

# PLUMBING CONNECTION

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WINTER 2019

## DRUG ABUS@

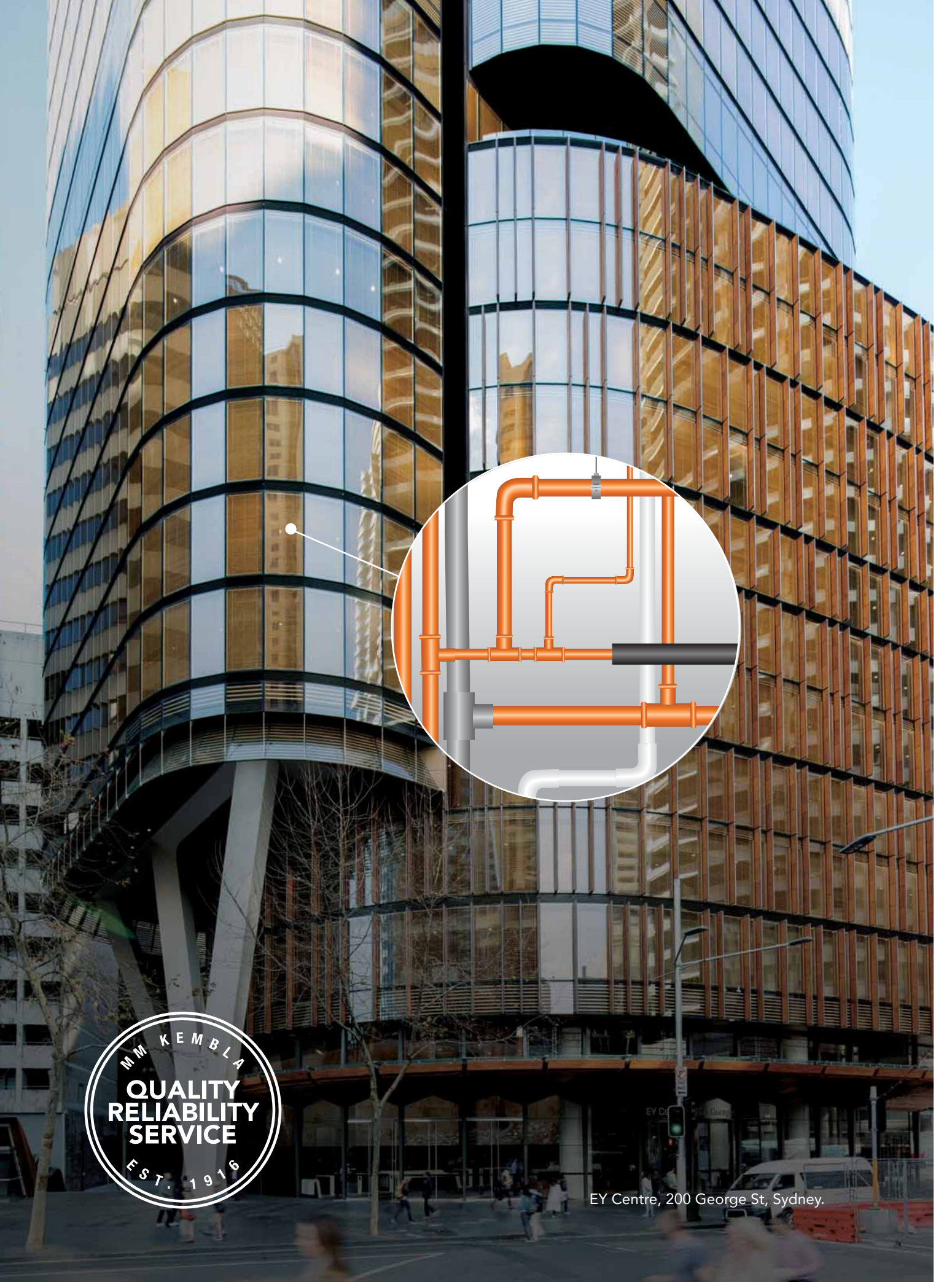
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**INSIDE:**

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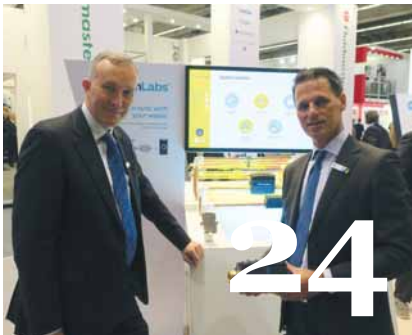
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# THE WAR ON DRUGS

**I**t feels like the debate on drugs will never be won. Most debates aren't after all.

Just consider the issue of pill testing. It won't be dissolving any time soon. Despite, what feels like constant reports of music festival overdoses, politicians and members of the public can't seem to agree on a solution.

"We have to remember that these substances are illegal and they're illegal for a reason. One pill can kill and we need to educate our young people that you don't need to be on drugs to have a good time at a concert," Queensland's Liberal National Party deputy leader Tim Mander said recently.

'Ignorance is bliss' rings true when that kind of comment comes out of a politician's mouth.

The truth is: drugs will always be taken. And not just by the nation's 'young people'.

Unfortunately though, the effects linger long after the music festival calls curtains after the last act. And the construction industry is far from immune to the sometimes ill-consequences of illicit drug taking.

As you'll discover in this edition's cover story, employers are facing serious problems when it comes to keeping worksites safe due to drug abuse. In the article, John Power explores a range of topics, including

the validity of random drug tests and whether workers have the right to refuse them, as well as the issue of Workplace Health & Safety [WHS].

While the article delves to great depths on the subject, unfortunately, as per the 'war on drugs' facing the nation, we've only just scratched the surface.

## WATERMARK EXTENDS ITS PRODUCT PORTFOLIO

Unbeknownst to most across the plumbing industry, the amount of plumbing product categories that require WaterMark certification is in the process of being expanded quite significantly.

From 1 August 2019, the following product categories will be added to the WaterMark Schedule of Products and you will be expected to comply:

- Ductile iron pressurised pipes and fittings
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The industry did have forewarning of this some time back with the ABCB sending correspondence out in 2017; however, after early discussions with some of our network, it seems as though many have either forgotten, or were never aware in the first place.

*Plumbing Connection* will cover the topic in full in the spring edition.

Enjoy the read

*Justin Felix*

Justin Felix

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### A HIGHER VIEW OF PLUMBING

Around the world there is a global research community of academics studying various engineering aspects of plumbing, particularly aimed at improving the performance of water and drainage for buildings. However, like many industries there is often a lack of awareness and cooperation regarding what is being achieved from one country to the next. However, the output of this work is important to all of society and in particular hydraulic engineers and innovative plumbing material suppliers.

This CIBW062 Symposium, which has run biennially for the past 30-years aims to continue to improve industry awareness by linking academics and exposing their theories and practices to the commercial world.

CIB [The International Council for Research in Innovation and Construction] is a European headquartered movement whose purpose is to provide a global network for international exchange and cooperation in research and innovation in building and construction, in support of an improved building process for the built environment.

Sydney hosted the event in 2010 and now Melbourne is proud to be this year's host. The two-day event is being held immediately prior to the World Plumbing Conference in Melbourne. Upwards of 100 plumbing researchers are expected for the event.

For further information and registration, visit [www.cibw062.melbourne](http://www.cibw062.melbourne)



### CALLS FOR MANDATORY TESTING FOR LEGIONELLA IN ADELAIDE

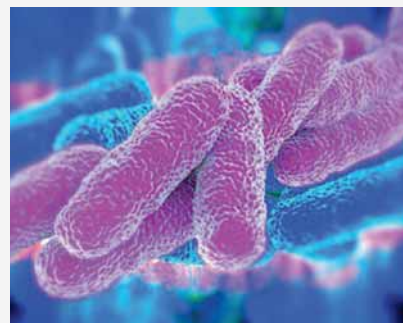
Adelaide bathrooms may be privy to legionella, a potentially deadly bacteria. Flinders University in Adelaide has discovered that one in four homes tested positively to harbouring the bacteria in the showers or bathroom area. Industry experts say that plumbing standards are of the utmost importance with bacteria like this, to ensure people's health and well being.

Researchers at Flinders University took samples of water from the showers across a range of 68 newer and older Adelaide households with three out of the four testing positive to legionella.

Legionnaires' disease is a severe pneumonia-like infection that can be especially dangerous for elderly and those with weakened immune systems. According to the national industry body Master Plumbers Australia [MPA], state and federal governments need to urgently enforce plumbing regulations to ensure the highest standards of public health are maintained.

"Our national industry body is calling for government to enforce regulators to mandatory test for legionella in all new and existing buildings including homes, apartments, schools and hospitals," chair of MPA Robert Pearshouse says.

"Plumbing regulations vary slightly from state to state uniform



legionella-based legislation needs to be introduced to ensure the highest standards of public safety are maintained. Anyone connecting fixtures to water or sewerage systems, or dealing with systems requiring heat regulation, must be appropriately licensed to carry out the work. As well as mandatory inspections, there should be nationally consistent and regulated maintenance programs put in place."

"As the Australian and New Zealand population continues to grow and we move towards higher density living, adequate resourcing is needed to ensure high standards are enforced and maintained," Robert says.

MPA would welcome the opportunity to work with the government to try and reach a positive outcome providing safe hot water to Australian and New Zealand homes, businesses and communities.

Effective plumbing services are critical for maintaining and enhancing community health as well as protecting the environment.

### OZPIPE XIX

The date and venue for the Plastic Pipe Conference Association's PPXIX spin-off technical conference, Ozpipe XIX, have been set and planning is now underway.

