HVAC&R NEWS

AIRAH | INDUSTRY JOURNAL

SUMMER 2025–26 | ISSUE 167

Keeping it local

Why HVAC&R companies are manufacturing in Australia

Fighting the hidden killer

The dangers of mould in HVAC&R

Top of the class

All the winners from AIRAH's 2025 State Awards

Skills workshop

Cleaning commercial kitchen exhaust systems

AIRAH

PRINT POST APPROVAL NUMBER PP 727272/60606

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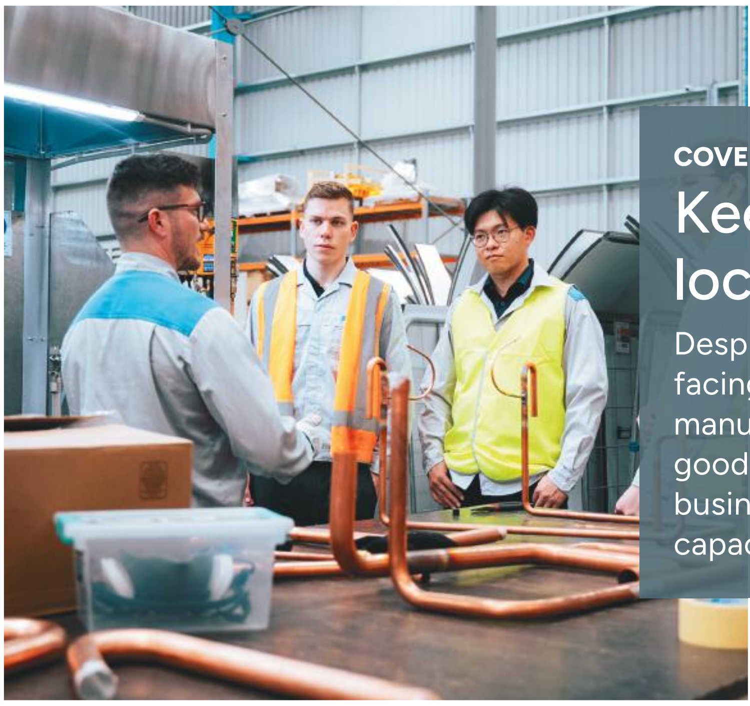
Summer 2025–26
ISSUE 167



Regular articles

Cover image courtesy of Daikin Australia

AIRAH

HVAC&R News is published by the Australian Institute of Refrigeration, Air Conditioning and Heating (Inc).

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ISSN 1834-9522

The value of recognition

Every Sunday during summer, I whittle away six hours of my finite free time playing cricket. Whenever the sun is scorching, the rain is pouring, or the scoreboard is looking hostile, my teammates and I often question the life choices that have led us to this moment. We can rarely justify why we come back each weekend.

For the most part, our cricketing feats are pretty standard for fourth-grade cricket. Quite often, they're hilariously bad – so much so that we film our games more for the bloopers than for the highlights. Very occasionally, we do something that's actually worth writing home about.

But our bad jokes, pot bellies and poor techniques belie the seriousness with which we take these Sunday matches. In the heat of the moment, every perfectly timed cover drive feels like a glorious achievement. Every dropped catch is a shameful failure. Victory is intoxicating, defeat sobering.

What happens out on that field really shouldn't matter. But it does, to us.

That's why, every season, we have an awards ceremony for the best players of the season. In theory, it's a light-hearted get together at the pub with a few cheap trophies up for grabs – a bit of fun with mates. But deep down, every player wants to be recognised for their efforts and their achievements throughout the year.

Why? Because even if the rest of the world couldn't care less about a fourth-grade cricket league, the people we value – our teammates, family and friends – understand what it means to us.

I don't think there's an objective measure of what is meaningful. When we put part of ourselves into our work – or our hobbies – we imbue them with our own meaning. That's why we love it when our efforts are recognised.

I had this realisation when attending AIRAH's 2025 VIC Member and Apprentice Awards in October; you can read about this and our other state awards from p22–24. While the wider community might not understand why this recognition matters, people in the industry sure do.

For me, the most heartwarming moment of the Victorian event was seeing William Lane, F.AIRAH, receive his Community Building Award. From my first day at the Institute, William has welcomed me warmly and been a source of guidance and encouragement.

He has written several articles for our publications and delivered an excellent presentation at this year's IAQ25 conference. And, in a break from our regular format, William has provided all six of the images – and explanations – for "the lighter side" in this issue of *HVAC&R News*.

William's reaction to winning his award was one of the most wholesome things I've ever seen; he was beaming for the rest of the evening. It was clear that, in a long career as one of HVAC&R's many unsung heroes, being recognised by his peers meant the world.

There's plenty of meaningful work in this issue: an in-depth look at the dangers of mould in HVAC systems, a peek inside Australia's newest HVAC&R manufacturing facility, and a different way of thinking about the vapour compression cycle. Our skills workshop guides technicians through best practice for cleaning commercial kitchen exhaust systems.

Whatever this time of year means to you, I wish you a safe and enjoyable holiday season surrounded by those who mean the most.

Nick Johns-Wickberg
EDITOR
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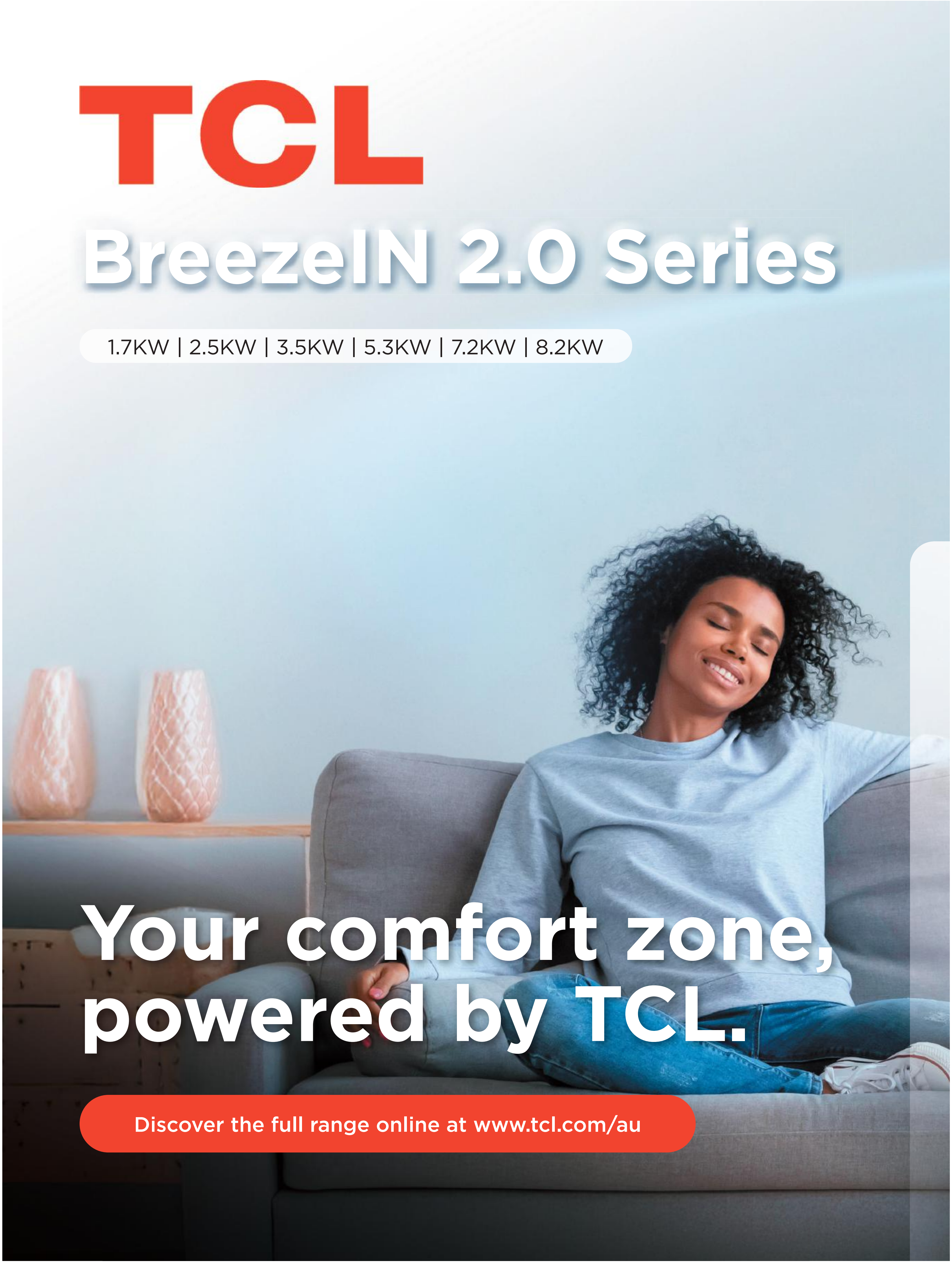
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Dust busted

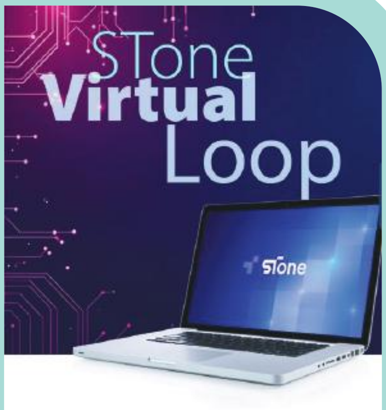
Camfil Australia has released its Gold Series III dust collector, which it says is "engineered for unmatched dust and fume control".

