its new Stylish Controller, incorporating a Zigbee 3.0 protocol to facilitate connection to a range of Daikin wireless sensors.

Daikin says the controller offers a compact display and intuitive touch-button control. Advanced functions can be achieved by connecting the device to the Daikin app via Bluetooth.

The model includes enhanced functionality, such as an off timer that can be scheduled in one-hour increments for up to 96 hours.

The new Zigbee 3.0 compatibility enables connection with an assortment of wireless sensors, including CO₂ sensors (CO2ZB1), temperature and humidity sensors (H24428), motion sensors (H74426), and door/window sensors (DWZB1-CE). These sensors have been designed to work with Daikin SkyAir and VRV indoor units, heat reclaim ventilators, and outdoor air processing units.

The sensor's derived metrics – such as temperature, humidity, and CO₂ concentration – can also be displayed on the controller.

The controller is available in a white (BRC1H63W) or black (BRC1H63K) finish.

6 TSI launches IAQ monitor

TSI Incorporated has introduced a new IAQ monitor to help maintain healthy and sustainable buildings: the TSI AirAssure 8144.

According to TSI, the link between poor indoor air quality and decreased productivity among occupants is undeniable. AirAssure aims to bridge this gap by offering real-time IAQ monitoring, providing insight into the health of a building's air.

The model is designed for schools and universities, office buildings, hospitals, civic buildings, and other indoor spaces for congregating. TSI says it can be easily mounted on walls in just 10 minutes.

There is a range of three models, each designed to measure an array of air quality indicators, including CO, CO₂, H₂CO, NO₂, O₃, SO₂, TVOCs, PM_{2.5}, PM₁₀, temperature, relative humidity, and barometric pressure.

According to TSI, users can build a network of AirAssure monitors, manage the device, analyse the air quality data, and make informed decisions with its TSI Link Solutions Software – a cloud-based SaaS application designed for remote device management, real-time alerts, and custom dashboard – and the TSI Link API Data Serviced and Integration for data analytics.

Go to www.tsi.com ■



7 Fluid thinking from Unist

Unist Australia – a company that provides lubrication solutions for HVAC, metal cutting, and forming – has released its new TSL Fluid Applicator. The company says the applicator will improve efficiency and productivity in the HVAC industry.

“Unist’s TSL Fluid Applicator is the ideal solution for precisely and accurately applying fin stamping fluids,” the company says. “The TSL features controlled lubricant delivery to both sides of thin stock using specialised felt application pads. The TSL is capable of applying lubricant coatings as low as 25mg/ft² (269mg/m²) and is an ideal solution for applications where precise lubrication is critical.

“Unist Australia’s HVAC fin-making solutions are specially designed to consistently and neatly apply lubricant to the thin materials commonly used in heat exchangers. The TSL system saves manufacturers time and money, and is environment-friendly, with reduced fluid consumption.”

Unist says the Smartflow increases efficiency by monitoring the lubrication process, tracking fluid consumption, and alerting operators to any lubrication issues.

Go to www.unist.com.au ■

DO YOU HAVE A NEW PRODUCT TO GO IN THE TOOLSHED?

Email mark.vender@airah.org.au All submissions received will be considered, though publication cannot be guaranteed.



Unist Australia provides lubrication solutions for HVAC, metal cutting and forming industries.

Heat exchange manufacturers know that lubrication is a critical factor that can help ensure productivity in fin making operations.

Introduced into the Australian market earlier this year, the Unist TSL™ system provides smooth and consistent lubrication to the coil, which helps protect expensive tooling and reduces fluid consumption and excess waste.

The TSL features controlled lubricant delivery to both sides of thin stock using specialized felt application pads. The TSL™ is capable of applying lubricant coatings as low as 25 mg/ft² (269 mg/m²) and is an ideal solution for applications where precise lubrication is critical.

Features

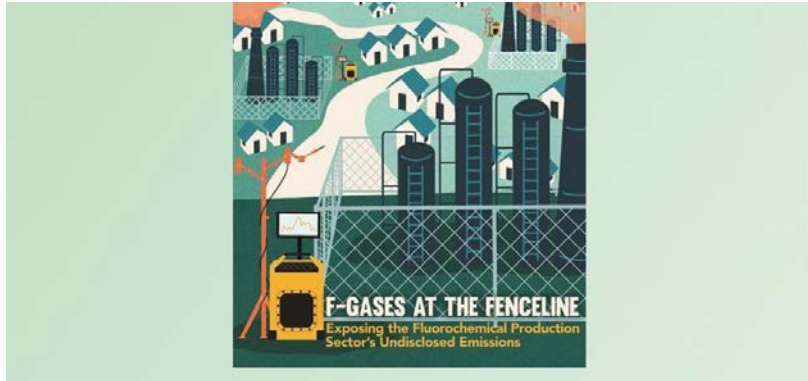
- Protects expensive tooling
- Consistent application at a fraction of the cost of an electrostatic system
- Controlled application of low or no VOC fluids
- Lubricates both sides of stock
- Pneumatic cylinders maintain consistent contact with material
- Reduce fluid usage



For more information:

Email: lloyd@unist.com.au | Phone: 02 4381 1375 | www.unist.com.au

USA



ROGUE EMISSIONS BEYOND THE PALE

The Environmental Investigation Agency (EIA) has released a report presenting evidence of high-GWP and ozone-depleting gases being emitted from two major fluorochemical facilities in the US.

For the report, EIA investigators used an infrared detection device at the fence lines of two production facilities operated by Honeywell and Chemours in Baton Rouge, Louisiana, and Corpus Christi, Texas, respectively. This revealed the emissions of various hydrofluorocarbons (HFCs), chlorofluorocarbons (CFCs), and hydrofluoroolefins (HFOs).

“Our evidence is damning: fluorochemical production continues to spew significant avoidable emissions, often undisclosed, despite control measures,” says EIA US Climate Campaign Director Avipsa Mahapatra.

“This industry, culpable for creating a hole in our ozone layer, continues to profit at a massive cost to our climate. It behoves companies to step up, contain their chemicals leaking into our atmosphere or step out of this industry.

“We have only scratched the surface of a colossal global problem of unaccounted emissions, equivalent to annual emissions of 200 coal plants, that has vexed the scientific community and the Montreal Protocol.” ■

EUROPE



HFCs ON WAY OUT IN EUROPE

The European Parliament and Council has taken the next step towards a new and ambitious phase-out schedule for HFC refrigerants.

The deal includes phase-out dates for the use of fluorinated gases in sectors where it is “technologically and economically feasible to switch to alternatives”. This includes domestic refrigeration, air conditioning and heat pumps.

Under the deal, HFCs will be phased out by 2050, and until then there will be a trajectory in place to reduce the EU consumption quota. There will be strong interim limits on GWP in different categories of equipment. This is intended to provide a clear market signal.

The agreement also covers strict conditions and deadlines for the use of fluorinated gases with high GWP for the servicing or maintenance of different types of equipment.

“We’ve reached an ambitious deal that would put an end to F-gases,” says Rapporteur Bas Eickhout.

“We are breaking the endless cycle of new chemical cocktails that risk dragging technologies like heat pumps and switchgear – which are key for our energy transition – into the PFAS-debate.” ■

CROATIA



GOING UNDERGROUND

A Croatian energy company has discovered an underground lake with super-heated water that could supply thousands of homes with clean geothermal electricity.

Power company Bukotermal conducted a two-year study before it found the geothermal water source at Lunjkovec – Kutnjak field, near the Hungary border. The lake is about 2.4km underground, with an average temperature of 142.03°C.

The site meets requirements for the construction of a 16MW geothermal power plant.

The research has been conducted as part of a tender issued by the Croatian Hydrocarbon Agency, with more than €2.5m (AUD\$4.14m) invested to date. It is looking into five areas in Croatia that have existing wells from retired oil and gas operations.

Drilling wells can be expensive and produce variable results, so using existing wells can lower the costs and possible risks.

Croatia already boasts areas where hot underground water is used to heat towns. The first geothermal power plant (Velika Ciglena) became operational in 2019. With 10MW of installed capacity, it can power 29,000 homes. ■

HONG KONG



CRAFTY CERAMIC

A breakthrough in developing a passive radiative cooling (PRC) material has been announced by researchers at City University of Hong Kong, with findings published in *Science*.

Known as cooling ceramic, the material has achieved high-performance optical properties for energy-free and refrigerant-free cooling generation. The researchers say its cost-effectiveness, durability and versatility make it suitable for commercialisation in many applications, including construction.

By reducing the thermal load of buildings and providing stable cooling performance, the cooling ceramic can enhance energy efficiency.

PRC is considered one of the more promising technologies for curbing soaring demand for space cooling and reducing pollution. Current PRC options have limitations, however, including high cost and compatibility issues.

“But our cooling ceramic achieves advanced optical properties and has robust applicability,” says Professor Edwin Tso Chi-yan, one of the paper’s authors. “The colour, weather resistance, mechanical robustness and ability to depress the Leidenfrost effect – a phenomenon that prevents heat transfer and makes liquid cooling on the hot surface ineffective – are key features ensuring the durable and versatile nature of the cooling ceramic.” ■

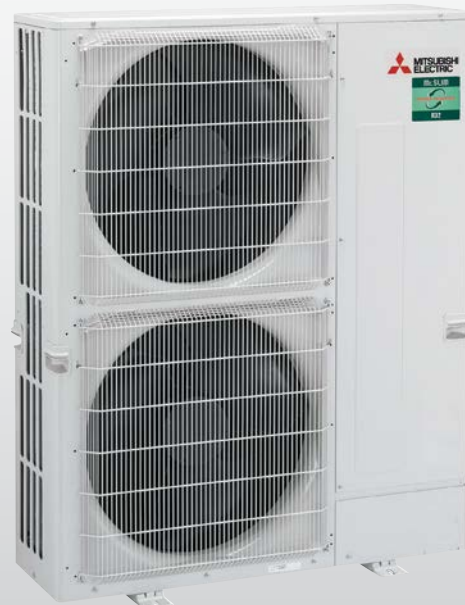
R32 Large Capacity Ducted Systems



PEA-M160HAA



PEA-M180/200/250LAA

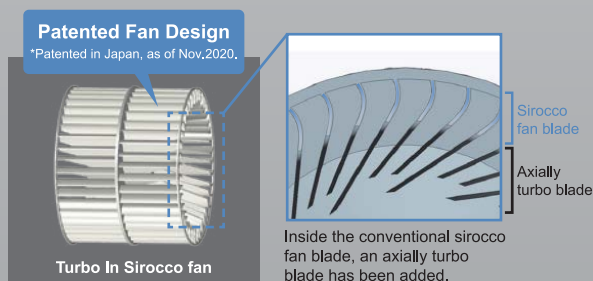

 PUZ-ZM160/180V/YKA
PUZ-ZM200/250YKA

Introducing the NEW Mr Slim large capacity ducted units in R32 refrigerant.

A new 16 kW model has been added to complete the range and now delivers 16 kW - 25 kW. In addition, the 16 kW and 18 kW indoor models can be connected to a single or three-phase Mr Slim outdoor unit, making the 18 kW model one of the largest ducted units available in the market with a single-phase power supply.

Low Input with New Fan Design

The PEA-M LAA Series fan motor has been upgraded with a maximum external static pressure of up to 250 Pa and has four fan speed settings. Achieved with a newly designed patented Turbo In Sirocco fan that delivers high efficiency with lower power input.



New Side Discharge Outdoor Unit

The Mr Slim outdoor unit PUZ-ZM250YKA-A is now a side discharge model with twin fans, compared to the previous PUHZ-RP250YKM-A top discharge. The new model is only 1,338mm high and 139kg, making it possible to install the outdoor unit in discrete locations and easier to transport to sites.