Ozpipe XIX technical conference will be held on November 7-8 2019 at Dockside on Sydney's Cockle Bay Wharf, just a few minutes' walk from the Sydney CBD.

The event will feature some of the world's most authoritative researchers and presenters on a wide variety

of topics related to plastics pipe materials, design, installation and performance.

PIPA has engaged the experienced team at Conference Co-ordinators to assist with event management.

If your business or interests involve plastics pipe, this event is right up your alley.

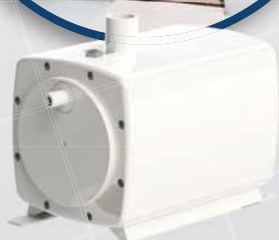




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### SEVENTH BIENNIAL EMERGING WATER TECHNOLOGY SYMPOSIUM

The call for abstracts for the seventh biennial Emerging Water Technology Symposium [EWTs], to be held from May 12-13 2020, in San Antonio, may be downloaded from the EWTs website at ewts.org.

The symposium will be co-convened by the American Society of Plumbing Engineers [ASPE], the Alliance for Water Efficiency [AWE], the International Association of Plumbing and Mechanical Officials [IAPMO], and Plumbing Manufacturers International [PMI], in cooperation with the World Plumbing Council [WPC].

Abstracts will be welcomed on topics including the water-energy nexus, water efficiency, water quality, alternate water sources, 3D modelling for plumbing and mechanical applications, water reuse, water infrastructure, sustainability, mitigating opportunistic

pathogens, and more.

The EWTs provides an opportunity for experts to present new ideas and approaches, emerging technologies coming to market, innovative green plumbing and mechanical concepts, and more. Professionals from the manufacturing, engineering, plumbing and mechanical, and water utility industries participate, along with individuals from government and academia.

"I'm delighted to announce, on behalf of the convening organisations that provide the EWTs, that abstracts can now be submitted and we look forward to receiving proposals from experts throughout the world who have made major contributions toward developing new technologies or conducting vital research that will help keep our building water systems safe and efficient," said IAPMO Group CEO GP Russ Chaney.



### A NEW ERA BECKONS AS DR BRONWYN EVANS FINISHES HER TERM AT STANDARDS AUSTRALIA



Dr Bronwyn Evans has concluded a six year term as chief executive of Standards Australia as of March.

Standards Australia chairman Richard

Brooks thanked Bronwyn for her time in the role and spoke about how Standards Australia has benefitted from Bronwyn's leadership.

"As we reflected on what has been achieved in recent years, and what lies ahead through 2019 and beyond, we are pleased to be able to say that she is leaving a legacy of substance, and excellent executive and senior

leadership teams in place," Richard says.

Bronwyn spoke about how privileged she was to lead the organisation and recounted the value of work being done by Standards Australia both nationally and internationally and its impact on the quality of Australian life. "The executive, senior leadership team and staff at every level are outstanding and all passionately committed to Standards Australia. I am proud of what we have achieved in so many aspects of our work. Standards Australia is in a great position with so much opportunity, goodwill and ambitions for the next phase of growth. I look forward to seeing Standards Australia move from strength to strength," she says.

### 20TH ANNUAL QUEENSLAND PLUMBING & GAS INDUSTRY AWARDS

The 20<sup>th</sup> annual plumbing and gas industry awards will be held on July 19. The awards recognise achievements in industry leaders and mentors, apprentices, gas installation projects, domestic and residential work and women in the industry, among others.

Executive director of Master Plumber's Association of Queensland [MPAQ] Penny Cornah says it is important to recognise leading professionals and achievements within the industry.

"Plumbing is a lifesaving industry and by acknowledging the exceptional work of everyone who contributes to it, we are able to celebrate the vital work they do day to day," she says.

Beavis and Bartels who won three awards in 2018 spoke about how motivational and uplifting receiving one of these awards really is.

Beavis and Bartels hydraulic engineer Matthew Ryan said, "If you get the chance to nominate your company or business for an award I would definitely recommend it, receiving an award in front of your peers at an industry night is definitely a moment you will not forget."

This year a number of new categories have been added to the program recognising passive fire projects, business excellence and an individual plumber, drainer or gas fitter.

Penny stated that, "These new awards allow us to highlight the comprehensive skills and talents in our industry that were not being recognised previously."







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# DRUG ABUSE REACHES NEW HIGHS

**DRUG ABUSE WITHIN AUSTRALIA'S BUILDING AND CONSTRUCTION SECTOR IS RIFE, POSING SERIOUS PROBLEMS FOR EMPLOYERS WHO ARE OBLIGED TO KEEP WORKSITES SAFE. JOHN POWER REPORTS.**

**I**llicit drugs [See Table 1] affect the entire community, spanning all age groups and professions. However, while most Australian citizens would agree with this sweeping generalisation, there is less accord about how to identify, quantify and tackle drug abuse within a specific sector like the building and construction industry.

Opinions about the issue of illicit drug abuse vary widely, from support for the legalisation of drugs like cannabis [see MP Fiona Patten's ideas on page 18], to the enforcement of zero-tolerance prohibition measures and penalties, along with widespread counselling services.

In this article we address a range of issues about drug abuse: How widespread is the problem? Are some drugs more prevalent than others? Do employers have a Workplace Health & Safety (WHS) duty to ensure workers are 'clean', perhaps via random drug tests? Do workers and contractors have rights to refuse to take such tests?

## HAZY DATA

Amazingly, there are no formal statistics in Australia revealing the extent of illicit drug abuse by profession.

"The Alcohol and Drug Foundation (ADF) does not have any up-to-date data that breaks down drug use by profession," says ADF spokesperson Laura Bajurny.

This seems incredible, given that one might have expected job-specific data to be a prerequisite for targeted health and education campaigns. Nevertheless, the ADF is unequivocal in its advice that illicit drugs are a potent risk to safety on building sites.

"Being under the influence of any drug – including some prescription drugs like opioid painkillers – poses a safety risk on worksites," Laura says.

"Drugs that depress the central nervous system, like alcohol, opioid painkillers or cannabis, slow reaction times and can impair clear thinking and planning.

"Stimulants, like cocaine or methamphetamine, can make people more impulsive and increase the likelihood of risk taking."

Most importantly, Laura stresses there are no 'safe' levels of illicit drug use.

"Drugs affect everyone differently," she explains.

"Mixing drugs – including with alcohol – can be especially unpredictable and dangerous, as each substance changes the way the others act in the body."

The effects of these substances can be long lasting: "Alcohol hangovers and 'coming down' from drugs can affect a person's performance even after drugs may no longer be active in their system. Depending on the drug[s] and volume of use, this may last for several days."

## STATISTICS DON'T LIE

While national data relating to illicit drug use in the Australian building and construction industry is scarce, private-sector drug testing companies can ➤



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shed more light on current trends based on 'in-the-field' experience.

One such company is Integrity Sampling, which is a private drug-testing company based in Melbourne. Integrity Sampling performs thousands of random drug tests every year throughout Australia across all professions, including building and construction.

Random drug testing is legal in all professions throughout Australia. In the building and construction industry, tests may apply to direct employees, contractors, subcontractors and any other official visitors to a worksite at any time.

"We've had the Australian Drug Foundation blown away by our stats," says Integrity Sampling director Michael Wheeldon, reiterating that his company's data are based on empirical test results, rather than 'surveys'.

According to Michael, approximately 3% of all random drug tests conducted by Integrity Sampling in 2016-17 produced positive results across all professions nationally, with South Australia and Victoria recording the highest rates of positive detections (see Table 2). NB: all positive results are based on saliva tests, which means they detect recent use of drugs (for example 4-8 hours for cannabis; and about 24 hours for methamphetamine) in significant doses (at least 25ng/ml for cannabis), rather than minor traces that might be attributable to historical or passive absorption.

Unsurprisingly, drug detection rates tend to vary considerably across different professions. As noted in Table 3, the warehousing, transport and manufacturing sectors displayed the highest rates of illicit drug detection as a proportion of all industries; however, the building/construction sector – representing 13.6% of all positive results – had the fourth-highest rate. By contrast, only 1.3% of tests proved positive in the marine industry, 1% in land clearing and 0.2% in the airline industry.

What kinds of illicit drugs are commonly detected?

As shown in Table 4, the most commonly detected drugs are opiates ➤

**TABLE 1: MAJOR CLASSES OF ILLICIT DRUGS**

DRUG	STIMULANT/DEPRESSANT
Alcohol*	Depressant
Cannabis	Depressant
Cocaine	Stimulant
Opiates (including prescription painkillers and derivatives)	Depressant
Amphetamines (including 'speed')	Stimulant
Methamphetamines (including 'ice')	Stimulant
Benzodiazepine (including tranquilizers)	Depressant
* Illicit, depending on blood alcohol concentration and permitted thresholds.	

**TABLE 2: RATES OF ILLICIT DRUG DETECTION – BY STATE (2016-17)**

DRUG	POSITIVE READINGS – PERCENTAGE OF TOTAL TESTS BY STATE
SOUTH AUSTRALIA	5.1
VICTORIA	3.6
NEW SOUTH WALES	3.3
QUEENSLAND	2.8
WESTERN AUSTRALIA	2.0
[In-House Statistics – Integrity Sampling]	

**TABLE 3: ILLICIT DRUGS DETECTED (ALL INDUSTRIES – NATIONAL 2016-17)**

DRUG	PERCENTAGE OF TOTAL TESTS
OPIATES*	32.3
METHAMPHETAMINE	25.9
AMPHETAMINE	18.5
CANNABIS	15.5
ALCOHOL*	5.9
MORPHINE/HEROIN	0.7
COCAINE	0.7
BENZOIAEPINE	0.1
[In-House Statistics – Integrity Sampling] * Refers to illicit 'levels' of alcohol in the blood system.	