According to Camfil, the new product offers the following benefits:

- High dust-processing capacity with low pressure drop in a compact footprint.
- Advanced baffle system that improves particle distribution and protects filters
- Reduced maintenance, longer filter life, fewer change-outs, and less downtime
- Lasting performance with reduced total cost of ownership
- Reduced risks in industrial environments, with the flexibility to be customised for specific applications
- Over 25 years of success controlling hazardous and heavy dust loads.

camfil.com

In the loop



Carel has launched STone Virtual Loop, a digital tool that allows developers to test and validate HVAC&R software in a virtual environment.

According to Carel, the platform uses virtual models of real thermodynamic units to simulate system performance and interactions. This approach allows development teams to examine system behaviour in a controlled digital environment, helping reduce time and resource requirements while improving code stability and verification processes.

Carel says that, by applying digital twin principles, STone Virtual Loop offers a practical tool for development, validation and ongoing maintenance work.

carel.com

Daikin ducted range

Daikin Australia has introduced its new 18 & 20kW R32 Premium Inverter Ducted Systems (FDYA180AV1 & FDYA200AV1).

The units operate on R32 refrigerant, have greater seasonal energy performance than previous models, come with compact side discharge outdoor units, and can be purchased with an optional refrigerant leak detector sensor.

Daikin says the new systems deliver up to 35% improvement in cooling and 42% in heating compared to previous models.
Both models are also approved under the Victorian Energy Upgrades (VEU) program.

daikin.com.au

Split decision

Panasonic Australia has launched its new R32 Inverter NX Series Splittable Ducted Air Conditioning System.

The system can be split into three sections for easier transport, handling and installation in tight roof spaces and compact layouts.

Panasonic says the R32 Inverter NX Series comes with several notable features.

- Flexible installation
- Performance and optimisation
- Energy efficiency
- Air purification
- Smart control

panasonic.com

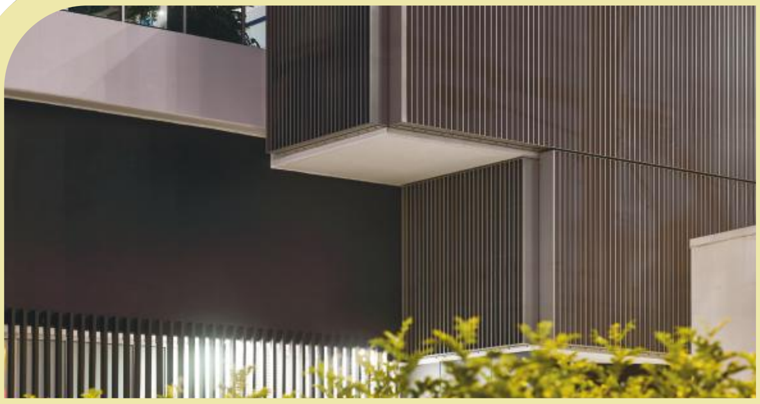
Feeling flexible

SuperCool Group has unveiled the Burgaflex MULTICOOL 6090 premium refrigerant hose, which it says delivers "strength and flexibility with zero compromise".

The hose comes with the following features:

- Compatible with R134a, R1234yf, R404A and R452A refrigerants, as well as standard/modified PAG & POE lubricants
- IIR inner tube with polyamide barrier, which SuperCool says reduces refrigerant loss
- EPDM outer cover that resists UV, oil, abrasion, and vibration
- PET-braided reinforcement to provide dependable working and burst pressure performance while remaining lightweight and installer-friendly
- Proven performance from -40°C to +135°C
- Available in 5m cut lengths, 15m cut lengths, as well as bulk reel stock.

supercool.com.au



Louvre and shaker

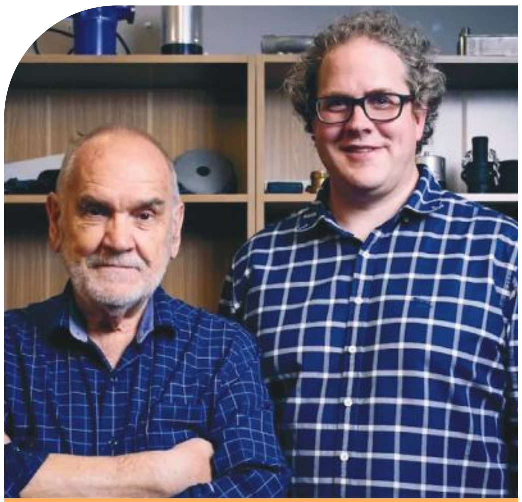
Australian company Louvreclad has released its independently tested Aerion Series vertical performance louvre, which won the Excellence in Innovation – Best New Product award at the 2025 AIRAH National Awards.

Louvreclad says the Aerion series has the following features:

- Verified class A 99–100% rain resistance up to 5m/s core velocity at a higher rainfall rate of 203L/h.m2
- Optimised class 1 airflow performance through aerodynamic blade geometry
- Reduced HVAC loads and improved building energy efficiency
- Proven compliance with AS 4740:2025, backed by independent testing data.

louvreclad.com

DO YOU HAVE A **NEW PRODUCT** TO GO IN THE TOOLSHED?
Email nick.johnsw@airah.org.au



Conry goes large

Australian HVAC start-up Conry Tech has raised a further $3 million in seed funding, taking its total funding to $13 million.

Conry Tech says the seed money from specialist climate tech investor Audacy will allow it to build its BullAnt air conditioner, which the company says can halve the energy bills of a commercial building. The BullAnt has been developed entirely in Australia to date, and Conry Tech will use its new investment to finish its development and expand its team.

The news comes after Conry Tech raised $8.7 million in pre-seed funding earlier this year.

conrytech.co

Fujitsu? Generally speaking

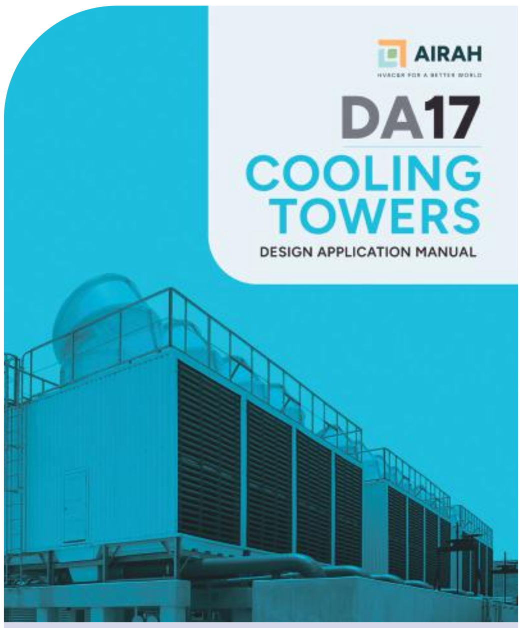
From January 1, 2026, Fujitsu General will trade under the name General Inc.

The move comes after Paloma Rheem Holdings HD acquired Fujitsu General through a public tender offer in August.

The new logo and branding will be introduced gradually throughout 2026 as the company unveils new products and offerings.

In November, the company also announced an extension of its relationship as a co-major partner of the Essendon Football Club.

fujitsugeneral.com.au



Cooling tower bible

AIRAH, with support of the ARBS Foundation, has published an updated version of *DA17: Cooling Towers*.

The newly updated design application manual is the comprehensive guide to the design, installation and operation of cooling towers. It provides guidance on the classification, manufacture, design, construction, installation, commissioning, operation and maintenance of cooling towers and cooling water systems.

The 2025 version is particularly relevant for those working on data centre projects, many of which are now turning to cooling towers to manage heavy cooling loads.

AIRAH members can access *DA17* for free online and get a heavy discount on printed editions.

To purchase or access the manual, go to

airah.org.au/site/resources/da-manuals/da-1

New MD for Beijer Ref

Beijer Ref Group Australia has appointed Jamie Brogan, Affil.AIRAH, as its new Managing Director. Brogan began the role on November 1, 2025.

The appointment follows the promotion of Wayne Ferguson to the role of Chief Operating Officer, APAC, and Executive Vice President, Beijer Ref AB.

Brogan joined Beijer Ref in 2023 as General Manager – ACD Trade and Complete Air Supply (CAS). More recently, he expanded his leadership portfolio to include Armcor Air Solutions.

beijerref.com.au

Online codes

The 2025 editions of the stationary *Australia and New Zealand Refrigerant Handling Codes of Practice* are now fully digital.

With this upgrade, technicians can now access the online versions of the codes for free on their mobile devices via the Australian Refrigeration Council (ARC) website. The HTML versions include a dynamic search function and quick navigation tools, making it easier for technicians to locate the information they need.

Earlier this year, AIRAH, the ARC and the Department of Climate Change, Energy, the Environment and Water facilitated an update of the codes, following considerable public consultation and assistance from a review committee.

arctick.org

New AMCA leadership

The Air Conditioning and Mechanical Contractors' Association of Australia (AMCA Australia) has appointed Ben Hawkins as CEO, with Scott Williams stepping down.

AMCA says Hawkins brings deep sector knowledge and strong relationships across industry, government, and education partners.

"It's a privilege to take on this role and continue serving the HVAC industry, which contributes so much to the safety, comfort, and performance of Australia's buildings," Hawkins says.

amca.com.au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TRAINING

Survey highlights HVAC&R training gaps

Powering Skills Organisation (PSO) has published the results of a survey identifying gaps in training for HVAC&R technicians.