	PUHZ-RP250YKM	PUZ-ZM250YKA
Height	1,650mm	1,338mm 18% reduction
Depth	740mm	330mm 55% reduction
Weight	199kg	139kg 30% reduction

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TO THE EXTREME

The world is heating up, El Niño is back, and Australia is gearing up for longer, hotter summers. So, what does this mean for HVAC&R contractors and end-users? Louise Belfield reports.

According to the Australian Institute for Health and Welfare, heat kills more Australians than fire, floods and storms combined. And an analysis of coronial records in the *International Journal of Disaster Risk Reduction 2022* found that more than half of heat-related deaths between 2001 and 2018 occurred within (mostly residential) buildings.

Not only is there a human cost to intense heat, but it also impacts key infrastructure, our economy, households, annual productivity and the private sector. And with a perfect storm of extreme heat factors already occurring in the northern hemisphere and increasing here in Australia, it's going to get a lot worse. Urban heat, climate change, and climate extremes are combining to present new and daunting challenges. So, how can we manage them?

A WARMING COUNTRY

Western Sydney Regional Organisation of Councils (WSROC) Project Coordinator Judith Bruinsma says what is happening in the northern hemisphere is definitely a warning to us. Three years ago in Sydney, temperatures were already reaching 50°C, she says.

"As we have seen from the northern hemisphere summer, there is also the concern for consecutive disasters," she says. "For example, extreme heat can go hand in hand with bushfire and drought conditions, creating additional complexities."

Added to that, Bruinsma notes that lots of areas in Australia are experiencing rising temperatures and

more extreme temperatures are highly populated, which increases the risk.

UNSW Senior Lecturer at the School of Built Environment, Faculty of Arts, Design and Architecture, Dr Riccardo Paolini, says in the next 20 years Australia can progressively expect more of the same sorts of conditions as are occurring in the northern hemisphere, where overnight temperatures do not bring relief.



Heat kills more Australians than fire, floods and storms combined

"With the combination of global climate change and increasing urbanisation here, especially in Western Sydney, from 2040 to 2050 we can expect an increase in the number of nights where the outdoor air temperature is above the cooling set-point temperature," Paolini says.

"A specific feature of heatwaves in most capital cities in Australia has been that night temperatures mostly drop below the cooling set-point. Therefore, night ventilation has been possible, and in general, there's a cycle of charging and discharging of the thermal mass."

Heatwaves in continental Europe, on the contrary, have lower peak daytime temperatures than in

Sydney, for instance, but high night temperatures above the cooling set-point for several days with no relief, Paolini says.

"The typical feature of Australian heatwaves is that they are relatively short, about two to three days. And while the peak daytime temperature is pretty high – for example, in the western suburbs in Sydney, we can reach 50°C during the day – the temperature drops quite low during the night, to below 22–23°C."

When this happens, people can open the windows in their dwellings and benefit from natural ventilation, and get some relief at nighttime. Commercial buildings can be naturally ventilated too, if this is enabled by design.

In Europe, however, heatwaves can last five days or more, and night temperatures are often as high as 32°C, meaning people cannot sleep, Paolini says.

After a few days the thermal mass in these European cities becomes saturated, exacerbating the problem, and so a lot of the previous passive cooling strategies are not viable anymore, he adds. These heatwaves intensify the magnitude of the urban heat island. And with the increasing urbanisation in places like Western Sydney, together with global climate change, we can expect more nights above the cooling set-point temperatures.

In such conditions, people generally turn their air conditioning on or up, adding to the heatwave and heat island effect by way of condensing units. A classic catch-22.



A PERFECT (HEAT) STORM

“Urban heat specifically refers to the tendency of urban environments to absorb and hold heat,” Bruinsma says.

“Therefore, urban heat will exacerbate whatever else is happening in the local climate. We know that the baseline climate is warming, and that heatwaves will become more frequent and severe. Urban heat islands are a local layer on top of that broader baseline climate.”

Greenfield development contributes to the mix.

“A report by Adapt NSW (2016) estimated that greenfield development in North Western Sydney will double the temperature increases expected by climate change alone,” Bruinsma says.

Urban heat is heat brought about by such things as urbanisation, buildings, roads, and infrastructure, and is often referred to as urban heat island, says Dr Negin Nazarian, Scientia Senior Lecturer at UNSW Built Environment, Chief Investigator at the ARC Centre of Excellence for Climate Extremes, and CFRC fellow at the City Futures Research Centre.

Add to this the impact of climate change, with average temperatures increasing across the world and climate extremes such as heatwaves becoming more frequent, longer, and more intense due to global warming. “Our cities are faced with an increasingly pressing problem of how to manage heat and care for the people living in them,” Nazarian says.

Airmaster’s Associate Director of Technical Services Naveen Dhakshinamoorthy says urban areas tend to be hotter due to the heat island effect, where building fabrics, roads, and other infrastructure absorb and re-emit the sun’s heat more than natural landscapes in rural areas.

“Cities may experience more pronounced effects of the urban heat island phenomenon, where urban environments become significantly warmer than their rural surroundings [and] combined with overall rising temperatures from climate change, this can intensify the demand for cooling,” Dhakshinamoorthy says.

“With greater variability in weather patterns, including more extreme temperature fluctuations and unpredictable seasonal shifts, the demand for cooling in homes, businesses, and industrial processes is expected to rise, placing additional stress on energy grids and HVAC&R systems.

“[As a result] HVAC&R systems may need to operate for extended periods, potentially leading to decreased efficiency and increased wear and tear. This continuous operation can lead to more frequent breakdowns and a shorter lifespan for equipment.”

IMPACT ON EQUIPMENT

With people turning increasingly to HVAC systems for heat relief, it will be important to understand operational thresholds, Bruinsma says.

This will be especially important for units used in buildings intended to provide life safety in extreme events, such as public buildings, critical infrastructure or buildings for vulnerable people: hospitals, aged-care facilities, and childcare centres, for example.

“Anecdotally, we have heard that many units cut out, or are not designed to function, when temperatures exceed 42°C,” Bruinsma says. “This will be increasingly problematic on extreme heat days where air conditioning may be the key solution to keep people safe.”

Telling end-users about the limitations of their systems is also important.

“High temperatures will put HVAC&R equipment under strain and reduce its efficiency,” Paolini says. “This has to be communicated to clients so they can frame their expectations correctly.

“Clients will need to be aware of the decrease in EER [energy efficiency ratio] with increasing temperature more than in the past, and of the need for planned maintenance,” he says. Clients should also consider what other measures they can take, such as using or adding more effective building fabric to minimise heat gains, to ensure their existing HVAC&R equipment can deliver their desired indoor conditions.

“Clients will also need to consider the energy supply, as more frequent extreme climate events (both heatwaves and cold snaps) will put the electrical grid under strain and power outages may become more frequent,” Paolini warns.

“Smart systems enabling solar pre-cooling might become more widespread, and dry and hot conditions induced by climate change may also again favour substantial bushfire events, as happened in 2019–20. So, natural ventilation will not be an option in those conditions, and there might be increased requests for air filtration,” Paolini warns.

Paolini also predicts there will be a surge in interest in ground-source heat pumps, because these don’t release anthropogenic heat in the built environment.



The demand for cooling ... is expected to rise, placing additional stress on energy grids and HVAC&R systems

CITY COOL

Blue and green have always been regarded as cool colours, and there is a reason for that. According to Dr Negin Nazarian, Scientia Senior Lecturer at UNSW Built Environment, blue and green infrastructure – cool materials, green spaces, climate-responsive urban planning, blue infrastructure, and reducing human-created heat – can all help to manage urban heat.

Materials traditionally used in the built environment tend to absorb heat and trap radiation, creating urban heat islands. Conversely, cool materials help to radiate heat, not absorb it. For example, light-coloured roofs, and advanced “super cool” materials that reflect most radiation back to the sky, help to reduce heat trapped within the urban canopy.

Green spaces include parklands, tree plantings, green roofs and facades, and they also help to reflect heat. Additionally, sensitive urban design and planning calculated to promote shade and ventilation can reduce local air and surface temperatures and improve outdoor thermal comfort.

Urban design that allows natural ventilation around buildings can help dissipate heat in cities as well. Sea breezes can then effectively help cool coastal urban areas, while inland, ponds and parks help cool the breezes that flow through the area.

“Blue infrastructure” refers to water bodies such as ponds, rivers and dams, and can not only be an effective tool for temperature reduction, but when integrated with green spaces and wind corridors can have a powerful cooling effect on surrounding areas. Water fountains in public areas have a similar effect.

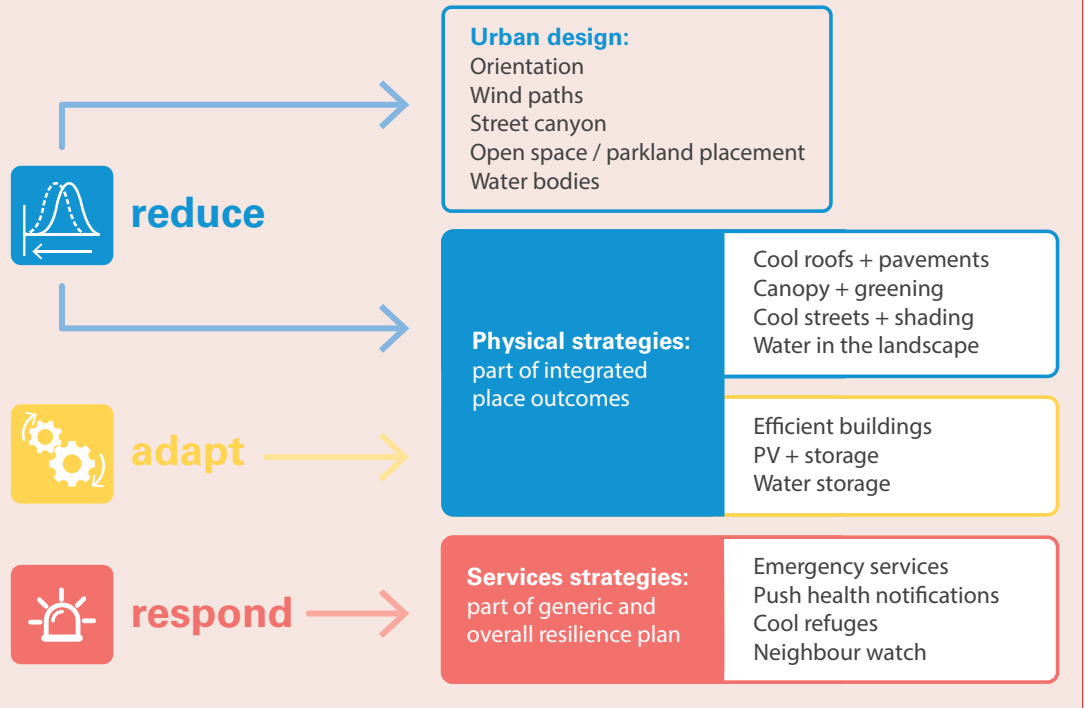
It is also important to reduce heat generated by human activities when looking to cool cities. This heat comes about from excessive use of air conditioning, cars and industrial practices. Air conditioning releases condensation and heat out into the environment, creating more demand for cooling (usually via air conditioning) in a vicious cycle.