**TABLE 4: ILLICIT DRUGS DETECTED – BY INDUSTRY (NATIONAL 2016-17)**

INDUSTRY	PERCENTAGE OF TOTAL TESTS
WAREHOUSING*	27.6
TRANSPORT	20.7
MANUFACTURING	17.4
BUILDING/CONSTRUCTION	13.6
OTHERS	5.4
GOVERNMENT	5.1
AUTOMOTIVE	2.9
WASTE	2.7
CORPORATE	1.4
MARINE	1.3
LAND CLEARING	1.0
AIRLINE	0.2
[In-House Statistics – Integrity Sampling]	



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and methamphetamines, though latest trends point to an alarming escalation in methamphetamine use.

"Since the introduction of codeine on prescription, we have seen a significant drop in opiate detections," Michael says.

"Since drugs like Nurofen Plus and Panadeine Forte have gone prescription, their usage has reduced and meth has overtaken it."

Michael says rates of methamphetamine detection nationally rose by 50% in 2016-17 across all professions – an extremely troubling finding.

### DRUG TESTING: IT'S UP TO YOU

The only way to determine and track drug abuse at a worksite is to test workers.

Random drug testing is justifiable, Michael says, because it is fundamental to the provision of a safe workplace under Section 21 of the WHS Act, as implemented by separate state jurisdictions. In the event of a workplace incident involving a drug-affected worker at a site where there was no testing, for example, an employer might be vulnerable to accusations of neglecting his duty of care to all staff.

While random drug testing is permitted nationally, as noted above, it is worth noting that there are no legislated protocols or restrictions governing random drug testing procedures in most Australian



With illicit drug use on the rise, it's up to individual business owners to decide whether to implement random drug testing.

workplaces. An exception relating to the building and construction industry dates back to 2016, when the Building Code of Australia was amended to include compulsory random drug testing on Commonwealth Government-funded construction sites (above \$20m project value). In such cases, sites with fewer than 30 workers must test at least 10% of all workers; sites with 30-100 workers must conduct a minimum of five tests per session per month; sites with more than 100 workers must conduct a minimum 10 tests per session per month.

As far as small-to-medium building companies are concerned, it's up to individual business owners to decide whether to implement random drug testing.

Before a business adopts a random drug testing policy, bear in mind that there are no 'mandatory' standards governing testing methodologies, the frequency of tests, the quality of test equipment, or the qualifications of testers... though Michael advises that reputable drug testing companies voluntarily adhere to strict international standards and benchmarks relating to all facets of the drug testing process.

"Anyone can do it [random drug testing], and unfortunately there are some cowboys out there, but the testing company should be [a] NATA-accredited, [b] ISO-accredited, and [c] each technician should have an Australian Quality Training Framework [AQTF] compliance in relation to drug and alcohol testing, and that's part of the Australian Standard, which falls back to the NATA Standard," Michael says.

How many tests should be carried out per annum? Michael says Integrity Sampling creates a unique testing schedule with each client based on budget and perceived need. In general, a company might commission a series of random tests throughout a 12-month period equivalent to 30% [by number] of the full workforce.

"You might have a multinational company with 500 employees; we might do 20 tests a month [over three separate sessions] within a 12-month period, which would give us 240 tests overall for the year – we look to test at least a third of all staff on a random basis in a given year," he says.

Each Integrity Sampling test takes about seven minutes to complete, and costs \$70-\$100 [average \$80-\$85]. ➤

### ILLICIT DRUGS – AGE GROUPS

From Laura Bajurny, Spokesperson, Alcohol and Drug Foundation.

Most people who use illegal drugs first try an illegal drug at around 20 years old (19.8 years).<sup>1</sup>

Our most recent data, which is from 2016, indicates that the average age of a person who uses cannabis is now 34, cocaine is 31, and meth/amphetamine is 34. The average age for people who use ecstasy or hallucinogens is late-20s.<sup>1</sup>

Please note that this data highlights drug use in general and doesn't distinguish between use and drug dependency.

Footnote

1. Australian Institute of Health and Welfare, "National Drug Strategy Household Survey 2016," AIHW, 2017.





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**YEAR**  
**WARRANTY**

\*3 years warranty on compressor  
\*5 years warranty on tank





Whereas some drug testing companies use “a \$5 piece of plastic with a sponge on the end of it” to perform tests, Michael says Integrity Sampling and similar businesses use Drager Drug Test 5000 test equipment [approximately \$10,000 per machine], which is “the best in the world”. Michael says his company’s units are certified to perform to Australian Standards by the Victorian Institute of Forensic Medicine, producing 99.6% accuracy against ‘false positives’, i.e. positive on-site tests that subsequently prove negative in a laboratory.

A typical test on a Drager device can detect all major classes of illicit drugs at once, including cannabis, cocaine, opiates, amphetamines and methamphetamines.

“The Building Code 2016 has benzodiazepine included on it,” Michael adds.

If a test is positive on site, a sealed sample is sent to an accredited laboratory for confirmation.

Privacy is a major consideration. According to Michael, reputable testers deal only with an appointed individual from each client’s company, and results are not shared with any external parties, including police or insurance companies, without a court order.

Tests are conducted at random and all worksite members – from payroll clerk to single-visit specialist tradesperson – are subject to the client company’s drug testing policies, which are usually articulated clearly in employment contracts as conditions of engagement.

What happens if there is a positive result? Michael advises that employers have the right to take a range of actions, from sacking staff to instituting counselling sessions.

Apart from enhancing worksite safety, Michael suggests another advantage of random drug testing relates to insurance cover.

“I imagine if an insurance officer went out and showed someone involved in an incident had had a drug and alcohol test that was positive, then that insurance company would be wiping that claim as quickly as they could.”

#### THE BIGGER PICTURE

Clearly, the topic of illicit drug use is complex. On the one hand, Fiona

Patten MP and other advocates of legalising drugs like cannabis seek to maximise personal freedom, albeit it in a disciplined way that attempts to separate drug abuse from the worksite. On the other hand, agencies like the ADF caution about the long-lasting negative effects of illicit drug use, including ongoing impaired performance long after a drug has been used. Meantime, there is a litany of medical literature warning about the permanent damage that might arise from just one dose of an illicit psychoactive substance.

At what point does impairment begin and end? Who defines whether usage is regular or occasional? Or whether dosages are low or high?

These questions are all defined subjectively, leaving scope for endless argument about the effects of drug use in a libertarian society.

**“Since drugs like Nurofen Plus and Panadeine Forte have gone prescription, their usage has reduced and meth has overtaken it.”**



#### LEGALISE CANNABIS?

Victorian Government Reason Party Leader, Fiona Patten MP, is an outspoken advocate for the legalization of recreational cannabis. Connection Magazines asked Ms Patten about her views regarding cannabis usage in the building and construction industry:



**Plumbing Connection (PC):** If cannabis were legalised, would its use by tradespeople undermine workers’ health and safety on building sites?

**Fiona Patten (FP):** The same impairment rules would apply as the ones now, like whether someone was affected by prescription medicine or alcohol, which would impair their ability to complete their work safely. We don’t want people impaired on building sites and putting themselves and their colleagues at risk. In some jurisdictions they are conducting impairment testing, for example if someone hasn’t slept for four days.

**PC:** As a rule of thumb, would you support the use of cannabis ‘during work hours’, or purely for recreational purposes away from the workplace?

**FP:** I would absolutely not support the use of cannabis during work hours. Employees need to remain as alert as possible. We don’t support the consumption of alcohol on a building site – so the same rule would apply to cannabis.

Surely, however – personal health impacts aside – the fundamental requirement for maximal worksite safety outweighs all other considerations, just as it does in the cockpit of an airplane or the operating theatre of a hospital.

Building and construction worksites are exceedingly dangerous places. Adopting a random drug testing schedule might be the only way to combat the scourge of illicit drug abuse – there is nothing ‘recreational’ about losing a limb, suffering a fall, or coping with the guilt of harming a colleague. ■

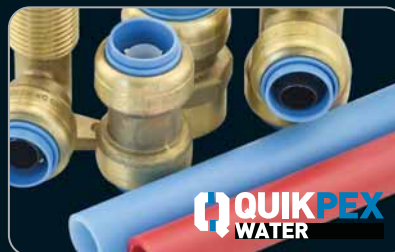
John Power is a freelance journalist based in Cherokee and Carlton, Victoria, and a former editor of *Building Connection* and *Plumbing Connection*.





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# TRAINING THE PLUMBERS OF TOMORROW, TODAY

With a vision to expand its reach and training capabilities, a new Plumbing Industry Climate Action Centre is landing in Melbourne's southeast. And it's teaming up with IAPMO to ensure this centre sets the precedent for future training centres. **Justin Felix** reports.

For a number of years now, the Plumbing Industry Climate Action Centres (PICAC) have been providing integrated education and training programs in advanced areas of plumbing and gasfitting in Brunswick and Geelong, Victoria.

PICAC's facilities are second to none and include the Fire Protection Centre of Excellence, the Occupational Health and Safety Centre of Excellence, a demonstration Green Plumbing House, world class reticulated water systems and the newest technology in water and energy efficiency. By its own admission, showcasing the world's very best, leading edge technology means PICAC is training the plumbers of tomorrow, today.