The survey, which was distributed earlier this year, yielded 526 responses from a cross-section of industry, including, small, medium and large employers, union organisations, industry associations, regulatory bodies and registered training organisations (RTOs). The positive response was achieved with support from AIRAH, AMCA Australia and the Australian Refrigeration Council (ARC).

Business owners speak up

Most responses were provided by small business employers located in metropolitan regions operating across multiple HVAC&R system types and applications, including domestic, commercial and industrial refrigeration. The mining, transport and defence sectors were all represented, highlighting the technical diversity of the HVAC&R workforce.

The survey identified strong dependence on hydrofluorocarbon refrigerants, increasing engagement with flammable and natural refrigerants, and widespread multi-licensing among technicians. Safety, testing, and diagnostic activities were dominated by work on electronic controls and commissioning tasks, reflecting a shift towards technologically complex systems.

Feedback from employers and RTOs highlights pervasive gaps in apprentice and graduate training, particularly in areas such as:

- Exposure to modern systems
- Practical competencies
- Advanced controls
- Emerging technologies such as artificial intelligence (AI) and Internet of Things (IoT)
- Digital literacy
- Energy management
- Workplace skills such as communication and customer service.

Employers noted that because of these gaps, training does not adequately support a graduate to work effectively within the HVAC&R industry upon completion of their qualification.

Respondents noted that jurisdictional inconsistencies in licensing, regional access limitations, and variation in qualification recognition contribute to barriers for workforce mobility, productivity and business efficiency. Qualifications such as the Certificate III and Diploma-level pathways are seen as outdated, lacking in specialisation and practical rigour, and misaligned with current industry needs. The Certificate II in Split Air Conditioning and Heat Pump Systems is broadly recognised as insufficient for safe and competent trade practice.

"Thanks to the excellent work of PSO in collating the report, we are better prepared to redevelop the training packages."

AIRAH CEO Sami Zheng, Affil.AIRAH

Areas for attention

The report offers a number of high-level recommendations, not all directly relating to the training package itself. These include:

- Reforming qualification structures
- Expanding electrical competencies
- Increasing work-based and practical training
- Improving regional access
- Harmonising licensing standards
- Strengthening soft skill integration
- Investing in educator development.

The report emphasises that collaboration between industry, regulators and training organisations is vital to ensure training programs meet expectations and set clear pathways for career progression and technical upskilling.

"AIRAH was pleased to support this survey, and we are grateful to the many respondents who gave us a clear view of the training gaps. Some of them were well known to us – such as the increasing need for training on flammable refrigerants – but there were also new insights," says AIRAH CEO Sami Zheng, Affil.AIRAH.

"Thanks to the excellent work of PSO in collating the report, we are better prepared to redevelop the training packages. Education is fundamental to AIRAH and our industry, and we look forward to strengthening the sector's offerings."

Read the full report

You can access the full report for free on the PSO website by scanning the QR code.

NCC 2025 slated for publication in early 2026

Commonwealth, state and territory building ministers have agreed on the timing of future updates to the National Construction Code – including NCC 2025.

Stakeholders in the commercial buildings sector were relieved to finally receive confirmation that NCC 2025 will be published by February 1, 2026. States and territories can consider adoption from May 1, 2026, though this decision will be left to each jurisdiction.

After considering advice from the Australian Building Codes Board (ABCB), building ministers discussed the proposed provisions in NCC 2025 and agreed on the following:

- Commercial energy efficiency reforms including efficiency improvements and mandatory onsite solar photovoltaic systems to support net zero ambitions
- Condensation mitigation
- Carpark fire safety provisions for commercial and apartment buildings
- Water management in commercial and apartment buildings to prevent water ingress.

Voluntary embodied carbon provisions will be published as an ABCB guidance document, and EV charging provisions and residential energy efficiency changes will not be introduced.

Streamlining the NCC

Building ministers agreed that there is potential to improve and modernise the NCC, ensuring a fit-for-purpose regulatory environment that supports the industry to build more homes, more quickly.

Agreed scope for the work underway includes considering how to:

- Streamline and use AI to improve useability of the NCC for trades, small businesses and households
- Reduce the regulatory burden on the building and construction industry
- Remove barriers to the uptake of modern methods of construction
- Improve how code provisions are developed by the ABCB and consider the appropriate cadence of future NCC updates.

According to the communique released after the meeting, this work will encourage greater national harmonisation, while recognising the need for state- and territory-based regulatory changes that reflect the specific quality and efficiency needs of each jurisdiction.

Pressing pause on residential

In line with the Commonwealth announcement in late August that no further residential changes to the NCC, except for essential quality and safety measures, will be made until mid-2029, the building ministers agreed on a pause.

Exemptions will only apply to serious issues and changes that can't be deferred until the next edition of the code. Other changes will be held over.

ARC unveils streamlined reporting tool

The Australian Refrigeration Council (ARC) has launched a new "report a breach" form on the ARCtick website.

The ARC says the form makes it easier for industry members and the public to report potential breaches of refrigerant handling regulations under the *Ozone Protection and Synthetic Greenhouse Gas Management Act 1989*.

Users can make reports easily via arctick.org, with the option to remain anonymous.

The ARC says the initiative supports its ongoing commitment to environmental responsibility and regulatory integrity across the refrigeration and air conditioning sector.

The ARCtick website provides a list of potential reportable breaches and outlines how submissions will be assessed. Potential breaches include:

- Unlawful discharge of regulated refrigerants
- Carrying out work without a permit
- Possessing refrigerant cylinders without a valid permit
- Suspected breaches of permit conditions
- False claims or false advertisement of holding a permit.

Each report is reviewed by the ARC's compliance team. Depending on the nature of the report, the ARC may conduct further enquiries or engage directly with the individuals or businesses involved. High-risk issues may be escalated to the Department of Climate Change, Energy, the Environment and Water (DCCEEW) for regulatory action.

Use the form

Scan the QR code to access the form.

HVAC&R SKILLS WORKSHOP

Cleaning commercial kitchen exhaust systems

MODULE 167

WHAT'S IT ABOUT?

This skills workshop provides an overview of best practice for cleaning commercial kitchen exhaust systems.

WHO'S IT FOR?

Relevant for technicians whose work involves maintaining kitchen exhaust and ventilation systems.

PULLOUT

This skills workshop, taken from AIRAH's *Commercial Kitchen Exhaust Management best practice guide*, introduces technicians to best practice for cleaning commercial kitchen exhaust systems. It outlines preparation procedures, frequency guides, cleaning methods, safety considerations, and reporting duties.

Introduction

Section 13 of AS 1851 sets out the requirements for routine service of fire and smoke control features of mechanical services in buildings covered by AS 1668.1, AS 1668.2, AS 1682.1, AS 1682.2 and AS 2665.

The commercial kitchen exhaust system best practice approach outlined in this guide goes beyond the minimum inspection and routine service requirements of AS 1851 to outline a targeted evidence-based approach, as documented in overseas standards.

This risk-based approach relates the requirement or minimum frequency for inspection/cleaning to the hours and style of cooking and evidence of build-up of grease in the system.

For inspection and cleaning, it is imperative that access to the ductwork system is available.

Pre-cleaning requirements

General requirements

A competent person should perform the pre-cleaning requirements.

Prior to cleaning, the person should determine if a certificate, label, or tag has previously been posted on the exhaust hood and, if yes, then all relevant information should be recorded. If no certificate, label, or tag is posted, this should be noted in the post clean inspection report.

Predicted level of grease production	Typical example	Cleaning intervals (months)			
		Where daily usage rate is:			
		≤6 hours	>6 hours ≤12 hours	>12 hours ≤16 hours	>16 hours
Low	No significant production of grease laden aerosols during normal daily food production operations	12	12	6	6
Medium	Moderate production of grease laden aerosols during normal daily food production operations	12	6	4	3
High	Heavy, significant, or continual production of grease laden aerosols during normal daily food production operations	6	3	3	2

Table 1 – Non-solid fuel cooking applications

Predicted level of grease production	Typical example	Cleaning intervals (months)			
		Where daily usage rate is:			
		≤6 hours	>6 hours ≤12 hours	>12 hours ≤16 hours	>16 hours
Medium	Moderate production of grease laden aerosols during normal daily food production operations	6	3	3	1
High	Heavy, significant, or continual production of grease laden aerosols during normal daily food production operations	3	2	2	1

Table 2 – Solid fuel cooking applications

Notes to Tables 1 and 2

1. The hood and extract plenum are areas with a high risk of fire. Consideration should be given to more frequent cleaning of these areas in accordance with insurers' requirements.
2. In addition to the scheduled specialist cleaning, a daily or weekly cleaning regime should be implemented on hoods, separators and associated drains and traps in accordance with manufacturers' recommendations. Typically, these are carried out by the kitchen operator, to comply with insurers' requirements.
3. Owing to wide variations in usage, the frequency of cleaning is often best monitored by the kitchen operator.
4. The results of inspection and cleaning of the system may lead to changes to cleaning frequencies.

Personal protective equipment (PPE)

PPE must always be used during inspection, cleaning, and post-cleaning processes, in accordance with regulations. Proper inspection of all PPE must be performed prior to commencing work.

PPE required for kitchen exhaust cleaning and inspection includes (but is not limited to) the following:

- Approved eye protection.
- Respiratory protection to prevent inhalation of harmful particulate and gases.
- Hand protection (gloves) to prevent injury from sharp objects and exposure to chemicals.
- Foot protection to prevent "slip and fall" accidents and foot injuries.
- Lock out/tag out and ground fault interruption devices.
- Fall arresting harnesses and lanyards.
- Head protection to include bump caps and/or hard hats.