As an international example, Singapore is shifting towards more energy-efficient, centralised cooling systems to mitigate localised heat, says Dr Nazarian. And modelling led by the University of Sydney found that slightly increasing indoor air movement with fans can reduce electricity consumption from air conditioner use by approximately 70 per cent, meaning they add next to no heat to the atmosphere. ■



A RESILIENCE APPROACH

“Understanding the difference between climate change, the urban heat island effect and heatwaves is important to ensure we are implementing solutions to each of the elements (they are related, but also different),” says Western Sydney Regional Organisation of Councils (WSROC) Project Coordinator Judith Bruinsma. “The resilience approach we developed [at WSROC] tries to look at heat holistically, and seeks to identify measures that mitigate, adapt and respond to heat.” ■



“In many urban contexts, the ambient temperature can be increased by 1–2°C in peak conditions by exhaust heat from condensing units.

“The interrelation between local climate, HVAC&R, power grid, and heatwaves (and global climate change) will be more and more relevant in the future, as the market penetration of air conditioning increases and health impacts of urban overheating also increase.”

According to Dhakshinamoorthy, contractors need to stress the importance of regular maintenance to ensure systems are running at peak efficiency, particularly before and during the hotter months. They should also advise clients on the benefits of having redundant units to handle peak loads and prevent total system failures.

Bruinsma recommends contractors ensure their clients:

- Understand operations thresholds and the impact extreme temperatures have. Should options for higher performing units (if they exist) be considered or put forward to clients?
- Understand what temperature to set their air conditioners to keep safe but also save money i.e., 23–24°C for comfort or 25–27°C for maximum energy savings
- Understand limitations in case of blackout, especially if people have solar. There is an assumption that their solar panels will still power the home in a blackout; however, this is not a standard feature in solar set-ups

- Understand how the effect of air conditioning can be maximised to keep people cool. For example, wet towels have been proven to be extremely effective in providing additional cooling
- Understand how fans can assist with cooling
- Are clients aware of options to adapt their home to support cooling, which can also benefit air conditioning longevity, e.g., greening, shading (particularly west-facing areas), irrigation, materials and colour choice
- Understand where the best place is to install an air conditioning unit for maximum efficiency e.g., on the south side, out of direct sun
- Know that air conditioning units require servicing and that filters require cleaning in order for them to operate well.

FACING THE STORM

As the HVAC&R industry adapts to the challenges posed by climate change, a focus on sustainability, efficiency, and proactive planning will be crucial for ensuring uninterrupted service and the safety of both clients and workers, says Airmaster’s Director of Technical Services Naveen Dhakshinamoorthy.

In response to these challenges, Dhakshinamoorthy suggests HVAC&R professionals in Australia might consider the following.

Upgrading systems

Recommending clients upgrade to more efficient and robust HVAC&R systems that can handle increased loads and are designed with climate resilience in mind.

Education

Providing clients with information on how to optimise their current systems by installing controls systems for better performance during heatwaves, and explaining the importance of energy efficiency.

Innovative solutions

Encouraging the adoption of green and sustainable cooling solutions, such as solar cooling, which can alleviate some of the demands on the power grid.

Regulatory compliance

Ensuring all advice and solutions comply with Australian standards and regulations for HVAC&R systems and considering future changes to these regulations as climate change continues to impact industry norms. ■

WHAT ABOUT THE WORKERS?

According to Dhakshinamoorthy, there are a few WH&S considerations that might arise due to the impact of urban heat and climate change.

“High temperatures can pose health risks to workers who are exposed to extreme heat for prolonged periods,” he says. “Contractors should conduct information sessions with their employees on heat-related illnesses, provide adequate rest breaks, and implement measures to mitigate the risk of heat stress.

“Contractors should also ensure that the installation and maintenance of HVAC&R equipment comply with relevant safety regulations. This includes proper electrical wiring, safe refrigerant handling, and adequate ventilation in confined spaces.” ■

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A QUESTION OF STANDARDS

Clearscope Legal's Raphael Brown looks at whether Australia's pricing model for standards is helping or hindering the HVAC&R industry.

Australian Standards are the unsung heroes of the HVAC&R world, defining the technical legal obligations that keep our heating, cooling and refrigeration systems in check. From the fine art of electrical wiring (AS/NZS 3000) to the riveting world of ducting installation (AS 1668), they've got it all covered. It's like the ultimate HVAC&R rulebook, right?

Well, that's what you'd expect, but here's where the plot thickens. You see, these standards aren't freebies – they come at a price.



Should small business owners and individuals in the HVAC&R sector really have to fork over heaps of cash for essential Australian Standards?

AUSTRALIAN STANDARDS: HIDDEN COSTS FOR YOUR LICENCE

Imagine this: you're gearing up for your driver's licence test, and you're told it's a mere \$100. Fantastic!

But then, the bombshell drops. The driving rules are set out in a series of 34 rule booklets. And each of the 34 booklets you need to master before you hit the road costs around \$100, adding up to a jaw-dropping \$3,000! And no, you can't share them with your fellow road warriors, everyone's got to buy their own.

Sound strange? Well, not all that strange when we take a peek into the world of refrigerant handling licenses. At first glance, the annual fee for an Australian Refrigeration Council (ARC) refrigerant handling licence seems like a steal at a mere \$80 a year.

But don't let that price tag deceive you. This licence comes with strings attached, and by strings, we mean a laundry list of 34 Australian Standards that must be adhered to. (For those who like diving into the nitty-gritty, check out Regulation 135 of the *Ozone Protection and Synthetic Greenhouse Gas Management Regulations 1995*).

As noted above, these 34 Australian Standards aren't free. Brace yourselves, because at the time of writing, obtaining the full set of all 34 standards for your ARCTick licence could set you back a staggering \$3,122.26.

HITTING THE HVAC&R AIRWAYS

You know that feeling when you book a budget airline ticket, and suddenly, you're hit with extra fees for baggage, seat selection, and even oxygen? Okay, maybe not oxygen, but you get the idea.

Now, picture your journey into HVAC&R standards and the National Construction Code (NCC). It all starts off so well, like a traveller packing for a breezy vacation. You think, "It looks like for my mechanical ventilation system, I just need AS 1668 and AS 3666, and I'm all set!" A "manageable" \$950-odd – not too shabby, right?

Wrong.

Check the wording of AS 1668 and AS 3666 and you'll find many references to other standards. Suddenly, your "budget" ticket turns into a high-priced adventure, rivalling the costs of a luxury vacation.

THE MISSING LINK: UNDERSTANDING THROUGH ACCESSIBILITY

A few years ago, I was researching the HVAC&R sector's transition from AS/NZS 1677 to AS/NZS 5149. I came across a small business owner and passionate industry advocate, critical of some of the new requirements under AS/NZS 5149. When I asked him to walk me through the new standard, he told me that he only had a single-page extract!

This encounter left me wondering: Could the costs of Australian Standards and the lack of access be leading to a serious lack of understanding in the HVAC&R world and in other industries?

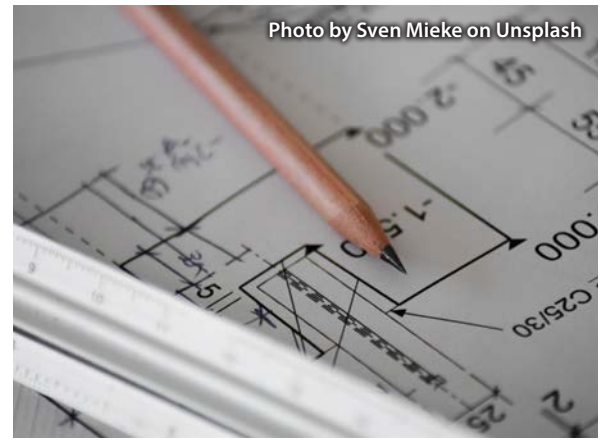
Multinationals and big businesses are well represented in the HVAC&R sector. But the industry isn't just about giants; it's also home to countless small and medium enterprises (SMEs). For the big fish, the cost of acquiring Australian Standards is pocket change. They even have the benefit of tailored licensing packages offered by Standards Australia.



ABOUT THE AUTHOR

Raphael Brown is the founder of Clearscope Legal. He specialises in commercial law and intellectual property, and has particular expertise in legal issues affecting the HVAC&R sector. Brown publishes a regular newsletter on legal topics relevant to HVAC&R businesses. To sign up, visit clearscopelegal.com.au/signup/.

Photo by Sven Mieke on Unsplash



But for the little guys, it's like trying to buy a single Tic Tac at the movie theatre – expensive and not very satisfying. SMEs need a fair shot at compliance without breaking the bank.

THE ROAD AHEAD

Now that we've exposed the enigma of Australian Standards accessibility, let's address the million-dollar question: Is this costly system justified? On one hand, Standards Australia does vital work in developing standards for industry safety and innovation – and it's only reasonable that they should be able to generate revenue to fund their future activities.

On the other hand, should small business owners and individuals in the HVAC&R sector really have to fork over heaps of cash for essential Australian Standards?

It's high time we shook things up and embraced alternative access models. Here are a couple of bright ideas ...

Government-backed access: For any standard referenced in legislation, let's have governments and regulators pay a "blanket" licensing fee to Standards Australia. This way we can all access these standards for free.

Group power: Industry organisations could negotiate group licenses, making the cost of access much more affordable when shared among members.

These new models need only apply to mandatory standards. The hundreds of other "voluntary" standards could still be available for a fee.

TIME TO TEAR DOWN THE PAYWALL

By continuing to restrict access to Australian Standards, we're hindering understanding, compliance, and fostering a culture of single-page extracts.

It's time to break down the paywall, promote knowledge, and create a level playing field for everyone in the HVAC&R world. After all, who wants to pay for wi-fi on a long flight when you can enjoy it for free? ■

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COMMISSIONING OF AIR CONDITIONING SYSTEMS

Skills summary

What?

The principles and equipment involved in commissioning air conditioning systems.

Who?

Relevant for anyone involved in installing, commissioning and maintaining air conditioning systems.

The efficiency and comfort level of a ducted air conditioning system depends ultimately upon the volume, velocity and temperature of the air delivered to each outlet or zone.

Technicians, then, must be as competent in locating the sources of complaints that arise from air distribution and temperature control problems as they are at changing faulty compressors, motors or refrigerant controls.

This requires:

- An understanding of the principles of air distribution and duct design
- Knowledge of the air distribution patterns from air outlets within the room
- The skills necessary to accurately measure the airflow at the different parts of the system
- An understanding of the control system and the controls which regulate the refrigerant, chilled and hot water and outside and return air, to produce the desired room condition.

Air distribution

The air duct system is necessary to deliver the conditioned air to the various air outlets located around the rooms and zones. The design of the duct system must ensure that each outlet and zone receives just the required amount of air at all times, in accordance with the system designers' specifications. If the supply air fan is correctly sized and supplying the required total volume, it is inevitable that any oversupply at one outlet will result in undersupply at the others, leading to complaints from all areas.

Definitions – air distribution

Any discussion on air distribution requires a knowledge of the terminology used to describe system components and the characteristics and behaviour of the moving air.

Primary air – air delivered to the room from a supply duct.

Secondary air – room air which is drawn into and mixed with the primary air coming from a diffuser, register or grille.

Supply outlet – any wall, ceiling or floor outlet for conditioned air.

Return outlet – any wall, ceiling or floor outlet through which air is exhausted or returned to the air-handling unit.

Outlet velocity – speed of the air as measured at the face of the outlet. Measured in metres/second (m/s).

Diffuser – an outlet discharging supply air in various directions and planes; usually located in the ceiling and including a damper.

Linear diffuser – an outlet discharging air from a straight slot, usually level with the ceiling, in one or both directions.

Grille – a cover for any opening through which air can pass.

Register – a grille, often sidewall, equipped with a damper or volume control.