Such has been the success of PICAC in Brunswick, Victoria, that in November 2014 the Andrews Government announced it would support the development of two new PICACs in Geelong and Narre Warren. With the Geelong site successfully completed and now delivering training, we were eager to see where things were at in Melbourne's southeast. Needless to say, it's an impressive structure, both in a tangible and intangible sense.

"The building itself incorporates contemporary plumbing product. But we've gone beyond that. The plumbing is a proud aspect of the building, so at every opportunity we're looking to expose it. Plant rooms are glassed features and pipework is exposed wherever possible," says PICAC chief executive officer Shayne La Combre.

As has been the case with all PICAC buildings, ideas and inspiration have been drawn from across the globe, to ensure the centre remains contemporary while delivering training excellence for our industry.

"The biggest challenge for plumbing training, or any sort of training really, is staying contemporary. But staying contemporary, just to ensure you're up to date with 'now', is almost conceding the lead," explains Shayne.

"We're constantly asking ourselves how we can get in front because we need to ensure our industry is always training for the future. We're investigating how certain technologies will have an impact on our industry while trying to pre-empt how we can deliver training for careers that don't even exist yet.

"From the industry's perspective, we're not going to be left high and dry. We're not leaving it to the likes of government





regulators to say, this is the direction you need to take. A place like this will be charting the direction,” says Shayne.

While this is all conceptual at this stage, it remains to be seen how the Narre Warren site will capture those visions; however, the industry needs the capacity to deal with change in the future. And that’s exactly what the PICAC team see as the purpose of this building.

As per the two existing training facilities, the Narre Warren site is not being set up to compete with local TAFE’s and other registered training organisations, but rather exist to complement them.

“This is the way of the future for training in this country. It’s not just a 3-year component of an apprenticeship; it’s about a relationship with the industry’s training arm to make sure career trajectory is taken as far as it can go.”

And a big part of ensuring students are given the best possible chance to achieve that is via PICAC’s partnership with the International Association of Plumbing and Mechanical Officials (IAPMO). In fact, a third of this building will be dedicated to product testing, standards development, innovation and knowledge sharing.

IAPMO is the largest plumbing certification organisation in the world. It entered the Australian market some 10 years ago and has been growing ever since.

IAPMO and PICAC have worked in parallel toward

advancement of the plumbing industry for years and this decision consolidates many of those efforts and gives both organisations access to world-class resources and professional expertise.

The idea behind IAPMO investing into the centre and setting up its head office and testing labs (including a gas laboratory) at PICAC is to create a true centre of excellence, from which the industry as a whole will benefit.

“To grow and to become number one you need resources and a big part of the resources equation is locations,” says IAPMO managing director Paul Bonsak.

“We’ve had a close relationship with PICAC since the beginning. Personally I’ve had a close relationship with the CEO of the company for a number of years. As many would know, they’re doing a lot to protect the plumbing industry and raise the standards. With that in mind, our philosophies are aligned as through our work, we endeavour to protect our community as well as develop and protect our licensed trade to ensure it maintains the standard that Australia is accustomed to.

One of the key benefits both Shayne and Paul see from this close working relationship is the ability to learn from one another, as well as keep plumbers abreast of any new products before they hit the market. All of the products making their way through the lab can be put on display where students



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will have immediate access to them. From there products can go straight into the training environment. On top of that, an auditorium will provide the perfect platform for knowledge sharing and industry forums.

And this is where the footprint of the building promotes ongoing innovation. It isn't just a shed that's been converted. It's a purpose-built facility. On top of that, it's Australia's first net-zero energy (NZE) education and research centre.

With climate change being a very real thing, there is a challenge to architects, designers and builders to produce sustainable buildings.

Not one to back down from a challenge, FMSA Architecture once again collaborated with PICAC to design an energy-efficient building that maximises northern exposure to both the ground and first floor.

A net-zero carbon building is highly energy efficient and powered from on-site or off-site renewable power. This particular building will generate enough energy to support its own requirements. Such a feat has been achieved via a combination of the geothermal system, solar technology, an airtight building, roof design and a 375-kW photovoltaic (PV) system.

"It's the first time it's been done in the Southern Hemisphere. We've taken a lot of American ideas and added multiple layers to them," says Hutchinson Builders site manager Nick Hollier.

That's not to say it's been an easy road though.

"One of the hardest aspects of the build was the fact the geothermal was integrated into the structural. That hasn't been done here before. The fact that we have thermals going into the ground is normal. It's more the fact that of 580 piles, 190 of them have waterlines in them, 28 of which descend one hundred metres into the ground.

"We had already had the base down, ready for slabs because none of us had coordinated this type of project before. There is 7km of waterlines horizontal and 7km vertical. The concreter had to come back through and work around the complex piping network, tidy it all up and set his slab up. You can probably imagine what kind of nightmare that is. It was a massive challenge. It took us six months to get out of the ground. It would normally take two months at worst."

As they say though, nothing worth having comes easy, and Hutchinson Builders and its consultants took a boutique geothermal system and expanded it to a fully integrated building system, with the outcomes being a net-zero energy building.

Nick explains that while the upfront investment was high, through research, discussions and experience from the plumbing industry in the Northern Hemisphere a 5-7 year payback is anticipated.

When you consider this incredible achievement coupled with the training, testing and collaborative works on the horizon, it's fair to say the industry as a whole has a lot to look forward to.

The official opening of PICAC Narre Warren will take place on 10 September, a day before World Plumbing Conference begins, with visiting international guests set to take part of the proceedings. ■



A geothermal system combined with solar technology and an airtight building make this one of Australia's most impressive.



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# THERE'S ALWAYS SOMETHING TO LEARN AT ISH

**Jeff Patchell** landed at ISH to find out what we can expect to hit the market in the near future.

**T**his year close to 500 Australian/New Zealand plumbing sector visitors made the biennial pilgrimage to ISH Frankfurt in March. I was one of them. I'll even admit that my first ISH experience was 30 years ago and since then I've clocked up at least 10 visits over the years – and as usual, it was a great experience.

Nothing replaces being at ISH but let me share a few brief observations with you in the limits of this space. These are but a few of the interesting products and solutions from the more than 2,500 exhibitors. In coming editions of *Plumbing Connection*, we'll cover off in more detail some of the new products emanating from ISH 2019.

## A NEW CATEGORY RISES

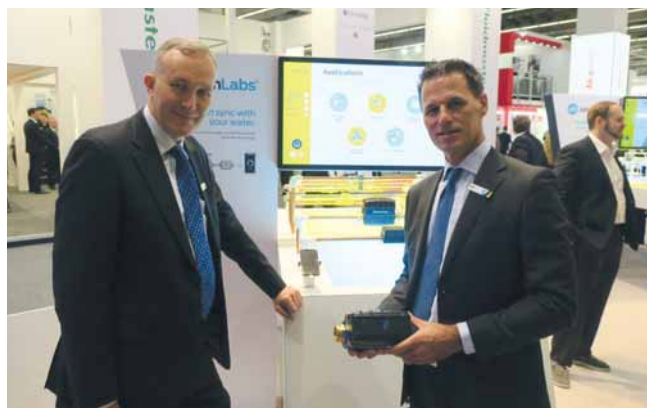
Worldwide, water damage caused by pipe, fittings, appliance and installer failure costs insurance companies more than any other claim category – yes, even theft.

While the insurance industry is not proactively addressing the water damage issue, the plumbing sector is stepping up with a solution. If it gains traction, then we'll see fewer floods in buildings and more business for plumbers.

Four companies at ISH indicated they are at varying stages of launching inline, app-supported water monitoring systems for residential and commercial facilities.

With fully proved-up devices, chiefly based on ultrasonic type technology, the suppliers are confident of winning insurance company support to reduce premiums, if one of these monitoring devices is fitted.

You could be talking \$1,000 and up for an inline installation, so there's still some work to do in convincing consumers to invest up front, then recover the cost on future premiums.



Peter Flynn and Brad Reid of Reliance Worldwide show off the Streamlabs water monitoring device.



It wouldn't be ISH without a range of fittings updates from most of the major suppliers. Uponor\* was one of the more interesting efforts.

Reliance Worldwide is entering the market around the third quarter this year by way of a US start-up company it purchased in 2016 called StreamLabs. Its app-supported product has been in development over a lengthy period. Other companies displaying water monitoring solutions included Grohe Sense Guard, RE.GUARD from Rehau and Uponor PHYN Plus. It's a topic we'll take a detailed look at later in the year.

## PIPE SYSTEM OPTIONS

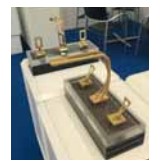
With mechanical fittings, one of the major issues is ensuring the pipe is pushed 'home' and that the crimp or slide is properly achieved.

Uponor launched its S-Press PLUS fitting for composite pipe. The fitting features an easy to identify colour-code wrapper for each fitting that indicates size and a QR code label that will fall away once the fitting is properly crimped. It also has a peep hole to visibly check the pipe is 'home'.