Ladders

Where ladders are necessary to gain access to facility rooftops or interior portions of the kitchen exhaust system, the ladder, surface, and safety requirements must comply with relevant standards and regulations and allow adequate space for safe working.

Chemical handling and use

All chemicals used in the cleaning process should be used, handled, and disposed of in accordance with manufacturer's instructions and applicable standards and the WHS regulations for chemical handling and hazard communication.

Pre-cleaning inspections

Basic operation test

Before cleaning it should be verified that the system is mechanically operable. If the system is powered off, system start-up should be initiated where possible, including all exhaust fans and any make-up air fans. Exhaust air flow should be verified, and the quantity should be assessed.

The owner(s) or operator(s) of the system should be interviewed, if applicable, to determine if the facility has experienced any problems with the system performance.

If system deficiencies are identified during the pre-cleaning inspection and testing operations notification should be provided as soon as practical to the owner/operator of the system.

Grease removal devices

Hood grease filters or other listed grease removal devices used in exhaust hoods should be inspected to determine their condition.

Fan visual inspection

Where possible, the visible portion of the exhaust fan should be inspected to ensure that it is operating. Notification of recorded deficiencies should be provided as soon as practical to the owner/operator of the system.

Inspection of belts and drives

The fan must be locked out and tagged out and all fan motion confirmed to have ceased prior to inspection of the belts and drives of the fan. The motor compartment of the exhaust fan should be opened, and a visual inspection should be performed of the belts and drives. Deficiencies such as cracked or loose belts should be notified as soon as practical to the owner/operator of the system.

Effluent treatment equipment

Effluent treatment equipment and systems should be maintained in accordance with the manufacturer's instructions by persons who have received specific training to service the equipment. Where grease or oil accumulates due to these systems, this should be identified and drained or cleaned as required. Any hazards to maintenance personnel (e.g., from UV or ozone) must be identified and mitigated.

Other equipment and systems

Other equipment and systems should be maintained and inspected prior to cleaning by a competent person in accordance with the manufacturer's instructions. Where oil accumulates due to these systems this should be identified and drained or cleaned as required.

Water wash hoods

The cleaning person should surcharge the hood drain in a water wash hood system prior to the start of work to ensure that it is free-flowing and record any noted deficiencies. Specialised blowers should be maintained according to the manufacturer's instructions.

Protective covering

Protection of workspace areas

To avoid the possibility of contamination, all food products should be removed from the workspace area and stored in a proper place prior to the start of the cleaning process.

Where possible, all food preparation cookware and equipment should also be removed from the workspace area and stored in a proper place prior to the start of the cleaning process to avoid any possibility of contamination.

Where that is not possible, all items that remain in the workspace area should be completely covered with protective sheets, prior to the start of the cleaning process.

When all cleaning procedures have been completed, all protective sheets should be removed from food preparation equipment.

Wet-washing process preparation

When wet-washing kitchen exhaust systems, all equipment that may be exposed to wash water and cleaning agents should be covered with protective sheeting. Protective covering used for hood wrapping and equipment protection should be of a thickness sufficient to withstand the cleaning process. Wash water should be contained for proper disposal.

No process wastewater should be disposed through a storm-water collection system. Waste solids should be collected and disposed of in an environmentally safe and approved solid waste disposal device acceptable to the relevant authority.

Energy source protection

Pre-cleaning

Prior to the start of the cleaning process, all electrical switches, open flame gas burners, and utility distribution systems serving the cooking appliances and the exhaust fans, that could be activated accidentally, must be locked out and tagged out.

Where solid fuel is present, all solid fuel must be extinguished and properly removed and disposed of, prior to the start of the cleaning process.

Post-cleaning

When all cleaning procedures have been completed, all components of the system should be returned to an operable state.

Cleaning methods

This section provides specific advice on how to clean and maintain kitchen exhaust systems.

All cleaning processes must result in the removal of cooking by-product deposits, grease, and fuel from the interior surfaces of kitchen exhaust systems. The cleaning methods implemented must be capable of achieving the required standard for post-clean verification, as set out in this guide, on both the internal surfaces of the exhaust ductwork and the system components.

The guidance provided on cleaning methods is not intended to be definitive as

Method	Removal method
Manual	Hand scraping and removal of deposits and/or wiping the surface of the ductwork with a cloth. Chemicals can be used to soften or dissolve heavy deposits making them easier to remove. Flammable solvents or other flammable cleaning aids must not be used.
Steam cleaning	The use of hot water vapour expelled at high pressure from a lance to dislodge/dissolve deposits to clean the surfaces.
Rotary/mechanised brushing systems	Scarifying of the surfaces of the ductwork with rotating brush heads to clean the surfaces driven by a shaft.
Hot chemical foam application	Application of degreasing solution by pressurised vessels to deliver chemical laden foam to clean the surfaces.
High pressure water washing	The use of pressurised water discharged at ambient or high temperature from a lance or nozzle to dislodge deposits and clean the surfaces.

Table 3 – Examples of cleaning methodology

PULLOUT

PULLOUT

there are many methods, both traditional and new technologies, which can be applied in tandem on a kitchen exhaust system. Table 3 provides examples of some typical cleaning methods.

When choosing the cleaning method, consideration should be given to operator safety. There should also be particular focus on the surrounding environment when using wet cleaning methods because grease and moisture can leak from the ductwork and components causing exterior damage.

All interior surfaces of a commercial kitchen exhaust system should be accessible for inspection and cleaning purposes. Where applicable, all exhaust ducts must be provided with access openings for inspection and cleaning in accordance with AS 1668.1.

For any specialised effluent treatment equipment or energy control equipment, the relevant equipment supplier, representative or agent should provide guidance on cleaning methods and frequencies. If any cleaning process or chemical has the potential to cause disturbance to any fire safety equipment, it is recommended that a person competent in that equipment is engaged.

Wet cleaning methods using chemical foam, steam cleaning and high-pressure water washing should be carefully assessed for use in ductwork that is situated above false ceilings or in vulnerable areas. Unless the exhaust system is specifically designed and sealed for wet cleaning, these methods should be avoided, due to the risk of possible leakage of contaminants from the duct to the surrounding area and services.

After applying wet cleaning methods care should be taken to ensure that all condensed vapours and cleaning fluids are removed from all parts of the exhaust system.

The use of chemical cleaning agents should only be considered where a risk assessment has been carried out to assess the effects of the applied chemicals on the materials of construction, environment, and cleaning personnel.

Vertical exhaust ducts should be cleaned from top to bottom either by direct personnel entry using manual processes or remotely using any of the described cleaning processes. The exhaust fan should be positioned to allow access to the vertical duct or access should be provided to the intake side of the fan.

Horizontal exhaust ducts should be cleaned from one end of the duct to its other end either by direct personnel entry using manual processes or remotely using any of the described cleaning processes. These processes can be applied from outside or inside the exhaust ductwork.

It is not normally necessary or economically practicable to clean kitchen exhaust systems and fans to a "like new" bright metal condition. This may be impossible due to substrate staining.

Excessive abrasion should be avoided, and care should be taken when cleaning to avoid damage or removal of protective coatings on fan casings, impellers, and motor housings.

Cleaning frequency

Minimum standard approach

AS 1851 provides guidance on minimum inspection and cleaning requirements. Specific cleaning intervals stated by property owners, facility managers, proprietors, system designers or insurers should be identified by the owner/operator and notified to the cleaning and maintenance contractor.

Best practice approach

The best practice approach is to determine cleaning frequency based on the recommended system inspection frequencies supported by grease thickness test measurements taken at representative locations. Following each inspection and/or clean, a decision on the frequency for future cleaning should be made so that grease levels are maintained below 0.2mm or 200µm, as a mean across the system.

Conditions and warranties within insurance policies, should stipulate minimum cleaning frequencies for kitchen exhaust systems. It should be noted that some insurance contracts may require a higher frequency of cleaning than recommended in this guide and failure to comply with such requirements may invalidate the property insurance policy.

Post-cleaning requirements

When all cleaning procedures have been completed all protective sheets should be removed and all components of the system should be returned to an operable state.

Post-cleaning verification

Pre-clean and post-clean grease measurements (grease thickness test) should be taken where practicable, and these should be clearly detailed in the post clean report.

For cleaned system verification, the surface should be visibly clean and capable of meeting the specified level of cleanliness.

For verification following cleaning, individual post clean grease thickness tests must not exceed 50µm.

Post clean report

A post clean report should include the following:

An executive summary page that highlights the following key risks:

1. A clear statement indicating whether the system was cleaned in its entirety.
2. If the entire system was not cleaned, state precisely what element(s) was not cleaned and why it was not cleaned, together with suggested solutions and recommendations.
3. Grease thickness test measurements for the stipulated test locations. The mean (average) micron reading across all Grease Thickness Test measurements taken.
4. A recommendation of a new cleaning frequency based on the pre-clean Grease Thickness Test readings.

   Note: To calculate a frequency based on keeping grease levels below 200microns as a mean across the system, the rate of build-up of grease needs to be assumed to be linear over time. This assumption can be validated by future inspections over time.
5. Any deficiencies or other hazards that have been identified.