Damper – a device used to vary the volume of air passing through a duct, by changing the cross-sectional area.

Turning vanes – blades or vanes inserted in the airstream at bends and turns of a duct to turn the air smoothly with minimum turbulence and pressure loss.

Gross area – the total area of a grille face or register within the limits of the grille frame, through which air can pass.

Free area – the total area of the openings in an air outlet or inlet through which air can pass. Measured in square metres (m²).

Throw – the distance an airstream travels from the outlet before its velocity reduces to "terminal velocity", which is usually considered to be 0.25m/s for registers and 0.50m/s for ceiling diffusers. "Throw" should not exceed three-quarters of room width, or three-quarters of the distance to the end of the throw from another outlet.

Terminal velocity – the average airstream velocity at the end of the throw. Terminal velocity should occur no lower than 2m from the floor.

Drop – the vertical distance the lower edge of a horizontally projected airstream drops between the outlet and the end of its throw.

Spread – the distance the airstream increases in width after it leaves the outlet. The angle of spread is approximately 30 degrees from the direction of the throw.

Aspect ratio – ratio of the long side of the cross-section of a duct to its short side.

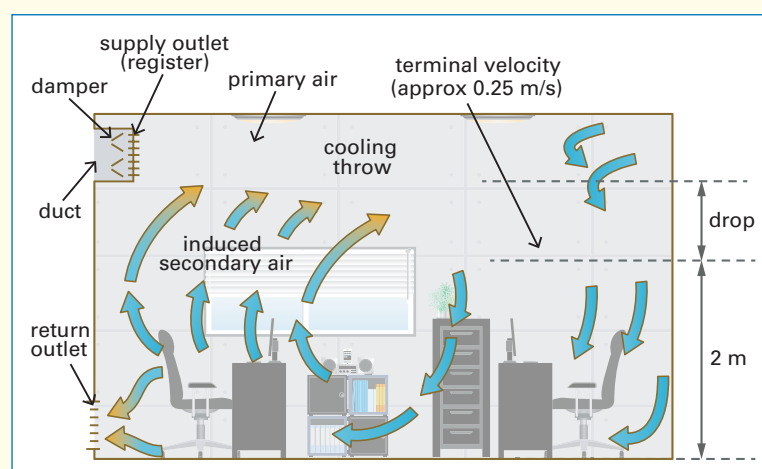


Figure 1 – Pattern of cooling air distribution in room (illustrating some relevant terms) with horizontal throw on one side. (See Figure 6 for examples of airflow patterns on heating.)



PULLOUT



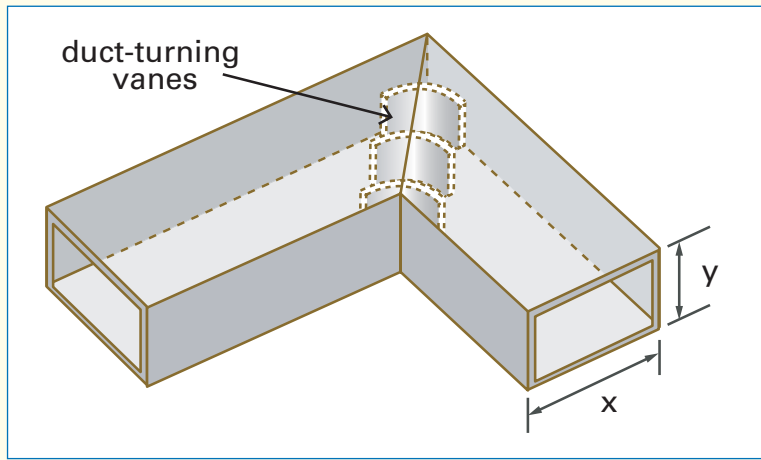


Figure 2 – Duct-turning vanes and aspect ratio of duct (x:y)

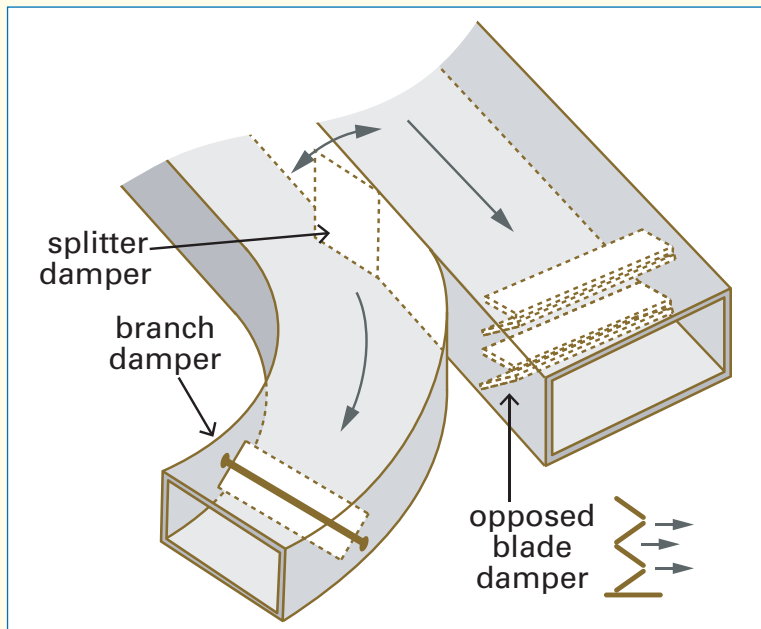


Figure 3 – Three types of damper used in ducts for air volume control

Outlets

Within the room being conditioned, the location of the outlets is determined by a number of factors including:

- shape and size of the room
- the possible location of the ducts
- the system being used, or outlets preferred.

Figures 4 and 5 illustrate some of the alternatives for square and rectangular rooms, showing the resulting primary air patterns. Figure 1 shows the shape of airflow from a horizontal throw on one side. It can be seen that “underthrow” could result in greater “drop” with colder air in the centre of the room, whilst “overthrow” could cause air to strike the opposite wall at velocities higher than terminal velocity and then bounce back and down onto the occupants of the room, causing draughts.

The main disadvantage of using long-throw outlets can be the noise level, as high face velocities are necessary. Generally, in large or long rooms, several outlets are preferred to one.

Stratification of air (development of separate layers of warm and cold air) most frequently occurs when heating from ceiling outlets, but can occur during cooling due to badly located return grilles and ducts. When both supply and return outlets are in the ceiling, supply air can “short-circuit” across the ceiling into the return grille without reaching the floor. This is a design problem and difficult to overcome in the field.

Heating can result in stratification of air, with warm air in the upper part of the room and stagnant air at lower levels – see Figure 6 (a). The situation would be worsened if the return grille was higher.

Floor location of registers with vertical discharge – see Figure 6 (b) – results in better warm air distribution and reduced stagnant area, and is the preferred duct position in cold climates.

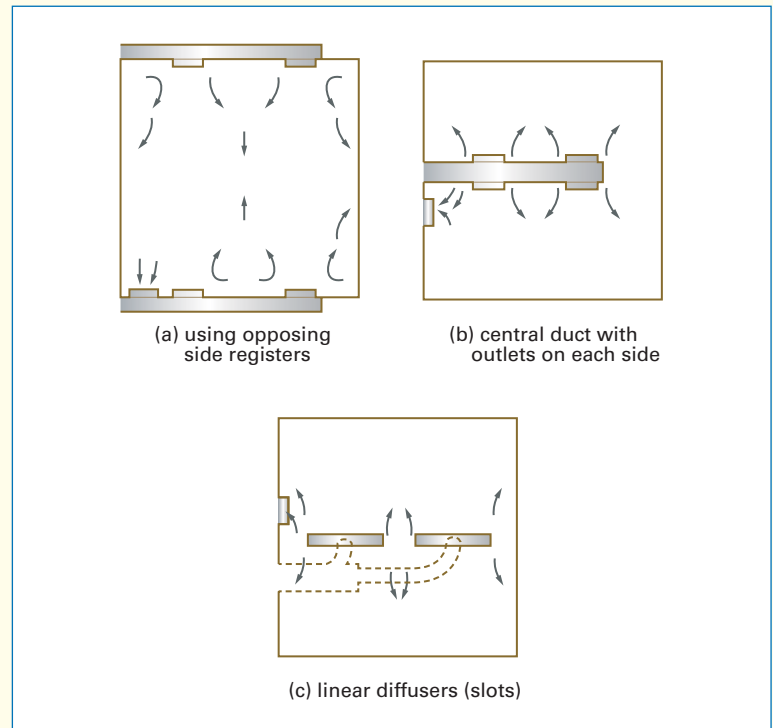


Figure 4 – Alternative outlet systems for large, square rooms

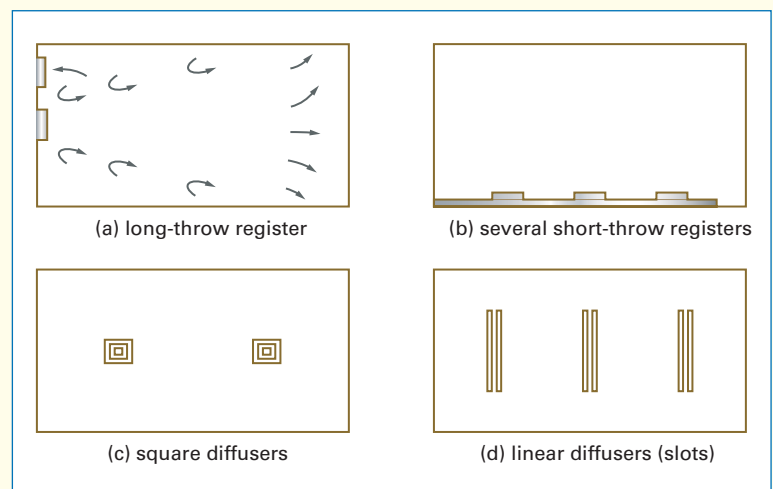


Figure 5 – Alternatives for rectangular room air distribution

Ducts

Ducts are necessary to direct air from one place to another, and air conditioning requires the delivery of conditioned air to wherever it is needed and its return to the conditioner.

In general, air should be conveyed as quietly and economically as possible, given the knowledge that small ducts will be cheaper and use less space than large ducts, but will be noisier and require higher power from the supply fan.

Duct velocities should be within certain limits to ensure adequate supply yet minimise noise. The pressures (static) will be determined by the system (that is, low-, medium- or high-pressure), its resistance and its terminal unit needs.

Basically, all ducts must be:

- **airtight** – to prevent leakage of air
- **rigid** – to withstand the fan pressures – whether low pressure at 0.25 to 0.5kPa or high pressure at 1.5kPa
- **as straight and smooth as possible** – roughness and every change of direction or duct size increases duct resistance and increases the fan power necessary to distribute the air
- **insulated** – to prevent gain or loss of heat to outside air
- **of low noise conductance** – to minimise fan and unit noise in the conditioned space, and to prevent noise from one room being carried to another



- **able to carry all the air needed** – and to distribute proportionally to branches and diffusers
- **fireproof** – and equipped with fire dampers which close automatically to prevent flames from being carried from one room to another.

Ducts may be constructed of many materials – from galvanised iron and aluminium to foil-backed fibreglass and plasterboard. Flexible ducting is extensively used in domestic and other low-pressure applications. It is light, easy to carry and install and, because of its flexibility, doesn't need extensive design and precision manufacture as do most rigid ducts.