\*Uponor is not currently distributed in Australia

## TAPWARE DESIGN WITH NO LIMITS

Here's an interesting application of metal 3D printing. Collaboration between Italian components supplier SOS ITALIA and the Politecnico Di Milano was demonstrating new flexibility in design, using 316 stainless feed-stock for metal 3D printing. It also featured new finishing technology that it calls PVD/DLC. The opportunity to use 3D technology knows no bounds, for small quantity and exclusive requirements. ■



Jeff Patchell was a guest of Messe-Frankfurt/ISH



## ISH VOX-POP – HERE ARE A FEW AUSSIE FACES WE SPOTTED AT ISH.



Chris Galvin  
– Galvin Engineering



Christian Stauber – Valsir



Cristiano Dalla Fontana  
– Aquatechnik



Sharyn Nichols – Geberit



Tim Fisher – RBA Group & Phil Woolhouse  
– Plumbing Connection contributor



David Doerfer & Michael Gee  
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Darren Fletcher & Andrew Whitney  
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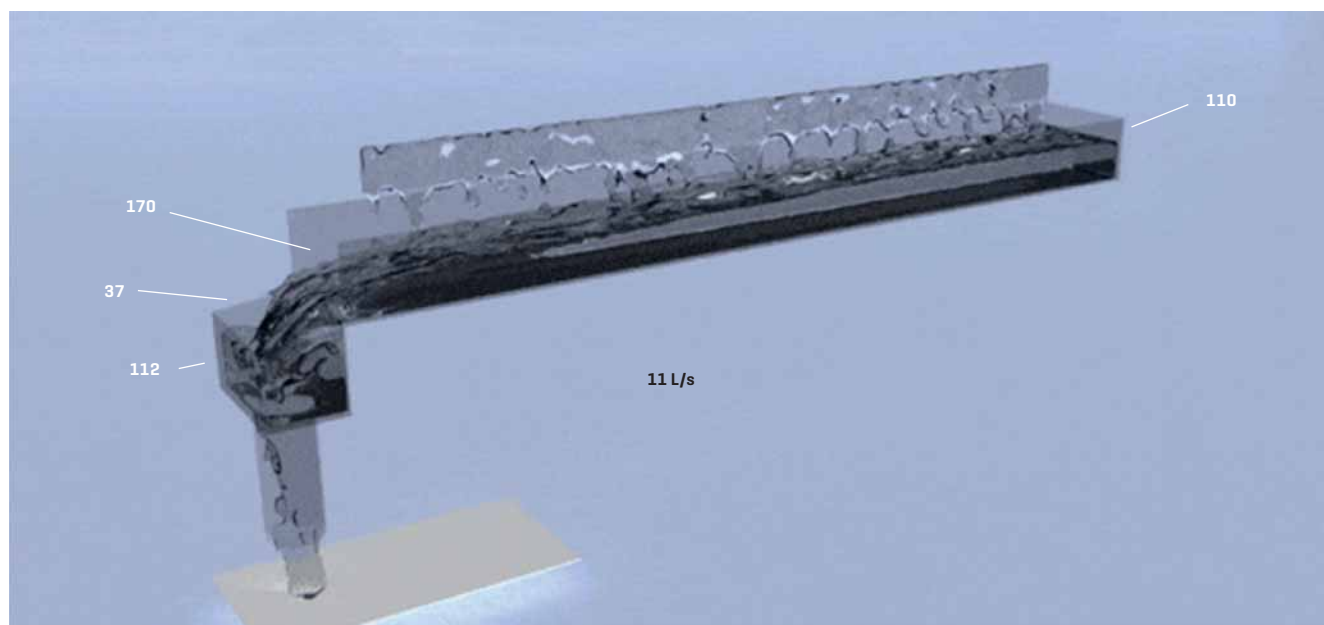
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# UNBOXING BOX GUTTERS

With decades of experience as a hydraulic engineer under his belt, **Ken Sutherland** introduces his new column by generating a working box gutter computer simulation to demonstrate how it all works.



From a young age, most of us have an idea of what our dream job would be, right? Whether it's becoming a fire-fighter, truck driver, ballerina or a vet, as a child one of the most entertaining pastimes was imagining what you would be when you grew up. As we get older those dreams become a little more realistic yet a lot further away; not for Ken Sutherland.

A dedicated man, Ken had one vision in mind; went after it, achieved it and held on to that vision for the rest of his career.

Ken began his plumbing journey in 1965 after he was employed by the Brisbane City Council as a cadet engineer. While doing this and studying an engineering degree part time for the next seven years Ken realised his skills were needed elsewhere.

For the next three years he worked as a contract engineer for different building companies across the United Kingdom. After working on projects such as shopping centres, elevated motorways and bridges, and Power stations, Ken decided it was time to focus his energy back home.

From 1978 to 1990 he spent working for a large consulting engineering firm as a senior civil/hydraulic engineer. After which he went to Tasmania setting up construction camps, building roads and bridges and of course Dams for the then Hydro Electric Commission. Took a couple of years off to go sailing, and eventually dropped anchor in Mooloolaba to set up a Hydraulic Consultancy. Which kept him

occupied for another 13 years.

After selling this business Ken was employed by Matthew Flinders Anglican College as a project manager for the remodelling of the school from 2006-2011. Included in his duties were building an early learning centre, a chapel, science block, maths and English staff rooms, three primary classrooms and a performing arts complex, just to name a few.

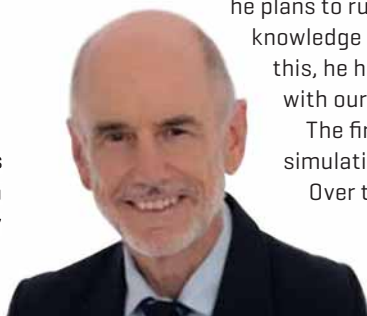
After the project finished, Ken decided it was time to share the knowledge, experience and computer programs he developed from over 40 years in the construction and building services industry. This is when [www.roof-gutter-design.com.au](http://www.roof-gutter-design.com.au) was conceived.

The website provides free online pipe sizing, roof gutter, box gutter and downpipe sizing programs for the benefit of students, teachers, engineers, architects, building designers, hydraulic consultants and the general public.

Running since 2012, Ken's site is an ongoing success and he plans to run it well into the future hoping to share his knowledge and findings with anyone interested. Following this, he has generously agreed to also share his wisdom with our readers in a soon-to-come column.

The first topic in Ken's series is on comparing a CFD simulation of a box gutter to the plumbing code.

Over to you, Ken.



Ken Sutherland



I have generated a computer simulation of a working box gutter to hopefully help in understanding how things work, and to explore how such a mathematical model compares with the Plumbing Code.

### SO WHAT IS CFD?

CFD stands for Computational Fluid Dynamics. It is a way of generating a computer simulation of fluid flow in real time. It consists of dividing the fluid into a mesh of very small particles. Analysing all forces on each particle, then tracing the resultant movement of each particle through the obstacles in the allotted time frame.

### ANALYSING THE RESULTS

The above simulation is very pretty, but not very good at measuring any meaningful depths. So let's take a closer look at the mesh.

#### The important things to note are:-

- The deepest flow is at the upstream end, because the water surface must always fall in the direction of the flow.
- The flow over the brink is  $0.7 \times \text{critical depth}$ . This is a hydraulic principle of a free outfall from an open channel.
- The downpipe does not flow full. The flow is restricted by the entry throat diameter.

### WHAT ARE THE CODE RESULTS

The simulation is based on 11 L/s, with a 300mm wide box gutter, and no slope.

From the Plumbing Code AS/NZS 3500.3, Fig I1 gives the gutter depth for no slope as 170, and with 1:200 slope, depth = 145 mm.

#### From fig I3, for a DP dia of 125, flow = 11 L/s rainwater head details are :-

- depth of water = 112
- Total depth of RWH = 187,
- and length of RWH, at BG depth of 145 [1:200] = 173

#### From Fig I6 :-

- Critical depth "Loc" = 52 mm
- $0.7 \times \text{critical depth} = 37$

### PLOTTING THE RESULTS ON THE MESH

The background grid is 100mm spacing, so you can visually check the dimensions, and confirm I am not pulling any legs.

The Code does not give any values for the freeboard, maybe this is because the freeboard may vary with width and flow, as in some other plumbing Codes. However I find that a value of about 60mm seems to work. It gives a water depth of 110 mm.

The total gutter depth, and rain water head dimensions are also plotted to the code sizes.

As you can see, there is remarkable agreement with the Plumbing Code.

So we can all go away with a warm inner glow, knowing that a CFD simulation agrees with the Plumbing Code [or is it the other way around?]. ■

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DIAGNOSTICS PRESSING PIPE & TUBE TOOLS DRAIN MAINTENANCE POWER TOOLS



# BRINGING THE HEAT WITH MANIFOLD SYSTEMS

Mainline plumbing has long been at the forefront of hot water delivery in Australian households; however, there is an alternative solution that offers many benefits. **Justin Felix** explains.

**T**here have never been so many heated water options available to the Australian plumbing industry.

While the major focus is on running costs, unit capacity and performance aren't too far behind. And when it comes to performance, the availability of hot water when you need it, where you need it. And that point of use location can often be a long way from the actual hot water unit, therefore you can be kept waiting a long time for the heated water to reach the outlet.

With a manifold system less fluctuation exists when taps and other appliances are turned on elsewhere in the home. There's no hammer noise either.

The concept of a manifold system has been around for decades, though with the advent of plastic pipe (polybutylene 'PB' was the first) in domestic installations some 40 years ago, there was a push in some countries to do more with manifold systems, to serve both outlet appliances and in-floor hydronic heating. The same cannot be said for Australia though. For one reason or another, the system hasn't exactly taken off here.



Leap Civil managing director Dave Porteous displaying the Manifold system, which he believes is part of a very underrated plumbing system.

When you consider the benefits of manifold over traditional plumbing systems, it's hard to understand why.

These days PEX is the leading plastic pipe by volume.

One of the key benefits of a home-run manifold system is the fact it's joint-free, and like it or not, failure of joints is a growing issue across the industry. Sometimes it's the mechanical joint itself, while on other occasions it comes down to poor installer practice.

The advantage of having no joints hidden away in walls or underfloor would seem pretty obvious.

So let's take a closer look at manifold systems, their advantages, applications and how they compare to traditional mainline plumbing systems.