Post clean reports should contain a description of the actual work performed, identification of systems that are cleaned, and the specific customer information, in addition to the following:

- Type of fan(s)
- Number of fan(s)
- Location of fan(s)
- Location of duct and access panels (accessible and non-accessible)
- Location and type of kitchen exhaust effluent and energy control equipment
- List of known leakage locations
- Fan switch location
- Enough photographs of the system taken before and after cleaning that are representative of the system condition
- A schematic diagram or as-installed drawing of the system layout, showing the system in its entirety including known components, changes of direction, access panels, areas that have been cleaned and any areas that could not be cleaned.
- *Note: If other factors are known to influence the speed of grease accumulation, such as peak periods of trade or where historical data infers, then interim inspections should be implemented/recommended to check grease thickness, and further frequency adjustments made as appropriate.*

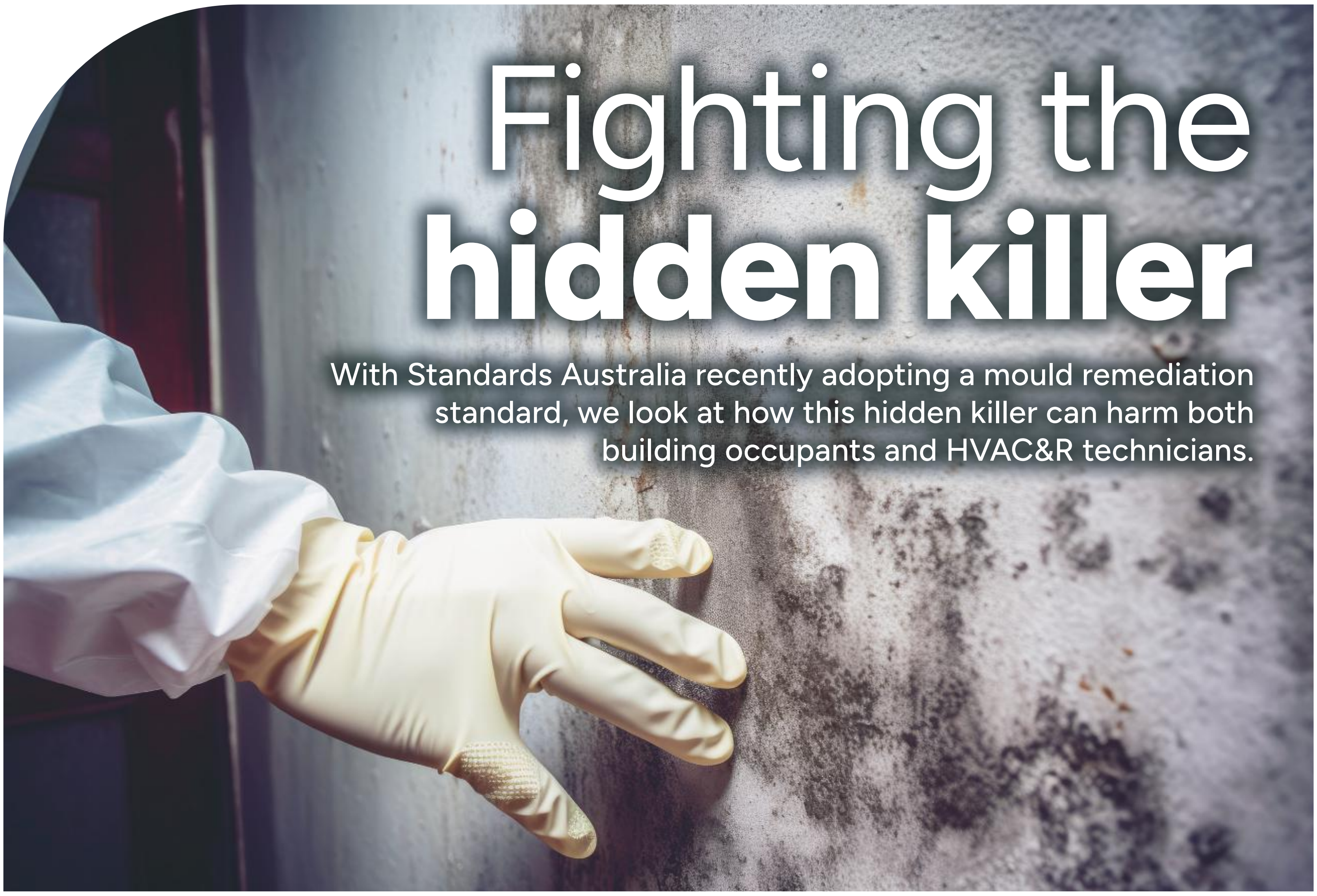
Verification certificate

When a commercial kitchen exhaust system is inspected or cleaned, the person performing the inspection or cleaning should attach a pre-printed label or tag containing the service provider name, telephone number, and date of inspection or cleaning.

Old certificates, labels, or tags should be removed when affixing new labels, or tags.

A service verification certificate should also be provided to the client.

This month's skills workshop is taken from AIRAH's *Commercial Kitchen Exhaust Management best practice guide.*



Fighting the **hidden killer**

With Standards Australia recently adopting a mould remediation standard, we look at how this hidden killer can harm both building occupants and HVAC&R technicians.

Throughout a career spanning over 43 years, Jenny Smith, Affil.AIRAH, was proud to call herself Australia's first female fridgie. She worked on every conceivable type of HVAC&R system, from residential split systems to commercial air handling units, industrial HVAC systems in manufacturing plants, freezers and cool rooms. Her years in the industry allowed her to establish her own small business, where she worked full-time in the trade.

In a physically demanding job where safety is paramount, Smith was always aware that her career could be cut short if she didn't protect herself from the standard occupational hazards. She didn't realise that the real danger was something much more insidious.

"I truly thought I'd die from electrocution, get ripped off a roof or chewed into a machine," Smith says. "But none of those happened. I got taken out by mould."

Jenny's battle with CIRS

At first, Smith had no idea that this hidden killer was making her so sick.

"Around 14 years ago as my 50th birthday was approaching, I decided I was going to be the fittest I could ever be. And I was already super fit and running, roller skating, velodrome riding – plus I work a pretty full-on job.

"The problem was that I kept falling asleep all over the place – on top of rooftops and at traffic lights – as if I was narcoleptic. That was my first real symptom."

"I was getting gaslit by doctors just trying to get a diagnosis – I got misdiagnosed many times."

It wasn't until a conversation with Dr Tim Law at an AIRAH conference that Smith even considered that mould could be the cause of all her woes.

On Law's advice, she took a visual contrast sensitivity (VCS) test. This involves looking at a series of greyscale images to identify distinct shapes and patterns.

While a VCS can't definitively diagnose mould-related illness, it can be an effective screening test; people suffering from mould exposure typically have poor capillary bloodflow, which can affect the rod cells in their retinae and make it more difficult to distinguish those patterns.

Smith's results were shocking. She was soon diagnosed with a severe case of chronic inflammatory response syndrome (CIRS), which was known as sick building syndrome at the time.

The prognosis was clear: as passionate as Smith was about being a fridgie, the risks of further mould exposure were too high. She had to quit the job she loved.

But the career that followed is perhaps even more surprising.

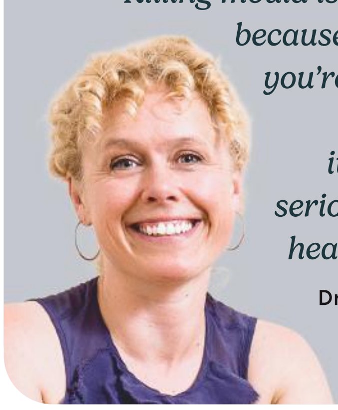
Understanding mould

Instead of running from this danger, Smith decided to face the challenge head-on by training as a mould testing technician with the Australian College of Environmental Studies (ACES). More than 400 restorers, remediators and tradespeople – including HVAC&R technicians – have completed the nationally accredited three-month course, which includes the theory behind how water damage causes microbial growth and leads to adverse health effects.

Smith enrolled in the course in part because she was filing an insurance claim for exposure to mould and couldn't find a doctor who knew enough about it to give her an official diagnosis.

"I couldn't find anyone to tell me and the insurance company was just talking at me, so I literally educated myself," Smith says.

> *"I got sick because I didn't know that mould posed a danger."*
>
> Jenny Smith, Affil.AIRAH



> *"Killing mould is irrelevant, because as long as you're breathing in mould … it can cause serious adverse health effects."*
>
> **Dr Nicole Bijlsma**

Incorrectly cleaning HVAC systems or failing to follow safety recommendations can cause more harm than good

Dr Nicole Bijlsma is the building biologist and mould expert who founded ACES and teaches the mould technician course. Like Smith and many others who work in this field, she has significant personal experience with mould-related health issues.

"I started ACES in 1999 to educate people about the health hazards in the home," Bijlsma says. "That began because I had 10 miscarriages after moving into our first home. I realised that something was wrong with the house itself when my neighbour said no one successfully had kids there."

She started noticing a similar trend in her professional life.

"I was working as a naturopath and acupuncturist for 15 years and many of my patients weren't getting well. They were talking about mould, so I started doing house visits, realised the extent of the problem and saw the need for education.

"We now know mould is a far bigger problem than we ever realised, and you usually can't see or smell it. Most of the homes I test haven't had a recent water event."

This lack of understanding is apparent is in how people – both occupants and many professionals – try to remediate mould in buildings.

"Killing mould is irrelevant, because as long as you're breathing in mould – dead or alive, whether it's viable or not – it can cause serious adverse health effects," Bijlsma says. "We have to get out of this mentality of killing the mould – the focus should be on physical removal."

Setting the standard

In November this year, Standards Australia endorsed and adopted standard 520 from the Institute of Inspection Cleaning, Restoration, and Certification (IICRC). According to Standards Australia, AS-IICRC S520 "specifies the procedures to be followed and the precautions to be taken when performing mould remediation in residential, commercial and institutional buildings, and the systems and personal property contained within those structures".