In fact, the use of flexible ducting in residential air conditioning has had a major impact in reducing the cost of ducted air conditioning and, therefore, making this type of air conditioning more accessible to the average person. The main criterion for all ducting is the strength necessary to contain the air without risking bursting, collapsing or physical damage at operating pressures. Round ducts are preferred in the case of high-pressure installations because of the inherent strength of the circle. Round spiral duct is often made a visible feature in large open spaces such as supermarkets and, because it is within the conditioned space, doesn't require insulation.

Duct design

If you did not have to worry about friction, a duct could be simply designed using the equation:

$$Q = AV$$

where:

Q = how much air

A = how big the duct needs to be

V = how fast you want to move the air

Simply, if we had to supply 1,000 litres/second ($1m^3/s$) at a velocity of 10m/s, the duct size could be calculated:

$$A = \frac{Q}{V} = \frac{1m^3/s}{10m/s} = 0.1m^2 \text{ area}$$

Duct sizes could be:

- a. **rectangular** – for example, $0.5m \times 0.2m = 0.1m^2$ area

- b. **square** – that is, $0.316m \times 0.316m = 0.1m^2$ area

or

- c. **round** – that is, 0.36m diameter = $0.1m^2$ area

Friction

In all ducts, however, there is a resistance to the free flow of air as a result of factors such as:

- roughness of the duct surface
- bends, tees and/or changes of dimension and area
- dampers, splitters and outlet registers, diffusers or terminal units
- the length of duct sections.

In fact, the same criteria apply to ducting as to refrigerant suction lines, so that on long and complex ducts all friction-producing and pressure-reducing components must be calculated and their effect allowed for.

Methods of duct sizing:

There are three methods used to calculate duct sizes for low-velocity supply air systems:

- velocity reduction
- equal friction
- static regain.

1. Velocity reduction

This procedure requires selection of a starting velocity for the supply air at the fan discharge, with progressive reduction in velocity down the duct run. The duct reductions as air is distributed to the various outlets en route may be selected from duct-sizing tables.

This procedure is suitable only for simple layouts as found in an average shop or house, and requires adjustable air splitters and dampers for air balancing.

2. Equal friction

This involves measuring and then design to equalise the friction which will occur in every part of the duct system. Such a system, if properly designed, should need no extra duct fittings, as balancing should be unnecessary.

3. Static regain

This requires designing the duct size before each branch or terminal so that the static pressure regained as the velocity is reduced precisely offsets the friction loss in the succeeding duct. ■



PULLOUT

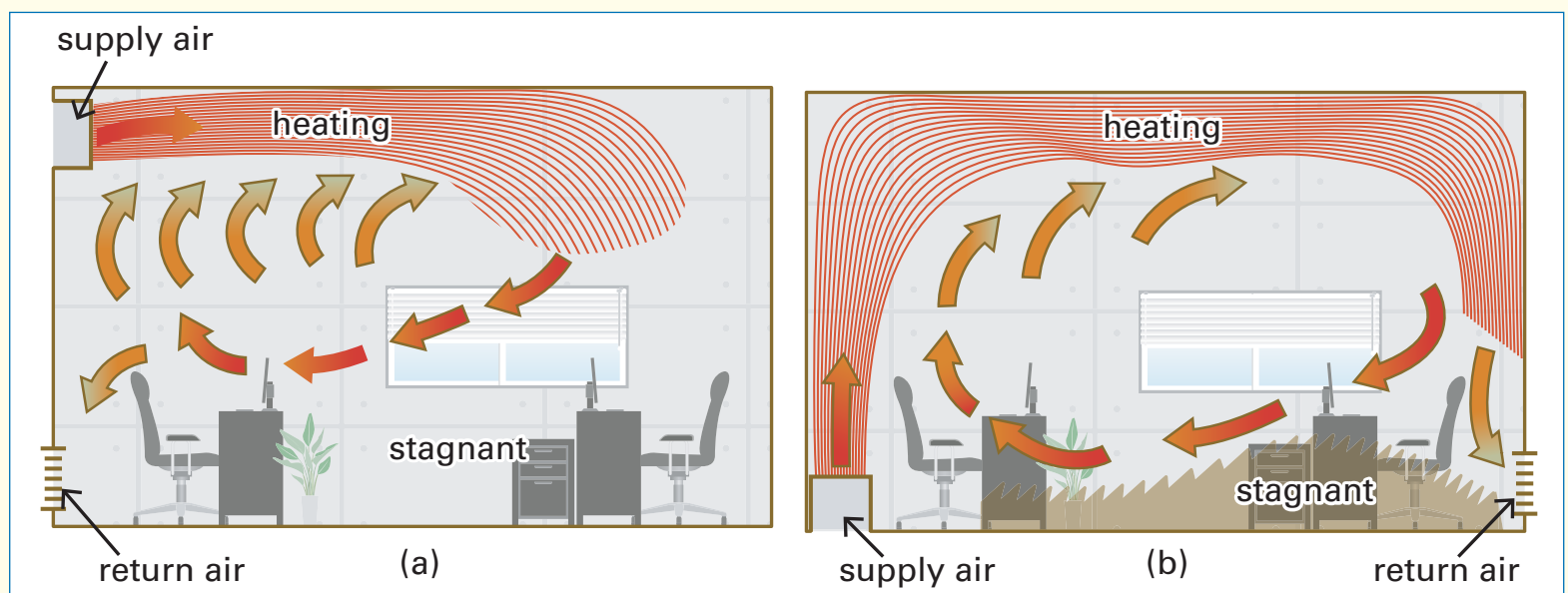


Figure 6



This month's Skills Workshop has been taken from *Australian Refrigeration and Air-conditioning, Volume 2*, authored by Graham Boyle, L.AIRAH.

Next month: Refrigerant discharge lines

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LIFE AT THE COLD FACE

The \$38 billion HVAC&R industry in Australia is expected to grow over the next five years. That's great news for the thousands of HVAC&R companies across the country, but what are some of the big challenges they are facing on the way? Louise Belfield reports.

Small-scale businesses feature prominently in the Australian HVAC&R industry, with air conditioning and heating system maintenance and repair contributing significant revenue.

But with fierce competition, stringent registration and licensing controls, and significant impacts on profits from the pandemic cramping their style, what does the future look like for our small-to-medium businesses?

STAFF SHORTAGES

Mick's Air-Conditioning Services (MAS) in Queensland began as a sole trader family business in 2009.

Starting out as installers, MAS gradually moved into air conditioning and refrigeration repair, "even

including milk vats and supermarkets in our line-up", says business manager Tammy Stagg. The business later took on an apprentice and became a company, while also expanding its range of services to include repairs of domestic appliances.

MAS now installs, repairs, and services domestic equipment, as well as maintaining a small commercial client base. With a team of four – a tradesman, an apprentice and two admin staff – the company keeps up with the latest appliances, tools, diagnostics, and installation techniques.

The business has moved from paper-based to paperless admin and streamlined processes to be more efficient, Stagg says. But the biggest change has been in the transition from repair to replace.

"Finding staff with the capabilities and patience to diagnose is difficult, and finding apprentices who want to excel at diagnostics is probably even harder," she says. "Not only are people looking for a quick, cheap fix, but the costs of parts versus labour are constantly increasing.

"Staffing is definitely our biggest challenge. People want big money and the cost of living is increasing. As a small business, the costs of employing staff are also skyrocketing, but we can't keep putting up our hourly rate to accommodate this as people just can't afford to pay more.

"We've come to the realisation that we need to keep the business small with a select team who excel at what they do and keep trying to do the hard yards



The hardworking team at Mick's Air Conditioning Services (MAS).

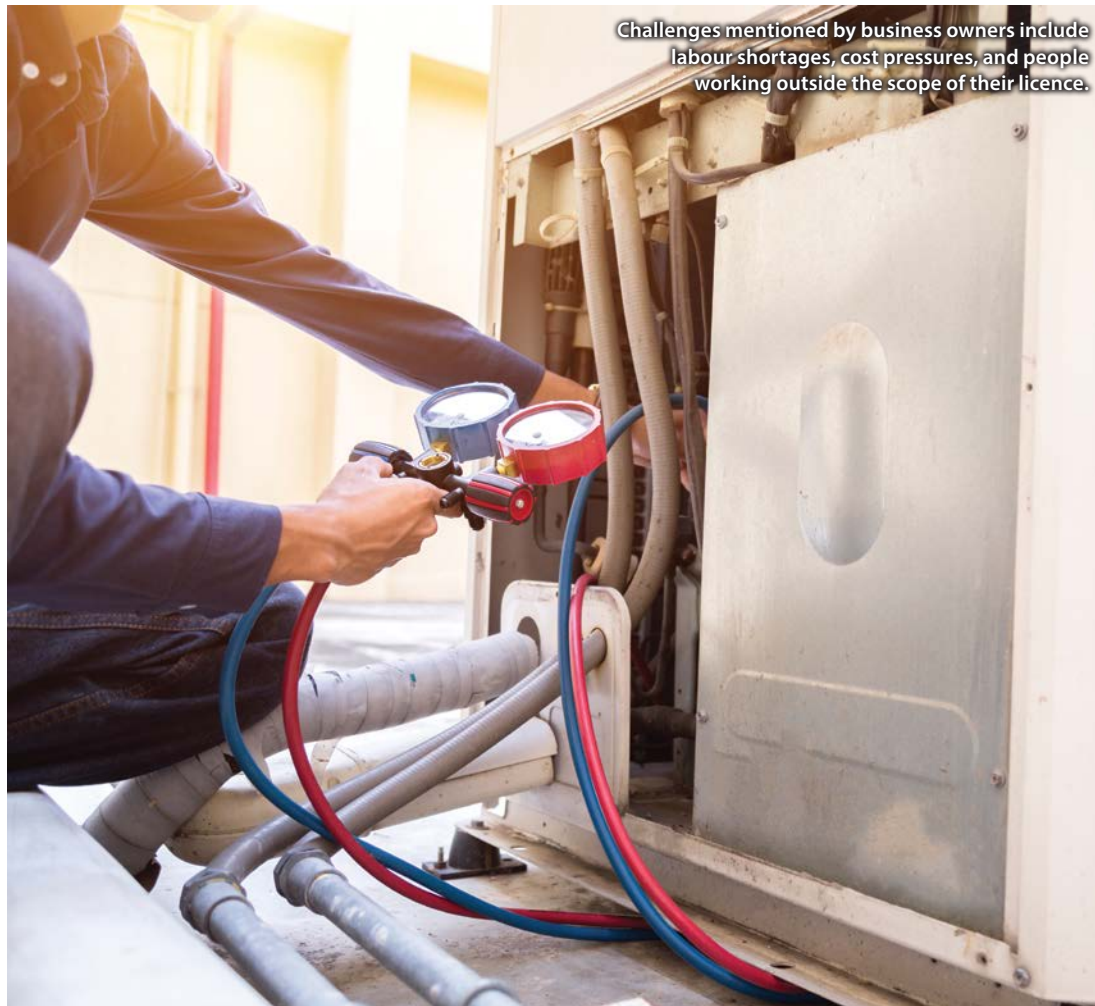
ourselves. The other challenge is the lack of local tradies – it's not easy telling people that we just can't get there or that they will need to wait six weeks."

It's a cry that is echoed by other small-to-medium HVAC&R businesses.

Ben Kuiper, Affil.AIRAH, is the managing director of Superheat in Tasmania, a business he started nine years ago. With a staff of 28 and working out of Hobart and Launceston, Superheat focuses predominantly on commercial HVAC&R and occasional residential work. His staff includes refrigeration mechanics, mechanical plumbers and electricians, and metal fabricators.

Kuiper believes the standard of work these days is a lot better than when he started in the industry, but finding good employees has become much more difficult.