Broadly put, manifold systems are not complex. While they can exist in multiple forms, their basic structure consists of a main service line that feeds into a tubular chamber with multiple connections to outflow lines.

That's a dedicated pipe from your water source to the kitchen sink, another to the bathroom sink, one to the shower, and so on. While that may seem like a lot of pipe running around a residential home, it results in more consistent temperatures, pressure and few wasted litres down the drain.

Having a dedicated pipeline from a manifold near the hot water cylinder to each tap or fixture means hot water goes directly where it's needed without sitting idle in larger feeder pipes that serve multiple outlets. ➤







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On top of that, given each fixture is supplied by its own line, pipes of a smaller diameter can be used. That in itself means less water is wasted.

Manifold systems can be made from various materials including the likes of copper, PB and PEX, and as with most things, each has its own advantages and disadvantages.

We caught up with Leap Civil managing director Dave Porteous to learn more about its PB product Manifold and these alternative plumbing systems as a whole.

"Initially we started plumbing the whole house in manifold - both hot and cold," says Dave.

"The unique selling point we pushed in the early days was 'a balancing system' which ensured you avoided being scalded in the shower when someone else turned the kitchen tap on. That was, and in plenty of homes still is an issue due to large diameter of pipes and the extra flow that travels through them."

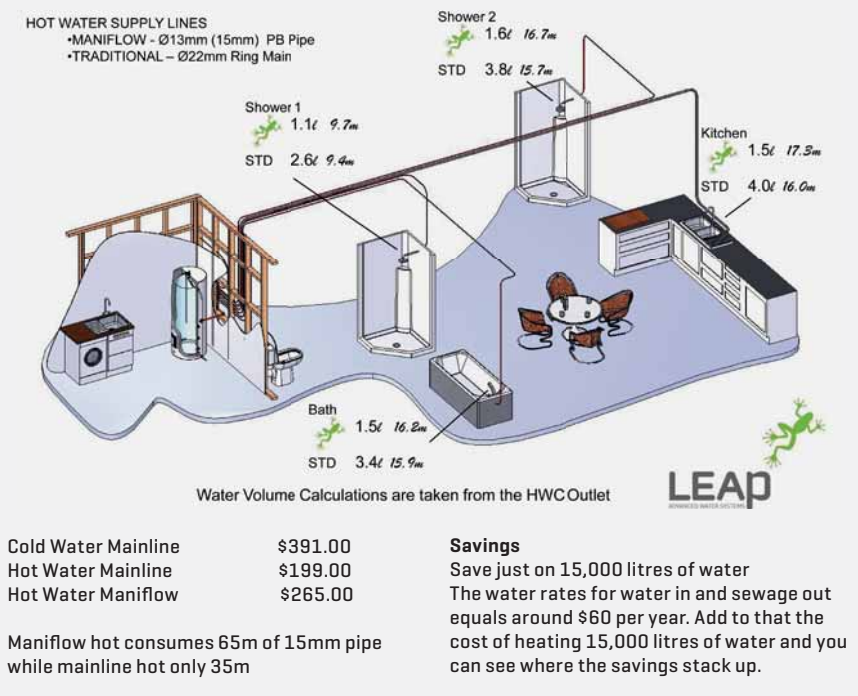
But then the drought came.

"When things began to dry up, I said to myself, 'it's time to look at things in a different way now'. We can boast it as a water saver because that's exactly what

#### KEY ADVANTAGES OF MANIFLOW PLUMBING SYSTEMS

- **Reduction in water wastage:** With conventional systems, each time you turn the hot tap on you have to drain off and waste a lot of cooled water before hot water arrives. With Manifold, pipes of a smaller diameter connected almost directly to the cylinder mean much less is wasted before the hot water arrives. You get hot water almost instantaneously and significant savings in water use that add up over time.
- **Energy savings:** When you turn the tap off, there's less water remaining in the pipeline to cool off, reducing the amount of energy wasted.
- **Consistent temperatures:** The Manifold manifold has a reservoir that helps keep the pressure of your hot water much more consistent. No more "aaaagh!" from the shower when someone fills the tub in the laundry or turns the sink tap on.
- **Less maintenance:** Continuous lines to each tap or fixture with no hard-to-get-at joints to leak. It's totally maintenance free.
- **Silence:** Flexible, small diameter Manifold pipes eliminate water hammer and water noise.

#### COST COMPARISON OF MAINLINE V MANIFOLD



Dave and his team at Leap changed the design a little bit so that only hot water was running to the manifold. They realised that they didn't need to manifold cold water. It was using extra pipe, it took longer and it cost more.

"So we went back to mainline plumbing for cold and turned to manifold for hot. We knew that would give us our water savings because people work automatically. Just watch people who want hot water. They'll turn the tap on and won't do anything with the cold water until the hot water arrives. Very few save that cold water," says Dave.

Interestingly enough, based on WELS data, most people wait 20 seconds before getting in the shower. That's 3 litres of water wasted at 9 l/m. If a household uses the showers 4 times a day on average, that's 12 litres of water wasted a day.

"The other cost saving we found comes from discharging water to the sewerage system. That is based on the amount of water that comes through the meter, rather than how many times someone uses the bathroom."

So after the drought Leap had two

a - the system will save you water  
b - the system will save you money because you're discharging less water down the sewerage system.

Unfortunately it seemed plumbers in Australia didn't quite understand it, so the adoption rate wasn't as high as Dave would have liked.

While installations can look tricky at first glance, Dave assures that most manifold systems can be installed in virtually the same time as a traditional mainline system and can be done so in virtually any home, so long as the plumber understands how the chosen system works.

To ensure the system works to its full potential, it's recommended that the hot water unit is located as central to the house as possible.

With water and energy seemingly becoming more precious, there's a bigger push for more sustainable building practices to be explored now and in the future. With that in mind, manifold plumbing systems seem to have evolved well ahead of their time and should be considered as an alternative method by both plumbers and builders all over the country. ■



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\*\*Must remain in an upright position for 30 minutes before connecting power during installation.





# INSTALLATION CRAFT: THE LOST ART OF STYLISH PLUMBING

With a decline in authentic tradespeople who define their work by their craft, a plumbing business in New South Wales has created a copper work of art. **Esther Rivers** reports.

**F**ivestar plumbing is a small business in Sydney that gained attention with a piece of work that is currently a trending concept for plumbers: installation works of art.

Beautiful pipework is for plumbers what beautiful brush strokes are to an artist. 'Sweet' installation pieces are almost like an impressionist painting, pleasing to the trained — or even the untrained — eye. A good plumbing installation is craftsmanship, precision and detail that will result in an entire piece of fine work. It involves hard work, a strong eye, imagination and talent.

Fivestar plumbing's managing director Wahib Shanferly had that kind of vision. When on site for a large job in Cronulla, he explains how he saw an opportunity to create a piece of work that would shine.

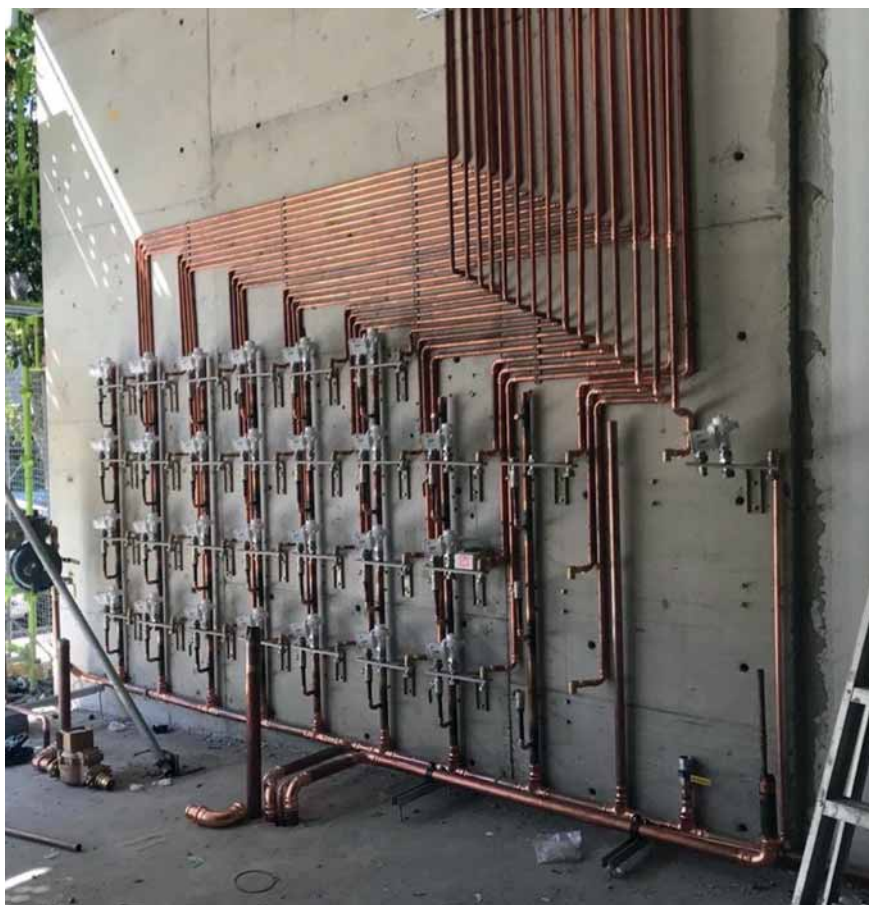
"We were doing 28 luxury apartments in Cronulla, working for Taylor Construction.