Bijlsma sat on the committee that reviewed AS-IICRC S520. She says the standard is particularly important due to the vertical integration in the industry; it's common for building rectification companies, restoration companies and hygiene companies to be owned by the same conglomerate, reducing their incentive to act in occupants' best interest.

"Under this new standard, if anybody suspects they have health effects in water damaged buildings and there's not an independent third party involved, all stakeholders must be notified in writing."

The standard also outlines requirements for remediation and management.

"Remediation will mean setting up containment under negative air pressure with scrubbers," Bijlsma says.

This means no "fogging" – a remediation process that is intended to create an antimicrobial mist to eliminate airborne mould spores, but actually introduces more moisture, potentially worsening the problem.

She says that the introduction of the new standard will "put the industry on notice" and encourage better and safer working practices.

Keeping fridgies safe

While Bijlsma and Smith welcome AS-IICRC S520, they realise much more extensive education is required to keep those at the coal face – especially HVAC&R technicians and wet washing professionals – safe.

As a working mould tester, Smith is often staggered by some of the unsafe practices she sees onsite.

"I just want to educate people a little bit better because there's lots of us out there just doing crazy stuff," Smith says. "I got to witness it this week.

"I was working with a company onsite in Darwin and I watched an HVAC technician pull the filters out of a ducted system. The filters were black with mould.

"He took them out while the system was running and dropped them down onto the floor off the 4m platform. All the mould not only became airborne, but was sucked back up into the return air.

"Worse than that, he had no protection whatsoever. He didn't just do the wrong thing for himself – he did the wrong thing for everyone else in the building.

Smith asked the technician why he wasn't wearing a face mask. He hadn't even considered that he might need one.

The incident Smith refers to is shocking not because it's outlandish, but because it likely happens every day around the country.

"That's what happened to me; I got sick because I didn't know that mould posed a danger."

She says the first step is to instil a culture of wearing the correct protective equipment and following safe handling procedures every day.

"I want fridgies to understand the risks to themselves and how PPE can protect them."

But, as Bijlsma points out, the onus shouldn't just be on individual fridgies to protect themselves; that cultural shift needs to come from above.

"It's got to start with management," she says. "If they don't take it seriously, nothing will change.

"And more importantly, these safety procedures need to be legislated. Otherwise, we'll continue to see that 'she'll be right' attitude."

Day-to-day **survival**

CIRS is a chronic, lifelong medical condition that has permanently affected Smith's wellbeing. To continue working her rewarding job and living a functional existence, she needs to remain hypervigilant.

"I wear the full mask, goggles and PPE suit when I'm onsite," she says. "I strip off after the job in the driveway so I can get back into my car in another PPE suit and drive home in my jocks."

Smith treats her small, custom-made and tightly air-controlled home in Darwin like an exclusion zone. She showers outdoors four or five times a day – every time she needs to enter her home – to keep moisture out, and she has deliberately excluded materials such as drywall (plasterboard) and carpet that can be breeding grounds for mould and fungi.

"I just had to think outside the box, which is ironic because I'm actually living in a glass box," she says. "I live in this box because I control the 6m by 4m space in here. It's got all this fantastic equipment, and I make sure that no moisture gets inside the building envelope.

"I control every millimetre and I'm safe in here."

Celebrating the best in 2025

In 2025, AIRAH expanded its awards program to six states and territories, recognising outstanding apprentices and long-term contributions among HVAC&R professionals across Australia.

AIRAH has long held apprentice awards in Western Australia and South Australia. This year, the Institute expanded those awards to include Queensland, Victoria, New South Wales and the ACT.

"The 2025 AIRAH State Awards provided the perfect opportunity to recognise the contributions of leading HVAC&R professionals and celebrate the outstanding apprentices who are driving our industry forward," says AIRAH Events Officer Lukáš Skaife.


The AIRAH national board at the 2025 WA State Awards

"Across the country, we saw a strong turn-out from organisations and individuals who came to support the next generation of talent. In some cases, people travelled several hours to support their apprentices who had been nominated.

"We're looking forward to building on this momentum as we continue to expand our awards in 2026."

AWARD CATEGORIES

Awards in most states and territories were given across seven categories:

Technical Leadership Award
Given to the HVAC&R professional who has demonstrated excellence in technical skill and leadership

Industry Transformation Award
Given to the HVAC&R professional whose work has had the biggest real-world impact

Community Building Award
Given to the HVAC&R professional who has shown the greatest dedication to fostering relationships and camaraderie between peers

Professional Development Award
Given to the HVAC&R professional who has demonstrated outstanding commitment to education and helping the next generation of talent achieve their potential

Rising Star
Most outstanding first-year apprentice

Emerging Talent
Most outstanding second-year apprentice

Apprentice of the Year
Most outstanding third-year apprentice. Winners of this award receive a complimentary one-year AIRAH affiliate membership.

NSW/ACT


Educator of the Year
Paul Wright, Affil.AIRAH


Best Performance in Diploma Studies
Beau Kupris, Stud.AIRAH


2025 NSW/ACT Apprentice of the Year
James Ferris, Affil.AIRAH


Rising Star
Molly Mayall

Emerging Talent
Christopher Sebalj

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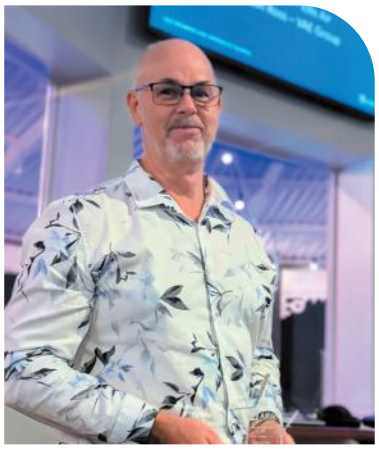
QUEENSLAND

Educator of the Year
Carl Balke, Affil.AIRAH

Industry Transformation Award
Ken Thomson, F.AIRAH

Professional Development Award
Sonia Holzheimer, M.AIRAH

Community Building Award
Campbell Williams, M.AIRAH



Technical Leadership Award
Dr Claire Bird, M.AIRAH

Rising Star
Rylan Coonan

Emerging Talent
Brenton Ross

2025 QLD Apprentice of the Year
Adam Attewell, Affil.AIRAH

SPONSOR

AIRAH thanks **Daikin** for being the major sponsor of the 2025 QLD Member and Apprentice Awards.

SOUTH AUSTRALIA

Community Building Award
Chintan Mody, M.AIRAH

Rising Star Award
Ali Clark

Emerging Talent Award
Anthony Jun

Technical Leadership Award
Sonali Deshmukh, Stud.AIRAH

Professional Development Award
Nick Burston, M.AIRAH

Airefrig Scholarship
Lane Talbot

2025 SA Apprentice of the Year
Jie Wang, Affil.AIRAH

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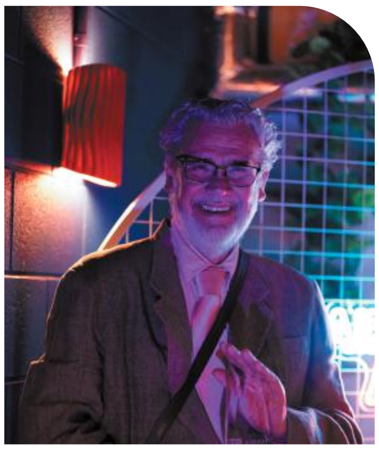
VICTORIA


Community Building Award
William Lane, F.AIRAH


Rising Star
Myfanwy Santwyk, Stud.AIRAH


2025 VIC Apprentice of the Year
Joshua Budd, Affil.AIRAH

Technical Leadership Award
Daniel Waack, M.AIRAH

Industry Transformation Award
Sean Maxwell, M.AIRAH

Professional Development Award
Andrew Pang, AM.AIRAH

Emerging Talent
Stewart Roberts

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WESTERN AUSTRALIA


Technical Leadership Award
Scott Whitmore, M.AIRAH


Professional Development Award
Alan Venn-Brown


2025 WA Apprentice of the Year
James Colin-Thome, Affil.AIRAH


Most Deserving Student in the Second Year of Apprentice Training
Courtney Pipes

Best Performance in the Second Year of Apprentice Training
Sean Van Der Brugge

Most Deserving Student in the Third Year of Apprentice Training
Lucas Yeeda

Best Performance in the Third Year of Apprentice Training
Benjamin Hargreaves


Industry Transformation Award
Darryl De Saran

Airefrig Scholarship Award
Brenen Fisher


Community Building Award
Kim Cramer


Best Performance in the First Year of Apprentice Training
Renee Youngs

Most Deserving Student in the First Year of Apprentice Training
Luke Bailey

WA images courtesy of Rift Photography

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Keeping it local

Despite the challenges facing Australian manufacturing, HVAC&R businesses are increasingly looking to build their capacity locally.

Nick Johns-Wickberg
nick.johnsw@airah.org.au

On December 10 this year, Daikin unveiled its new Australian manufacturing facility in Chipping Norton in Western Sydney. The $28.6 million, 7,500m² factory is adjacent to Daikin's existing 8,800m² facility and will be primarily used to manufacture air handling units (AHUs) and packaged rooftop products, with flexibility to expand operations in the future.

It raises the question: When sectors such as the auto industry have found it impossible to continue manufacturing in Australia, why are HVAC&R businesses investing locally?

Local security

In the June–July 2024 issue of *HVAC&R News*, we spoke to several Australian HVAC&R companies that have decided to invest in local manufacturing.

One of the messages from that article was that manufacturing in Australia provides a level of quality assurance that is difficult to replicate offshore. Companies can design products specifically for the Australian market, maintain better control over their supply chain, and ensure that their products are put together safely, effectively and efficiently.