"The whole reason [for starting a business] was that it wasn't easy back then to find work, and I considered myself a reasonable enough employee," he says. "But I look at that now and think if someone came to me today who was in their third or fourth year of their apprenticeship, I'd be happy to have a chat with them. Even if they were a pain in the bum but did great work in great time, I could deal with that. But even that's not out there now."



Challenges mentioned by business owners include labour shortages, cost pressures, and people working outside the scope of their licence.

"If I was to put an ad out for an apprentice tomorrow, I'd get next-to-no response, and any who did respond would not be qualified or suited."

Even those who could be a good fit don't always work out.

"When you whittle that down and interview who's left, then they decide 'nah, I don't think this is for me,'" Kuiper says. "When I was looking for an apprenticeship, I would have taken on any HVAC apprentice work – plumbing, building, electrical – but then you interview someone who seems like a reasonable kid and they decide they don't want it."

SLIPPING STANDARDS

In Kingscliff, NSW it's a similar story. Robert Brown runs Cudgen Air & Refrigeration and specialises in domestic appliance sales and servicing, including air conditioning. Brown has been in the industry since starting his apprenticeship in 1979 and has had several businesses since then. His current business has been operating for 44 years and he's owned it for four. He has three staff.

According to Brown, standards aren't what they used to be.

"[The industry has] become less professional. Opening it up to plumbers and electricians ... is creating a lot of mischief in the industry," Brown says. "For people like me who went through all the apprenticeships and training years ago, that standard is just not there anymore, unless a company is wanting to take it on themselves."

"The TAFE college systems [have] been dumbed down [and] probably don't go into the detail anymore," he adds. "I'm concerned about the level of training; now it's like 'just get them through, pass them!'"

And while he knows major companies do their own training to ensure their staff have the appropriate technical knowledge, "I don't think that a four-year apprenticeship has the same relevance and standards today as it did years ago."

"You're just not going to find people who can work and service big supermarket equipment or multi buildings or chillers. The servicing front line really doesn't have a great deal of knowledge anymore."

Then there are those who do a short course and think they're qualified, Brown says.

"They don't care ... whether it works or doesn't ... they just palm it off and move on to the next disaster. There's not a lot of integrity there."

Brown is also frustrated by the lack of standardisation across the country, with regulations in New South Wales, Victoria, and Queensland all different.

"Surely I should be able to go to Victoria and work my trade without any hassle," he says. "Without government support, and without some sort of forum to table with the industry itself, it's probably not going to go anywhere."

ROGUE TRADERS

Reece Houston is the owner/operator of Darwin-based AusNorth Refrigeration and Air Conditioning. He has been in the industry since 2003, when he completed his apprenticeship in Airlie Beach, Queensland. His familiarity with the industry goes back even further, having grown up around his father's HVAC&R business in Proserpine.

Houston started AusNorth in 2015. The business employs three full-time refrigeration mechanics and two apprentices, as well as three office staff and another three fridges on a subcontractor basis.

And while he says his focus is more on commercial construction projects than his father's service-based business, the biggest change he sees is in the more stringent enforcement of health and safety requirements.

"Darwin is generally behind the rest of the country with these things, so that's really just starting to catch up to us up here," Houston says. "The processes have always been there, but [now] licensing has to be very much up to date, SWIMS up to date, all your risk assessments up to date, for example."

Houston believes that as projects grow bigger and busier, scrutiny is also increasing, leaving no room now for the once traditionally laid-back Top End attitude.

And the demand on equipment is huge, he says.

"The stress the equipment goes under for eight months of the year [because of the intense heat] here is what most other states would only see for one or two days. So in refrigeration ... everything has to be oversized and heavily maintained."



Robert Brown and team believe standards in the trade have fallen.

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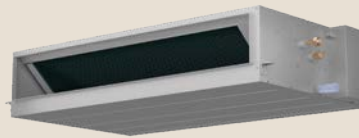
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Cooling & Heating



Our starting wage now for tradesmen is \$10 more an hour now than it was eight years ago

But lack of workers is his biggest challenge.

“Trying to find qualified tradies is a nightmare, which I think goes for just about everyone,” Houston says. “And the cost of staff ... our starting wage now for tradesmen is \$10 more an hour now than it was eight years ago, which is just incredible.

“We’re now paying startup guys more than we were paying supervisors back then. And the charge-out rate that we can charge our customers isn’t keeping up with the payout rate.”

Added to that are the problems caused by people working outside the scope of their licences.

“In Darwin’s high humidity, when you have these guys installing ducted systems in ceiling spaces, not using the correct insulation and pipe work and everything else ... entire buildings have had to be virtually demolished.”

And while it’s an issue from a competitive point of view, it’s a bigger issue for the property owners, Houston says. It also harms the industry’s reputation.

“When unknowing property owners go through the phonebook and ring, say, ‘Jonno’s air conditioning’

they’re under the assumption that they are a qualified and experienced company, but unfortunately that’s just not the case anymore. It’s a major issue and we don’t really know how to address it.

“The ordinary consumer... doesn’t know that they’re not getting a fully qualified technician.”

Houston cites a case where a company without Certificate III-qualified technicians had installed air conditioners into a two-storey house with a subfloor supported by timber joists. The resulting condensation issues were so bad that the whole top storey had to be removed and rebuilt: an \$800,000 rebuild because of badly installed split systems.

So, with staffing issues, operating costs, and qualifications on everyone’s mind, what’s the solution?

EDUCATION, EDUCATION, EDUCATION

Tammy Stagg at MAS says it comes back to education at both a school and consumer level.

“Students need to be made aware that there really is a trade called refrigeration and air conditioning mechanic and that it has nothing to do with being an electrician,” Stagg says.

“Consumers often assume they need an electrician, when in fact a refrigeration mechanic would be more suitable to look at their refrigeration or air conditioning system. Many people aren’t even aware that the trade exists, so it doesn’t open the door to future generations to pursue as a career.

The majority will go down the electrical avenue or be mechanics, plumbers and boilermakers [because those are] the trades everyone knows.”

Ben Kuiper at Superheat says there are only two solutions: have less work or have more employees. “And the only way to get more employees short of importing them is to teach them,” he says. “But if they don’t really want to work, how are you meant to do that?”

“Somehow we have to change the attitude of kids who are the future of our industry.”

For Robert Brown, it needs to go much further.

“We need to have a level playing field,” he says. “An electrician and a plumber now can go and get a license to do something that 20 or 30 years ago you had to have a trade to do. But we can’t go and do secondary electrical work, I can’t do secondary plumbing work. So why can’t I do that? What about crossed trade fairness with everybody? I know how to do electrical, I’m a B-grade electrician standard. So why can’t I go and wire up my own air conditioner? [We need to be] able to compete on equal terms.

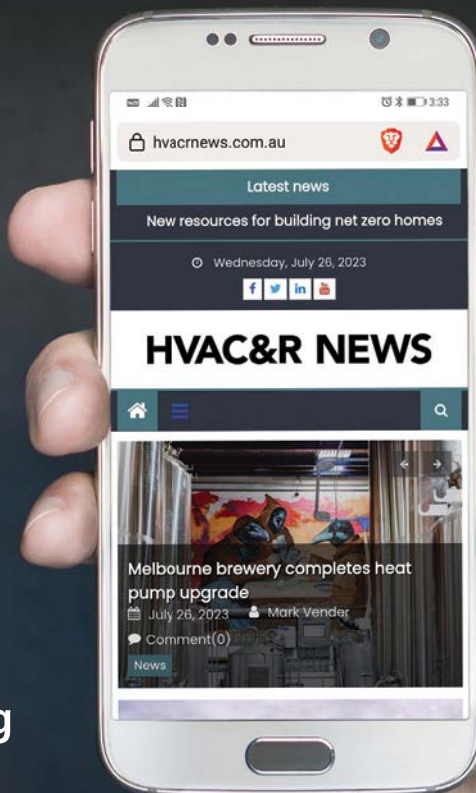
“If we could do our own electrical work, we might be able to compete on price. And consumers would actually get people trained in the field.”

Meanwhile, in Darwin, Reece Houston says he recently hired a young school leaver who approached him for a few days a week of labouring. With no skills or experience, “his minimum wage is \$29 an hour”.

“I have a 16-year-old casual labourer now earning \$1,000 a week who has never had a job before,” says Houston, “and I’ve had to cut him right back to next

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to nothing, because I can't afford to be paying a 16-year-old \$30 an hour to sweep floors and pass tools."

It's a massive issue, Houston says, and applies to other trades as well.

"There needs to be a change in the award for a junior construction labourer. It makes it more equitable for employees, but also much easier for the employer.

"I'm not a penny pincher and I pay all my staff truly above the award, but for a school leaver who doesn't even have a driver's licence, who we have to pick up and drop off ... there has to be some sort of give in those cases."

On the upside, the outlook is good for AusNorth, says Houston. While staff remains his biggest pain point, the company has just signed a contract on a new shed and is getting consistent work.

"We're lucky in Darwin that we have industries that won't disappear. It does go up and down here, but the down is never really that down."

In Tasmania, Ben Kuiper would like to grow his business. But there's no point growing if you can't find employees.

"You just grow bad," he says. "Big is not necessarily better. I enjoy seeing apprentices doing good work and becoming better at what they're doing. I'd hate to lose that if we were to grow bigger – the enjoyment and the kicks that I get out of it – it's not all about money for me.

"I can get the work to grow, but I can't get the employees to do it. I could grow by about 5–10 per cent per year based on the workers I can

get now, whereas the work would allow me to grow it at 20–25 per cent if I could get the staff."

Robert Brown agrees that the outlook is bleak when it comes to skills. "We're always going to need refrigeration, but people are learning to manufacture equipment to take a lot of that sort of skill out. I worked for [a global HVAC company] as their national technical manager for seven years and I've seen both sides of the coin. They're just creating systems to make it easier to diagnose, and they don't care who they sell to and they don't care who installs it, as long as they get sales."

“

I can get the work to grow, but I can't get the employees to do it

He sees the integrity of businesses going the way of skills, "because anyone can go and install an air conditioner and anyone can go and buy one".

For MAS, trying to stay ahead is frustrating, to say the least.

"We've revisited our business plan many times over the years and just when we think we've got it right, we get thrown a curve ball and change it all again," says Stagg.

"Our plan is to keep on going and just take it as it comes, to keep up with the ever-changing technology and strive to be the best we can be, offering the service that our clients have known us for." ■

LOOKING FOR LABOUR

Many small- and medium-sized businesses we spoke to for this feature reported difficulties finding workers. The skills shortage has been affecting the HVAC&R industry for decades, and HVAC&R News has delved into the issue in previous stories.

Check out our "Hard market" feature from the June/July 2022 edition for

more views on the problem, and how we might solve it.



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Hacia Atherton refuses to believe that women can't thrive in trades, just as she refused to accept that she would never walk again.

Hacia Atherton is no stranger to conquering seemingly insurmountable odds. While training to represent Australia as a dressage rider, she was thrown off her horse, which then collapsed on top of her. The 600kg impact shattered her pelvis, fractured her hip and several other bones, and caused severe damage to her nerves.

Doctors told her she'd never walk again. Six months later, she was discharged from hospital on her own two feet. A few years after that, she ran a half-marathon.

While her injuries have put an end to her horse-riding career, Atherton now devotes her incredible determination to a different challenge: supporting and training female tradies. The latest in a long line of Athertons to work in skilled trades – her great-great-grandfather Fred was a founding member of the Master Plumbers Association in 1891 – Hacia is, nevertheless, the first woman in her family to go down this path.