"Originally they had all the gas metres in the lobby areas. They wanted to remove them from there and locate them all in the loading dock area on the road. We knew there was going to be a lot of work involved, so we thought 'Ok, no problem, this is an opportunity'."

This kind of work is the recognition of great craftsmanship within the plumbing trade, which could be described these days as a bit of a lost art.

Installations such as these ones are so often on the inside of buildings that even if they are works of beauty we fail to be able to witness it. For those wanting to see this kind of work in person, all you need to do is head to Cronulla and walk on by.

"I figured I could take the installation from where you can't see it, really take advantage of the situation and showcase the work from the outside. I



Plumbing installation or work of art? Fivestar plumbing's Wahib Shanferly knew his team had an opportunity to create a statement piece here and he was right.

knew what the end result could be."

The Fivestar plumbing job took only two weeks to complete from start to finish. Wahib explains how there are still plumbers out there who want to see and do good work, and why it's important.

"We made sure we put the right guys on the job and we did a beautiful job of it. We wanted to show that there are still good quality tradesmen out there who take pride in their work. Lately the quality of people has just dropped dramatically, it's really bad."

Wahib explained that from the initial

design phase to the installation stage there were only four people involved. The building process took only two.

Other external installation pieces have garnered similar attention on social media with similar amounts of appreciation expressed alongside the installation photographs.

For Wahib and his team it is a celebration of a company who take pride in concepts, pride in their ideas, and above all pride in their craft.

"I thought I would turn this into something." ■





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# LEAD[ING] THE INDUSTRY

The problem of lead contamination isn't new, but an Australian university team believes they may finally have a solution. **Ainsleigh Oates** talked to researchers to find out how.

**L**ead plays an important role in the machining of plumbing brassware but there is a downside to having lead in contact with wetted surfaces.

Back in 2014 the United States became an icon for the plumbing industry. Practically eliminating lead from plumbing products with the standard being set to 0.25%, it took four years from the commencement of the legislation in 2010 for the entire nation to get on board with the change.

With all the stories about lead poisoning over the past couple of years, Australia has not been so quick to the game. The Australian standard for lead content in plumbing brassware is still 4.5%. Compare that to 0.25% and it's a significant difference.

Scientists from the University of New South Wales (UNSW) have been working on a way to replace traditional brass plumbing materials that contain lead with a lead-free brass alloy. Aptly named 'bright brass', the new alloy will still have all the industrial advantages of lead without the harm involved.

Lead consumption in infants and children has been linked to underdevelopment in the brain, not to mention a huge range of symptoms from muscle pains and fatigue to seizures and coma in any age that has been exposed to it. Given the number of reported cases of high lead levels in water systems nationally Dr Kevin Laws from UNSW believes it has reached the stage where it's crucial to provide an alternative to lead in order to avoid the situation getting worse.

"If we don't find a suitable replacement for leaded brasses, costs are going to keep rising in all areas. The cost to



While the initial change to a new material can be costly, the long-term advantages could be significant for the industry.

manufacture will go up and in turn that will get passed on to society, to the buyers paying for these products. And when costs go up that's when people tend to start taking shortcuts. On top of that, if cost goes up, the replacement of leaded components in existing water networks becomes a lower economic priority, taking much longer," he said.

Kevin is the inventor of bright brass and director of Advanced Alloy Holdings. As the bright brass trials have been ongoing for quite some time now, Kevin says the researchers are between the laboratory stages of development and internal testing and taking the product for

pilot runs in the field.

With some flagship alloy compositions already developed and avenues like casting alloys, free-machining alloys and forgeable alloys being explored, the UNSW team has started to approach large international foundries to get them on board for production trials.

"Very recently we've formed a large consortium of these Australian and international foundries and end users within the brass industry. The overarching concept behind this consortium is industry will come to us and say 'okay, we need the materials to do this, this and this' contributing to the required research and when we have developed a suitable material, the industry partners will begin large-scale production trials and manufacturing," says Kevin. Depending on how fast the consortium comes together and research funding can be generated for





this work, we're looking at having pilot products rolling off their lines within the next two years," he says.

As the materials will perform in a very similar way to leaded brasses and are essentially produced the same way, Kevin believes the time it takes to get bright brass to the market should be reasonably quick.

The key to getting bright brass to the market is through the UNSW spin-off company, Advanced Alloy Holdings. The company was founded to hold the intellectual property associated with the lead-free alloy products developed at UNSW and shall be responsible for licensing the products globally. With the partnership between Advanced Alloy Holdings and the international foundries that are interested in trialling the product, Kevin can see the bright brass potentially being in circulation globally within the next 2-3 years.

There are many obvious advantages to the manufacturing of lead-free

brasses and other products, however there are also disadvantages and Kevin explains how bright brass overcomes those.

"The toxicity of lead is the key issue, with the recent legislation in the USA and Europe dramatically limiting the lead-content in key brass grades, leaded brasses will likely be extinct within the decade. However, when you take the lead out, you lose all these fantastic machining and castability properties, making them less economically-viable to industry" he says.

"We have a lot more design flexibility with our product. Regular brasses contain copper, zinc and lead in them. It's basically a two-dimensional scale that you can move in terms of what properties you can generate in these brasses. When we put in the other elements; manganese, nickel and aluminium, it then becomes a five dimensional compositional space so we can adjust all of those elements in

certain ways and we can accurately change things like our strength, toughness, corrosion resistance and of course our machinability."

In saying all of that, Kevin believes the most important factor for industry is cost.

"Brass is basically a commodity metal, with the market prices of copper, zinc and scrap brass dictating the product price across the sector. Profit margins are determined by manufacturing efficiency which in most cases is related to machinability which is why industry has been so dependent on lead.

"By developing a free-machining product incorporating low-cost elements like manganese and aluminium gives the flexibility of offsetting the cost of more expensive elements like copper and nickel making it cheaper than regular leaded brass and less susceptible to market price fluctuations." ■



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# WHAT'S CAUSING CORROSION IN OUR PIPES?

During the last 10 years we have been told that high velocities (water speeds) in pipes cause the corrosion of copper and that plumbing standards have allowed water speeds that were detrimental to the installation of copper pipes. However, onsite field testing has actually found that water speeds were nowhere near their maximum permissible rates and, in fact, the opposite was occurring - the velocities in most instances were too slow. **Phil Woolhouse** explains.

**T**here are currently many opinions being expressed on social media about the cause of plumbing material failures, with quite a diverse range of theories from across the industry.

Some opinions are simply not accurate as they suggest these problems are only occurring in a single material. Those of us who do this type of work professionally know this is definitely not the case. I have been studying and investigating pipe failures for almost seven years now and if we do nothing as an industry to try and fix this problem, then things will get only get worse for every pipe material and everyone associated with plumbing.

I have been fortunate in my plumbing career. I was trained by and have had the privilege to work with some of the best people in the industry, both in Australia and my place of birth - New Zealand. My first boss, the late Alan Bull, owner of White & Taylor Plumbers in Christchurch, had one of the smartest plumbing minds in the industry. He once told me, "I don't want you to fix anything without understanding why it broke in the first place."

At the end of every day, Alan would go through my maintenance job cards and ask me what happened and why it happened? If I didn't know why a problem occurred, he would send me back to the house the next day to try and work it out. You only have to face the embarrassment once of returning to someone's home to work out what the problem was.

Wanting to know why something happens can be addictive, almost an obsession. There have been many times in the past when I think I have solved ➤



This copper pipe was installed in an area where there were very high free chlorine levels. It was interesting how the pipe damage changed dramatically depending on the orientation of the pipe. This indicated that chlorine on its own was not the only contributor.



If PPR pipe fails, it generally occurs in the same location within the building, depending on which multiple simultaneous factors it was exposed to. In my experience it is typically a very small percentage of the total amount of pipe that is affected. This image is of a transition between a totally oxidised pipe to further down the line where the majority of the pipe was undamaged. Different factors are more prevalent in different parts of the system. The key is knowing how to turn them off.





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a problem only to find out there was something missing in my hypothesis and I was forced to look for another piece of the puzzle. I now see the puzzle as almost complete, with only a slight adjustment required of what we already know. Albert Einstein once said, "If I had one hour to solve a problem, I would think about the problem for 55 minutes before starting on the solution."

### WHAT'S THE ROOT CAUSE OF PIPE OR EQUIPMENT FAILURE?

Well, first and most importantly, it's not one single thing. It's a combination of multiple factors that occur simultaneously.

Think of it as the perfect storm in a changing climate. These factors are all occurring more regularly. To make it even more interesting, the combination of different factors changes from job to job and two factors occurring simultaneously can create a third or fourth factor.

#### Here is what I often encounter and they are in no particular order of importance:

- Temperature
- Entrained air

- Compatibility of certain types of equipment
- Expansion of pipe materials (or lack of)
- Incorrect pipe supports (or back fill for below ground pipes)
- Water hammer
- Cavitation
- Poor installation or pilot error
- High levels of copper chlorine or oxygen
- Lack of system preventative maintenance
- Cyclic pressures
- Large sudden pressure drops
- Velocity is either too fast or too slow
- Design or equipment selection issues such as:
  - Incorrectly sized pumps
  - Incorrectly sized valves
  - Pipe alignments and sizing
  - Pressure zoning

I have been to a building pipe failure where almost all of the above factors were occurring within the same system. Needless to say, that system didn't last long and nor would have any piping material if it had been used.

So, where do we start?

To try and explain seven years of acquired knowledge is not going to

occur in one single article. I'll start with trying to explain how a water distribution system in a building works. The figures and numbers that I use are mostly based on the data I have collected.