Daikin Australia Manufacturing General Manager Nick MacDonald understands manufacturing in Australia better than most, having previously worked in the auto industry. He agrees that quality control and reliability are key benefits of local manufacturing, while acknowledging that Australia will likely never return to generating roughly a quarter of its GDP from manufacturing, as it did in the 1960s.

"Manufacturing in Australia is tough, so if you try to do what the rest of the world does, then that's really challenging," MacDonald says.

"Companies like ours can and do have success when they target particular areas that are in demand on the local market but aren't as well served by overseas offerings. Our local products are quite focused on the local market."

This means building products that qualify for the certified Australian Made mark and are desgined specifically for Australian conditions and regulations. According to Daikin Australia Managing Director Hideaki Furihata, this approach is guided by the company's global philosophy.

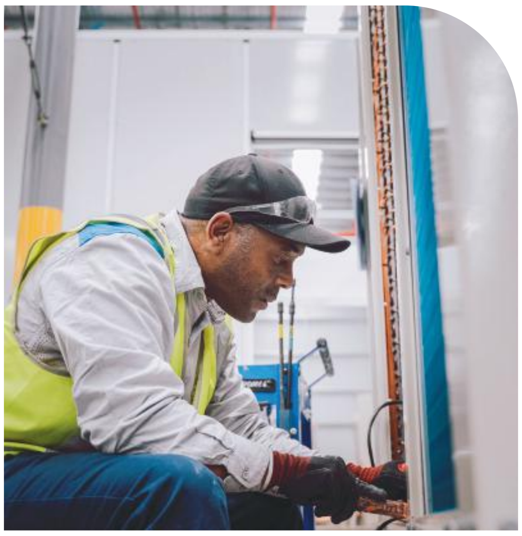
"Even though we're a Japanese brand, we always want to have local plant," Furihata says. "Our strategy as a global company has been to have local facilities wherever possible. This allows us to better understand and serve the local market and the local people."

Pandemic planning

In last year's article, respondents highlighted supply chain disruptions from COVID-19 as another key reason for bringing manufacturing back to Australian shores. While Daikin

"I could talk for hours about the importance of manufacturing to the local economy and the community."

Daikin Australia Manufacturing General Manager Nick MacDonald



Images courtesy of Daikin Australia

acknowledges this as a key reason to invest in Australian facilities, Furihata says the company had decided to build the new Chipping Norton facility even before the pandemic struck.

And while Daikin's facility stayed operational and actually increased production throughout the pandemic, MacDonald says the experience has provided valuable learnings.

"We definitely learnt our lessons from that period and we're doing our best to apply them to the new factory," he says.

Work smarter, not harder

Just as products need to be suited to local conditions, so do factories. One of the requirements of successful manufacturing in Australia is finding technical solutions to maximise efficiency.

"AHUs are highly customised," MacDonald says. "Every unit is different for every different customer, which means the design is different and there's a lot of modification and customisation to the design of the product.

"That's all very labour-intensive. To do that in Australia in a cost-effective manner, we need to digitise and automate the process as much as possible."

As well as autonomous mobile robots, the new facility also uses software that allows the machinery to build AHUs to customised specifications with minimal human intervention.

"We've adapted a system that enables the sales team to select a product in conjunction with the customer. Once the solution is finalised, that product specification and design flows into the factory to the automated production equipment in a digitised manner.

"The machines make it, then we put it together. It eliminates a lot of manual drafting and opportunity for error.

"We could not build AHUs without this system."

Lifelong skills

One of the messages that came out of our 2024 feature story was how hard it is to find workers with the appropriate enthusiasm and experience to work manufacturing jobs in Australia.

Daikin's response to this is what the company calls a "skills dojo". The term comes from the Japanese word for classroom, and the concept is simple: all workers receive onsite training when they begin their employment, and complete ongoing upskilling throughout their employment. It means that even school leavers can thrive, as long as they've got the right attitude.

"The purpose of the factory skills dojo is to upskill our workers, many of whom come to us with limited exposure to manufacturing," MacDonald says. "They receive training in shop floor manufacturing skills, all the way from safe operation of equipment to skills and techniques such as metal forming, brazing, and electrical wiring.

He likens the program to continuing professional development (CPD) and says all employees – from the shop floor to the C-suite – participate.

"Each department organises that ongoing upskilling, and it's never finished," MacDonald says. "Our trainers have KPIs around how many hours of training they deliver per person per month to make sure we're getting training to the people who need it."

Furihata notes that the company adopts this policy globally.

"We spent around $100 million to build our own dedicated training centre a few hours from Osaka," he says. "There, we gather people from all over the world, sometimes for competitions and sometimes for conferences."

"Our strategy as a global company has been to have local facilities wherever possible. This allows us to better understand and serve the local market and the local people."

Daikin Australia Managing Director Hideaki Furihata

The two trainers who run the skills dojo at Chipping Norton spent three months training at the Japanese facility.

Building community

Daikin says its new facility has already generated more than 60 full-time jobs. MacDonald sees this not just as an economic positive, but as something for the local community to build upon.

"I could talk for hours about the importance of manufacturing to the local economy and the community," he says.

"There are members of my team who joined us as their first job out of school. They've come to us just with year 12. They've learnt how to become manufacturing professionals. They've learnt how to operate a factory and are now well on their way to building wonderful careers.

"That has a massive positive impact on the local community and on the lives of the people involved. It's one of the things I gain great personal satisfaction from."

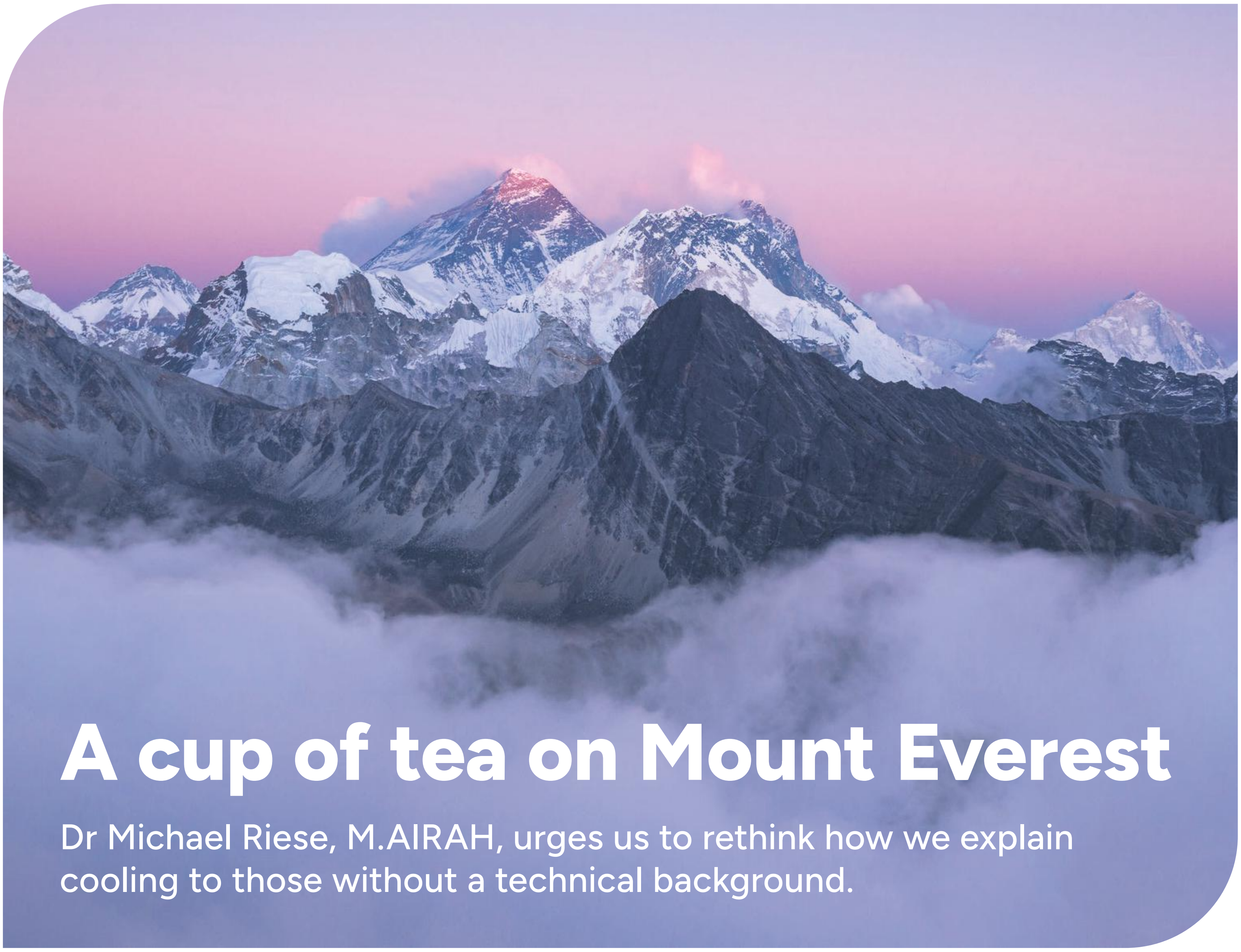
Clean manufacturing

With the effects of climate change becoming more apparent – and HVAC&R's role coming under the spotlight – carbon neutrality is a top priority for many in the industry. While manufacturing has traditionally contributed to carbon emissions, Daikin says it is striving for net-zero greenhouse gas emissions across all product manufacturing factories by 2030.