Quickly realising that there were numerous educational, practical, and societal barriers stopping women from entering trades, Atherton decided to do something about it. She founded Empowered Women in Trades (EWIT), an organisation that raises awareness about career opportunities in trades for women and non-binary people and helps them take those first steps into the industry.

Atherton took the time to talk with HVAC&R News about EWIT and the future of trade careers in Australia.

Why did you start EWIT?

Going into the industry, I thought that because I'm a woman, I couldn't be a plumber or a welder. I just kept hearing that we have no idea how to even get into these jobs, so I started reaching out to some of the local schools to see if they would be interested in bringing students to the family factory and having a look at trades. When the career counsellors didn't

even know what some common trades do, I thought, "Wow, this problem is a lot bigger than private girls schools not putting trades in front of their students; it's a deeper-rooted issue in our education system."

I started EWIT to really turn that around and give women access to come and explore the world of trades in either a one-day program called a tool skills day, or a program of up to three weeks. We also go to schools, so female students get to do some work like making planter boxes, painting them, and just getting their hands on the tools. They can start understanding their career pathways out there through apprenticeships and traineeships, and if they're active and they like being outside, there is a world of opportunity for them.

We bring a lot of positive psychology into everything we do. We want to overcome that self-doubt that tells you that you can't go into a manufacturing facility or a construction site because you're a woman.



EWIT introduces women and non-binary students to many different trades – HVAC&R businesses are invited to get involved.

How long has EWIT been running, and what have the results been like?

We're finishing off our second year of doing these programs. The first year we got 500 female and non-binary participants through our program. About 70 per cent of the adult students converted into employment in the industry.

In the schools it's obviously a different mechanism; a lot of them are in Year 7 and 8, but for example we did a program recently and four female students have enrolled in either a school-based apprenticeship or a VET, so we've had really good conversions. By the time we finish this calendar year, we would have seen close to 1,000 women and non-binary people through our program.

People decide to get into certain jobs for all kinds of reasons, like good pay, secure work, or being part of a more sustainable future. In your experience, what are the factors that attract women to a career in trades?

With the female demographic, pay is actually not something that they really ask about much. Women and non-binary people seem a lot more attracted to trades because they see it as contributing to society. They can go out there, work hard, step back and say they were a part of building that building or putting in that infrastructure.

They see a lot more legacy in their working trades, as well as the ability to do philanthropic work. A lot of women say things like: "I can't wait to be a qualified plumber so I can go to Cambodia and get fresh, clean, safe water to a remote community," which is incredible.

A lot of women also see the ability to have flexibility in trades. When they come to our EWIT programs and see examples of working mums who run their own trade businesses, they realise that they can have their own business. They can work around childcare commitments. They can earn a good wage. And they can travel the world with a job that will always be in demand.

Given that we're going to need a lot more tradies in the near future, do you think there is a role for governments and larger institutions to encourage kids to think about trades more?

Yes, the government needs to invest some money into resources in this space. The Department of Education has a big role to play in producing some kind of resource that supports schools and parents to understand and be able to have those conversations.

It would be great to have a database for students, parents, and career counsellors to access, so that if the student is showing that they're interested in trades, they can use a questionnaire or some other resource to work out what trades interest them.

We also need to provide the resources for students, parents, and career counsellors to understand what that role looks like. Parents aren't going to encourage their kids to go into a career in refrigeration, for example, if they have no idea what that actually means.

If you're speaking in schools about trade, they all suggest that their students go for general plumbing, electrical, or carpentry, and that's about as far as the career counsellors go, because they don't have that deeper knowledge. Many schools don't even understand the process of how to get an apprenticeship.



EWIT focuses on positive psychology, so that women and non-binary people feel confident on the worksite.

What can people who are already in the industry to do make trades stronger, more diverse, and more inclusive for women and non-binary people?

Start having those conversations with diverse people in your world. Whether that is talking to your niece or a friend's daughter, start talking about the opportunities that are there, because it's important for women to see men as wanting them in the industry.

If you're a tradie, invite your kids to come and have a ride around with you for a day, or get them on site if you can. Even at home, just do some activities to bring trades into the lives of the women and kids in your world.

A lot of women think men won't hire them or will treat them badly, harass or bully them on site. The more females can see males in the industry speaking up and saying that they want to see diversity, the better. If they saw that men would actively step in and stand up for them, women would know that they'd be safe and protected in the industry.

What do you think the future holds for Australian women in trades?

It's ambitious but realistic: I would love to have 30 per cent female representation in trades by 2030, not 3 per cent. A lot of women in their early 20s have done one or two years at uni and are just not interested anymore. That's a big cohort coming into our program, so I'm very hopeful and very confident we'll see a societal shift with the industry becoming a lot more welcoming to women.

We've got employers who actively reach out and say they want to take on a female apprentice. That mindset has changed in the past couple of years – it used to be really hard to find an employer who would take on a female. Now I would say there's more demand in the market than supply of females. That's great, because we've got a database of people who are actively seeking females, so we can connect them to women who are seeking employment. ■

GET INVOLVED

EWIT has a range of programs through which employers can help increase gender diversity in their organisation and in the industry. For more information visit ewitrades.com



1 ROLL OUT THE RED CARPET!

At the time of going to print, AIRAH was gearing up for the Australian HVAC&R industry's night of nights: the AIRAH Awards, on November 30 at the Sofitel Hotel in Darling Harbour Sydney.

The black tie gala sees winners announced in 10 categories. The recipient of the James Harrison Medal – AIRAH's highest honour – is also revealed.

Finalists are chosen by a panel of expert industry judges through a rigorous and impartial process, making the AIRAH Awards the most highly prized accolades in Australia's HVAC&R industry. Award categories celebrate technical excellence, as well as pioneering work in sustainability, and individuals and teams who are raising the bar in the Australian industry.

By the time you read this, the winners will be published on the AIRAH Awards website. Check them out, and if you work with any of them, be sure to give them a pat on the back!

Go to www.airah.org.au/awards ■

2 LOGIC WINS OUT

Cold Logic has been awarded a multi-million-dollar contract to construct and install cold and cool rooms for the first batch of three Hunter class frigates.

The Adelaide-based refrigeration specialist will partner with UK company Ernest West & Beynon (EWB), leveraging EWB's experience in supplying into the Type 26 program, the reference design for the Hunter class frigates. The vessels are being built at Osborne Naval Shipyard in South Australia.

The contract covers the construction of a refrigerated storeroom, including a cold room, cool room, refrigerated airlock and dairy room, and refrigeration machinery.

Defence and security company BAE Systems Australia is working closely with the federal government to maximise Australian content on the Hunter Class Frigate Program.

Go to www.coldlogic.com.au ■

3 GET PUMPED!

The Department of Climate Change, Energy, the Environment and Water (DCCEEW) has released a report from the Expert Group that analyses how increased heat pump deployment in Australia could impact our goals to phase down HFC refrigerants. The report finds that although heat pump use will rise significantly, the HFC phase-down won't be affected.

The surge in heat pump sales – expected to continue until at least the mid-2030s – had raised concerns that the refrigerant bank could grow significantly and jeopardise Australia's commitment under the Kigali Amendment to reduce the use of HFCs by 85 per cent by 2036.

The report estimates that the additional HFC usage from the surge in heat pumps will add up to 0.071 million tonnes of CO_{2e}, equating to around 4.4 per cent of the Montreal Protocol limit of 1.622 million tonnes of CO_{2e} in 2036. This relatively small increase is unlikely to cause major issues with the phase-down plan; much of the equipment is in sealed systems that have low servicing requirements and low leak rates, with the largest emission risk coming at end of life.

The full report is available at www.dcceew.gov.au ■

4 TESTING, TESTING ...

Rinnai has received NATA accreditation for its new Yukawa laboratory located at the company's Melbourne manufacturing facility.

The twin-room, 120kW, dual-chamber enthalpy test laboratory is the largest in Victoria and the second largest in Australia. It will provide testing services to the general market including:

- Ducted split/package air conditioners for MEPS capacities, performance and seasonal star rating
- Geo-thermal/water-cooled air conditioners/chillers

- Heat pump water heater units for performance rating
- Evaporative air conditioners
- Solar collectors
- Gas/electric hot water storage tanks for heat loss MEPS
- Gas ducted space heaters for MEPS capacities performance.

The name Yukawa is derived from Professor Hideki Yukawa, who was a Japanese theoretical physicist and the first Japanese Nobel laureate for his prediction of the pi meson or pion.

Go to yukawalab.com.au for more information. ■

5 NEW LEADERSHIP AT ARBS

On October 30, ARBS named Amanda Searle as its new CEO. With more than 25 years of experience in marketing, communications, and events, Searle is poised to lead ARBS into its next phase.

"Taking the lead at ARBS is both an honour and responsibility," Searle says. "I'm looking forward to contributing to ARBS' growth, highlighting industry innovations both locally and globally."

ARBS Chair Professor Tony Arnel says Searle, whose career includes a substantial tenure at AMCA Australia, brings considerable experience to the ARBS role.

"Amanda brings a wealth of expertise that aligns seamlessly with our vision," Arnel says. "Her leadership qualities and forward-thinking approach promise an exciting and progressive future for ARBS."

ARBS Exhibition Organiser Sue Falcke is stepping down after 23 years in the role. Falcke's accomplishments include significantly increasing attendee figures and launching flagship initiatives such as the ARBS Industry Awards and ARBS Seminar Program.

Falcke's association with ARBS began in 2000, two years after its inaugural show in 1998. ■



Meighan Heard (Mitsubishi Electric) and Colin Heath (Diamond partner)



6 A FIRST IN FIRE SAFETY

FPA Australia has received formal approval from the NSW Department of Customer Service for a Certificate III pathway for the four mechanical fire safety assessment measures, encompassing fire dampers, smoke dampers, smoke and heat vents, and mechanical air handling.

The Certificate III pathway requires the applicant to hold any Certificate III level qualifications or higher in the fields of engineering, construction, plumbing, electrical, fire safety or air conditioning, plus a number of specified units of competency including UEERA0098 – *Inspect, test and repair fire and smoke control features of mechanical services systems*.

This represents a breakthrough for the fire safety industry in NSW. Previously, a diploma qualification was required in order to obtain certification for performing mechanical fire safety assessment – something many practitioners did not have.

Superior Training Centre can deliver the UEERA0098 unit individually online – contact info@stc.nsw.edu.au

The remaining units can be delivered by FPA Australia – fpas@fpaa.com.au – or practitioners can visit training.gov.au to find a list of RTOs that can deliver each required unit. ■

7 MITSUBISHI DRIVES INTEGRATION

Mitsubishi Electric Australia has launched a system integrator program designed to support automation integrators by offering tools and resources to help build their business.

The program will offer access to benefits such as pre-project assistance, technical support, health checks, a partner portal, a newsletter, and a technical library, as well as sales and product training. System integrators will be able to purchase a range of products through their choice of Diamond Distributors or other authorised Mitsubishi Electric Australia resellers. Program participants will be listed on the Mitsubishi Electric website and have access to a partner logo.

The program will have four levels: Registered, Professional, Gold, and Diamond. The availability

and extent of the benefits will vary depending on the membership level of each system integrator.

Mitsubishi Electric has also announced Colin Heath (pictured) of A.I Automation as the first Diamond Systems Integrator of the new program.

Go to www.mitsubishielectric.com.au ■

8 GOOD SHEPHERD

Stiebel Eltron Australia, a provider of all-electric hot water, heating, and ventilation solutions, has appointed Nick Shepherd as its new general manager.

Shepherd has more than 20 years of experience in sales, marketing, and product development.

Stiebel Eltron says the appointment coincides with a period of rapid expansion as Australia embraces electrification. The company says it remains steadfast in its commitment to delivering products and services that empower customers to achieve their energy-efficiency and sustainability objectives.