"The main mechanism Daikin Australia will employ for net zero manufacturing is to have onsite photovoltaics to generate power that we consume," MacDonald says. "We've also implemented measures around the use of highly energy-efficient manufacturing equipment.

"Our current factory employs around 550kW of generation on the roof. Our new factory will go online with a roughly equivalent amount in 2026. Between those two arrays, we will offset more than 50% of the power consumption at this site."

MacDonald says the company will use carbon offsets to neutralise other operating emissions from the facility.



A cup of tea on Mount Everest

Dr Michael Riese, M.AIRAH, urges us to rethink how we explain cooling to those without a technical background.

A few months ago, a client asked our company to develop a short training session on two-phase heat transfer for their non-mechanical engineers.

It was an interesting challenge. We're so used to talking to clients and colleagues with some understanding of HVAC&R that we sometimes forget how complicated even the fundamentals of our work are.

We only had one shot to get it right in front of up to 200 professional engineers with varying levels of experience during a one-hour training slot. This required a lot of reflection and set off an interesting thought process for me.

Whether you trained as an HVAC&R technician or a mechanical engineer, you would've learnt about two-way heat transfer in quite technical terms. The explanation would've been something like this: "To remove heat from an environment, you increase the pressure in a system through mechanical work, thereby increasing the enthalpy. You then condense the gas before expanding it to create the cooling effect."

After talking to some non-engineering contacts in my professional environment, I realised that this a complicated and unnatural concept to most people. We need a more approachable explanation.

The tea metaphor

Everyone I talked to could understand that atmospheric pressure decreases as you move from sea level to the top of the highest mountain. They could also understand that, as pressure falls, so does the boiling point of water.

So, I asked them to imagine a cup of tea on the top of Mount Everest – 8,848m above sea level – where water boils at around 70°C. As soon as the water hits 70°C, it evaporates, meaning the liquid will never get up to our customary 100°C.

Unfortunately, black tea brews at 90–95°C. This means that, no matter how long you boil the water or swirl the teabag around, your mountaintop tea will taste weak and bitter – not unlike if you just dunked the teabag into room temperature water. And those potatoes you boiled in the other pot? They'll be rock solid. Just when you needed a nice hot meal and a warm cuppa!

From there, it's quite easy to explain the idea of sensible and latent heat transfer. It makes sense that "breaking water particles into gas" requires much more energy than just raising the temperature of the water does, and as such removes more heat from the environment in the process.

It's a sucker, sucker!

It's challenging for most non-engineers to understand how an expansion device is used to convert high-pressure, high temperature liquid refrigerant to a low temperature liquid-gas refrigerant mixture. It's much easier for them to understand how a vacuum pump can be used to lower the pressure inside a space to achieve a lower liquid boiling point. They can also visualise a mechanical throttling device that ensures that only a limited amount of refrigerant is replenished in the low-pressure space.

These aren't alien concepts within the industry. We often refer to a capillary tube as a throttling device, because through its restriction in cross-sectional diameter, it will only allow a certain amount of liquid refrigerant to move into the low-pressure space. We also use a slightly modified compressor assembly in the form of a vacuum pump when technicians evacuate an HVAC&R system prior to charging it with refrigerant.

So, would it make more sense to call a capillary tube a throttle? Or to call a compressor a sucker? I'd argue that, at least for non-technical audiences, it would.

Old habits die hard

Pick up a refrigeration training manual and you're guaranteed to see the same old basic vapour compression circuit with a high side and a low side, a compressor, a condenser, an evaporator and a TX valve. To an outsider, this diagram may as well be hieroglyphics.

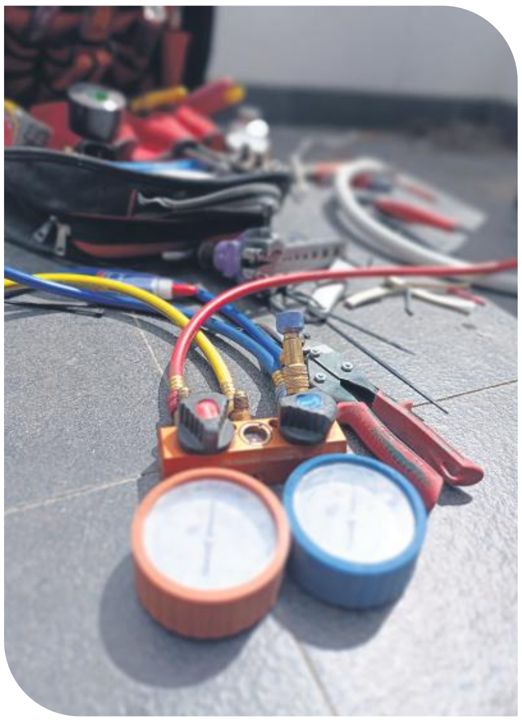
If you've been in the HVAC&R bubble too long, you forget how difficult the vapour compression cycle is to understand. This can perpetuate when senior experts – who have been immersed in the bubble longer than anyone – write teaching materials. We use these materials to teach tradespeople who have already been exposed to refrigeration during their apprenticeship and engineering students who have proven their mechanical aptitude and logical thinking. But we make it almost impossible to explain our industry to laypeople.

Are we so set in our ways that we're not interested in making our industry more accessible? Or are we simply too busy to care?

I don't think it's either. Most long-term HVAC&R professionals understand that we're a hidden industry that struggles to attract school leavers and engineering students. They want to make our work more accessible; they just might not be using the right vocabulary to do it.

Do I want you to throw out your training materials? Absolutely not! But instead of the jargon-heavy explanation you learnt at TAFE or uni, some real-world metaphors can make our work so much easier to understand. I'd argue that, in some cases, it makes sense to reframe refrigeration as boiling a liquid at a saturated pressure-temperature point that is lower than the ambient temperature to achieve latent heat transfer.

So, next time someone asks you how refrigeration works, offer them a cup of tea. Unless, of course, you're on Mount Everest …



About the author

Dr Michael Riese, M.AIRAH, is the manager for defence business and R&D at industrial refrigeration contractor Cold Logic in South Australia. He completed a trade apprenticeship as a machinist fitter in Germany before moving to Wales to obtain his degree in mechanical engineering. After graduating with first class honours, Michael moved to Adelaide to pursue a PhD in experimental fluid dynamics.

He currently sits on AIRAH's board of directors, is an active member of the Refrigeration and Commissioning STGs, and associate director of the SA division. Michael also represents AIRAH on a number of IIAR standard and research committees in the USA.

Ductwork disasters

For this edition of "The lighter side", we've decided to do things a bit differently. The following images and commentary are provided by William Lane, F.AIRAH, an experienced HVAC commissioning technician who has seen it all over decades in the field.

William shared these images – and many more – in an entertaining and educational presentation at AIRAH's 2025 Indoor Air Quality Conference focusing on "installation fails" and how they affect commissioning. We've compiled some of the best "ductwork disasters" from that presentation – we hope you enjoy it! And as always, please let us know which one is your favourite.

1. Round the twist

One of the common themes of William's presentation was unnecessary bends or twists in ductwork restricting airflow. Here's one of the ~~best~~ worst.

"In the first scenario, the installer did not shorten the flexible ducting," William says. "Instead, they squashed the flexible ducting to suit the install.

"Needless to say, the total airflow had been compromised by the lack of airflow through this duct."

The solution? In this case it was fairly simple – William shortened the duct and achieved the desired airflow.

2. Leaning tower

It seems that sometimes, kit isn't even connected properly during installation. In this case, a light air boot fell over in the ceiling cavity, causing all the air to flow into the ceiling and not into the supposedly air conditioned room.

"This is a more common fault than you might imagine," William says. "Even when installed in the upright position, there still can be a large leakage rate at the ends of the box where it meets the slot grille."

3. It's called duct tape, but ...

Sometimes, you shouldn't take a name too literally. In this case, the flex has been removed and just taped over with duct tape, which isn't as good a solution as it sounds.

"As the ducting becomes hot and cold, the duct tape may lose its adhesiveness and release the cap, which would cause air to flow into the ceiling cavity" William says. "This should have had a metal cap over the pop, and the pop should have been riveted on and sealed."

4. Crushed (pipe) dreams

William came across this particularly ugly piece of work when air balancing a ceiling console unit.

"In this scenario, the flexible ducting has been crushed by the heating water pipework being too close to the intake pop on the console unit," William says.

"It was a simple solution to turn the console unit around to enable the flex to enter the console unrestricted. But why didn't the mechanical contractor rotate the unit in the first place? Why did they think this was okay?"

5. Road to nowhere

At the very least, most of the installations in this collection are connected to something. This one, not so much ...

"How is it possible to provide an air balance when there is nothing connected to the flex?" William asks. "At least the ceiling space was satisfied."

6. Modern art masterpiece

No, this isn't some abstract artwork on display at a high-end museum; it's a completely deflated kitchen exhaust duct. William was called out because, unsurprisingly, there was no airflow through the canopy system; instead, all the air was discharging into the cupboard.

"The flexible duct must have had a tear in it at the time of installation," William says. "This allowed the airflow to rip and completely deflate the flexible ducting by pulling itself apart."

About the author

William Lane, F.AIRAH, began his career as a plumber before moving into HVAC&R, eventually running his own company as a commissioning technician. He has been an active member of AIRAH since 1987, achieved fellow membership status, and was honoured in AIRAH's 100 Faces project in 2020, having also received a Master Plumbers award in 2010. One of William's greatest honours is coordinating the AIRAH Legends group, where long-serving members gather to socialise and share knowledge. He received the Community Building Award at AIRAH's 2025 VIC Member and Apprentice Awards.

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