“Stiebel Eltron is renowned as a premium brand, and I am inspired by its unwavering commitment to delivering sustainable, all-electric heating solutions,” says Shepherd. “It’s a privilege to be part of an organisation dedicated to shaping the future of energy efficiency and sustainability.”

Go to www.stiebel-eltron.com.au ■

9 RMIT ANNOUNCES TRADES CENTRE

RMIT has launched a new trades innovation centre designed to cater to an increased need for tradespeople caused by population growth and infrastructure expansion along Melbourne’s northern corridor.

With projections suggesting that Victoria will need around 500 more refrigeration mechanics – as well as 4,000 electricians and 2,400 plumbers – by 2025, RMIT says the centre will help it meet forecasted demand over the next three to five years, in line with the Victorian Government Skills Plan and Clean Economy Workforce Skills requirements.

Located at RMIT’s Bundoora East campus, the technology-backed facility will give students access to sector-leading equipment and teaching practices, simulations, and programs that integrate job-ready and future-ready industry skills. Industry will also be able to use the facility for testing and education purposes.

RMIT consulted representatives of the Wurundjeri Woi-wurrung Cultural Heritage Aboriginal Corporation during the construction of the 1,700m² centre, which will have an indigenous name: Murmuk-nganjin marnang, meaning “We work hands”. ■

10 SEEKING NET ZERO HEROES

The Clean Energy Council and the Energy Efficiency Council have launched the Careers for Net Zero campaign, designed to help fill Australia’s skills gap and encourage job seekers to pursue a clean economy career.

According to the campaign’s organisers, at least two million new jobs are required to meet net zero by 2050, and 200,000 new roles are needed to reach Australia’s 2030 target of 43 per cent lower emissions.

The campaign includes a clean economy career explorer tool on the Careers for Net Zero website. The online platform will aggregate the growing list of careers needed to help Australia achieve net zero. It will feature the most in-demand positions and will map educational pathways to get there for students, graduates, and experienced workers.

Alongside the campaign, a coalition of leading industry, education and training, and civil society organisations has called for government to take real action to secure our emissions reduction and workforce goals.

According to the campaign organisers, it is estimated the transition will create 14 million new clean energy jobs by 2030, while another 16 million workers will need to move into new roles in renewables, energy efficiency and electrification. Around 60 per cent of these roles will require post-secondary training.

Go to www.careersfornetzero.org.au ■

COOL UNDER PRESSURE

South Australia's top technicians took centre stage at a recent awards night. We catch up with the winner of the Apprentice of the Year gong.

When Ezekiel Papadopoulos first signed up as a labourer with Wilson Refrigeration & Air Conditioning, he thought he'd be moving fridges, not fixing them.

A few years later, Papadopoulos was named the Kirby Apprentice of the Year at the SA Apprentice Awards, hosted on October 10 by AIRAH and TAFE SA. AIRAH SA Committee President Dr Michael Riese, M.AIRAH, was the MC of the event.

More than 50 people attended the awards night, where other winners included Jake Sparrow of MG Group (Encouragement Award, sponsored by Air Con Serve) and William Hebbard from Bromson Energy (Airefrig Scholarship Award).

A HAPPY ACCIDENT

For the ever-modest Papadopoulos, who describes himself as "definitely not the smartest fridge who's been at TAFE," the award is recognition of a burgeoning

career that was surely written in the stars, even if it wasn't what he thought he was signing up for.

"I was interested in chemistry and maths, but I wasn't really interested in sitting in an office, so I dropped out of some of my classes and picked up some labouring work with Wilson," Papadopoulos says of his introduction to the industry while he was still in high school. "At the time I didn't even realise what a refrigeration mechanic was – when I called up the business, I thought we were just movers of fridges.

"Once I started working for them, I realised there was a bit of chemistry and maths integrated into it. I got offered an apprenticeship on the day I left school, so I thought I'd sign up and do it."

This willingness to accept opportunities as they come, and to learn by doing, has held Papadopoulos in good stead as he works through the final year of his apprenticeship and prepares for his capstone exam.

CURIOSITY IS KEY

The three key criteria for the Apprentice of the Year award are hard work, dedication, and a keen interest in learning about HVAC&R. Papadopoulos demonstrated all three, but he feels that it was his curiosity rather than his talent that put him on the judges' radar.

"I didn't even expect to be nominated, honestly," he says. "If I were to put it down to anything, it's probably that I asked a lot of questions in the classroom, so I would've been a predominant voice.

"I think there's a big disparity between being academically gifted and actually being capable

of critical and logical thinking while you're out in the field," he adds. "You can definitely have all the know-how but not be able to fault-check a system or install a system correctly."

Papadopoulos feels that his own technical skills are more the result of hard work than natural talent. He credits his improvement to "being thrown in at the deep end" in a small business where it's just him and his boss running the show.

"I don't think I was very mechanically skilled myself, but I had a good opportunity [to learn on the job] with my boss."

A COOL HEAD

As a young technician, Papadopoulos has found that communicating about complex problems in fridge lingo over the phone can be challenging. Then there's the stress of doing major jobs singlehandedly.

"If I'm on my own and doing a freezer install or something that's fairly critical ... that's the time when I might feel a bit of stress, because obviously the pressure is on me to get everything right," Papadopoulos says.

Juggling all these responsibilities is a challenge, but it's one that SA's Apprentice of the Year is more than happy to face for the sake of his clients.

"There's a bit of pressure on you, but you fix it and then you've solved someone else's problem for them, which feels pretty good." ■



Ezekiel Papadopoulos (right) with Justin Strange from sponsor Kirby HVAC&R.

AWARD NOMINEES

Marley Butler-Chaseling
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Matt Collins
Below Zero

Klaus Duthler
Glow Heating & Cooling

William Hebbard
Bromson Energy

Augustus Livingstone
Rural Electrical Airconditioning
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Name: Arthur Pelecanos

Company: Cleanrooms WA

Occupation: Cleanroom design consultant.

What's the best thing about working in HVAC&R?

The challenges that stretch your knowledge and resolve. There so many facets within the industry that one can, if they so choose, specialise in a particular area. There's also the long-term friends you make, be they work colleagues or clients.

How long have you worked in the industry?
57-plus years.

What is the biggest thing that has changed about the industry since you started working in it?

The Montreal Protocol and the Paris Agreement compliance.

If someone wanted to find you on a worksite, they should look for the person who is ...
Doing things differently.

Favourite tool: Anything cordless.

Best on-the-job advice you ever received:
To grow, always volunteer for anything you have not tried before.

What's the happiest a client has been with your work?

The Therapeutic Goods Administration (TGA) considered bypassing an audit when they were advised that we designed and built a particular cleanroom facility.

Dream car: Mustang.

Dream holiday: Trek to Base Camp Mount Everest.

Favourite smoko snack:
Kebab.

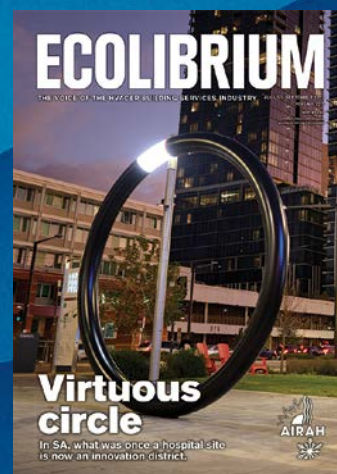
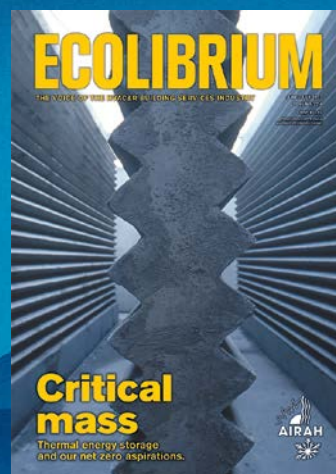
What did you listen to on the way to work today?
Pre-recorded music/artists on a USB linked to the car audio.

Sporting hero: Australian cricketer Alan Davidson.

When I'm not working I'm ... Gardening, being with the grandkids, car rally officiating (SOS), camping, telescope star gazing, contemplating the universe.



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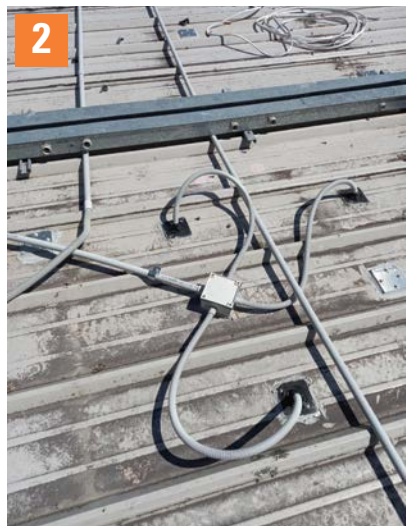
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1 THE ONLY WAY IS UP

Braydon rocked up to a site in Hawthorndene, SA, to find the customer had left him the outdoor unit like this.

Steve says: *I can see the dilemma the homeowner was faced with: "If I stand it upright on the wheelie bin there is a high risk of it falling over and crashing to the concrete. Best if I lay it over on its side". For those who are not aware, the lubricating oil normally sitting in the sump of the compressor can drain into other parts of the pipework.*

2 CORI OCTOPUS

"The more you look, the worse it gets," says Stephen.

Steve says: *It is most satisfying to see examples of quality workmanship. A pity this isn't one of them! Although somewhat "unprofessional" in my opinion, the use of corrugated conduit is acceptable according to the electrical installation standard (AS/NZS 3000), but I doubt that the Dektite manufacturer would be impressed.*

3 PRE-LOVED PARTS

Steven was called out to service this unit with an unusual mod. "Owner said he didn't want to pay \$800 for the fan so he found an evap cooler fan on roadside collection and knocked this up," says Steven, "complete with waterproof relay box to house capacitor and powered by an extension cord. "The compressor is now burnt out."

Steve says: *A suitable example of the oft-repeated phrase: "A little bit of knowledge can be a dangerous thing"! I do, however, appreciate the finer points of the conversion. The neatly trimmed timber support and bespoke straps are stand-outs.*

4 TX FOR THE MEMORIES

While servicing a coldroom in Townsville, Jeff checked the Tx valve operation and found this.

"I had to look a couple of times," he says. "The room was down to 1°C but not loaded."

Steve says: *This is a gem. The only saving grace being the fact that the valve is externally equalised, so the opening and closing forces on the needle would be OK, but the incorrect forces over the orifice and needle would impede its ability to function as designed when a load is applied.*

5 NO FAULT-FINDING REQUIRED

Bruce drove 200km for a warranty job to find the installer had forgotten an important step.

Steve says: *Brings to mind my early TAFE days as an apprentice when we were told of this new technology that would dramatically change the trade. "Just connect the power and turn it on." Well, fast-forward some 45 years, and thermocouples have not taken over as forecast. Clearly, this installer hasn't been informed.*

Additional comments and observations provided by Steve Smith, Education Relationship Manager at Superior Training Centre. Please note that the comments are provided on the basis of the photos only and should be read with this in mind – not all issues or solutions are apparent from a 2D image.



HAVE YOU COME ACROSS SOMETHING SCARY, UGLY OR JUST PLAIN FUNNY?
 If your entry is deemed the winner, a 700ml bottle of Jim Beam will be on its way to your door. Please include a postal address with your entry. Entrants must be 18 or over. Send your hi-res (>500KB) photos to Editor, Mark Vender at mark.vender@airah.org.au



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