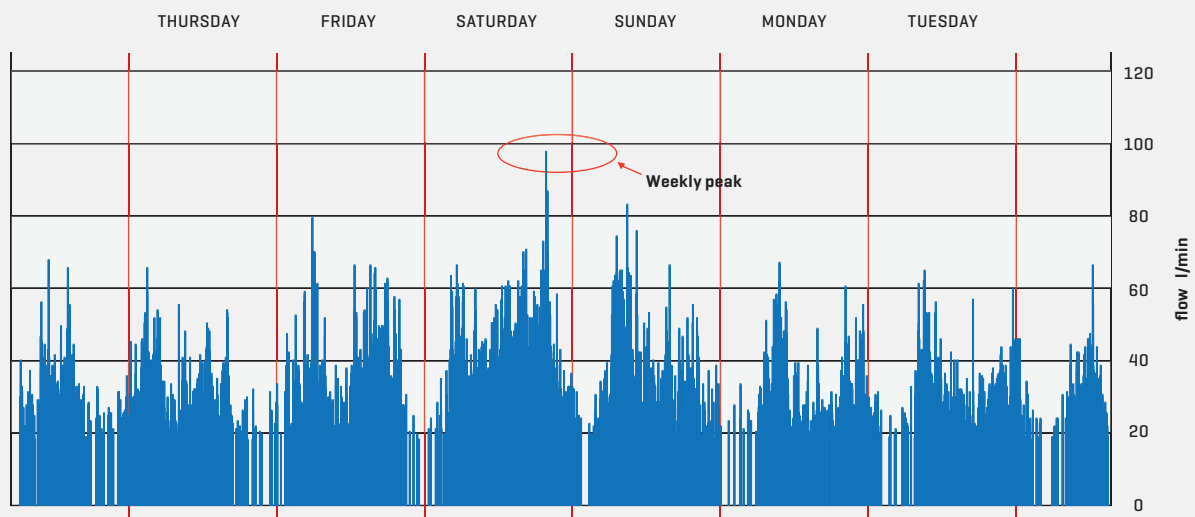
A building's water plumbing system generally operates as a direct reaction to the human bodily needs or functions. How long do we drink for, or shower, or wash, or go to the toilet for? On average, we each use 100 to 120 litres of water per day per person. If we assume the average flow rate per fixture is around eight litres per minute, then individually we are using the plumbing system for a maximum of 15 minutes per day. That is just a mere 1% of the day that the system is actually flowing per person.

### UNDERSTANDING WEEKLY PEAK FLOW RATES

Recording flow profiles in many different buildings starts to show us some common trends.

The first trend is the weekly peak flow. There always seems to be a couple of peak flows that are significantly greater than all of the rest but they only ever last for a short period of time - ➤

### WEEKLY PEAK FLOW





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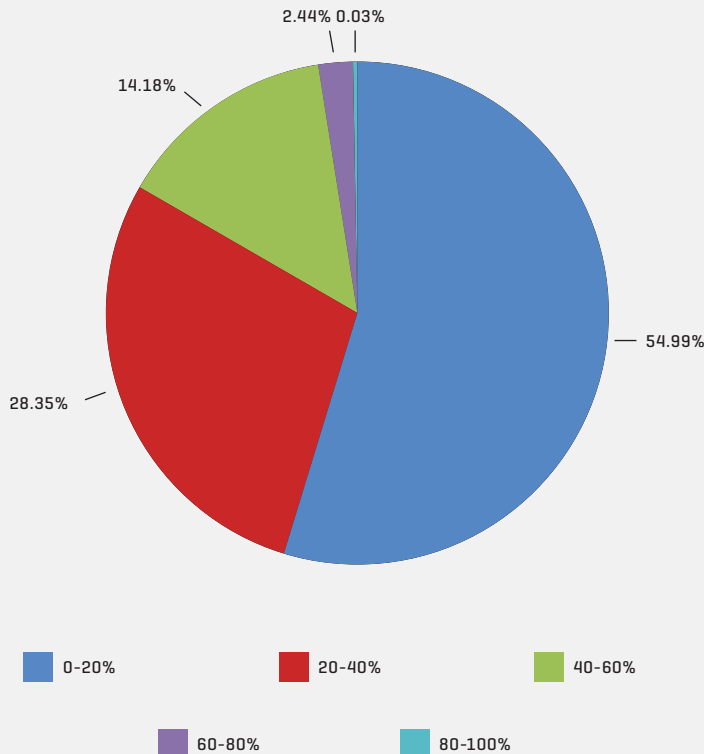
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## AVERAGE TIME OF FLOW RATE AGAINST WEEKLY PEAK



generally less than a minute. This actual weekly peak is substantially less than the required minimum simultaneous flow as nominated in the AS3500.1. The system is operating at low flow rates for the majority of the time.

NB: There are some exceptions to this rule and these are normally associated with commercial equipment, such as a tank filling device or an irrigation supply or connection.

Peak or high flow rates that happen in the top 40 percentile of the weekly peak occur less than 3% of the time. For 90% of the time, the building is operating at less than 50% of the weekly peak and 55% of the time the building is operating between zero flow and 20% of the weekly peak.

## MY FINDINGS

We are clearly designing and/or installing our pipes and equipment for the highest possible demands but our systems most frequently are operating at their lowest demand. I am

not recommending that we all go out tomorrow and install several pipe diameters less than we are today; however, we just need to be more aware about how our systems actually function.

High pipe velocities are known to increase the rate of corrosion to copper and

other materials. Cavitation damage is normally the contributing factor resulting from the increased water flow rate. Some believe that due to the reduction in the velocities in the

**High pipe velocities are known to increase the rate of corrosion to copper and other materials.**

standards that copper pipe needs to be increased in size. I have found no evidence in the field to support that theory but the calculations within the standard defiantly indicate that to be the case.

I am seeing some instances of increased rates of polymer degradation that are consistent with cavitation yet the velocities measured in the pipe do not support the presence of cavitation. The Australian Plumbing Standard AS3500 is one of the few plumbing standards in the world that include the maximum PSD rate within maximum velocity calculations. How often do they occur less than 3% of the time? Is this really an issue? I don't believe so.

The low flow rates are generally more critical to the sizing and selection of valves, pumps, water meters and similar equipment - other than pipes. It amazes me that plumbers all seem to understand how to size a gas meter based on the volume of gas being used but when it comes to a water meter, if the pipe size is 100mm then they also install a 100mm water meter...

The consequences of this may not be that critical to the operation of the plumbing system. You might just miss 30%-40% of water that passes through the meter as large meters do not detect low flows, but it should not affect the overall fluid dynamics.

Make the same mistake with a pressure reduction valve or a diaphragm tank fill valve and we can have some serious turbulence and system dynamic issues.

I will discuss these types of examples in more detail in later editions. As I move on to discuss other topics, the need to understand the majority of times our piping systems are operating at a minimum flow capacity will become a really important aspect of material failure. ■

Phil Woolhouse is Perth-based a plumbing consultant passionate about discovering the reasons for material failures of piping systems.





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# HOW TO HIRE AN APPRENTICE

Finding a suitable, hard working apprentice seems akin to finding a needle in the haystack these days. So what can you do to tip the odds in your favour? **Plumbing Connection** reports.

**F**ew contractors are skilled in hiring apprentices. It's a world away from being on the tools after all.

Too many look for someone like themselves, or off the back of a recommendation from one of the blokes at the pub, which is not necessarily the best way to go about it.

And the kid playing centre forward in the local footy team might look the part, but won't always make a good apprentice.

The thing is, a lot of time, money and effort is required to get an apprentice up-to-speed. So the return on your investment doesn't typically kick in until the third or fourth year. On top of that, there's very real risk of them leaving you as soon as their apprenticeship is served. And then you're back to square one.

On the flipside, it provides an opportunity to give something back. It's a chance to pass on your skills to the next generation of Aussie plumbers. And of course, there's the obvious bonus of having a helping hand onsite.

So what should you look for, and where can you turn to for advice?

The Master Plumbers nationally have field officers who can assist and they obviously employ kids under their own group scheme; however, there are plenty of contractors who have to go about it on their own.

Master Plumbers Association of New South Wales general manager Paul Naylor explained that while its 7-step application process may be elaborate, it is a great way to filter out the good from the bad. Across the TAFE system in NSW, the completion rate is less than 50%, while plumbing is around 59%. For Master Plumbers NSW it's 90%.

Paul kindly ran us through the 7-step process in an attempt to provide ideas for contractors looking to hire apprentices.



If only it were as easy as putting an ad in the local paper and waiting for tens of hard working, dedicated, non-attitude bearing apprentices to knock on your door.

## 7 EASY STEPS TO BECOME AN APPRENTICE PLUMBER

**1** Complete an application form and attach it to the front of your resume. This includes supporting documents.

"We grade the initial applications. We do so because we try to find out right from the get go if these kids can read, understand what they read and answer the questions they are given. It is pretty obvious if the parents have helped them," says Paul.

**2** If your application meets the minimum requirements, you will be invited to sit an aptitude test at a Year 10 level in Maths and English. NO calculators are allowed.

"A pass mark is 60%. They cannot bring a calculator in. That rocks the boat among a whole lot of kids, especially because they can access one so easily on their smart phones these days."

**3** Applicants achieving the minimum benchmark score will then be invited to attend an interview with MPAL Staff. On completion of the interview you will be invited to undertake a Harrison Motivation Assessment.

"The world renowned test takes around 30-40 minutes and it really shows if the kid sitting in front of us is telling the truth and whether he or she has the skills required to become a plumber. It isn't a pass or fail test. It's an indicator test.

**4** Candidates may be required to attend a "Pre-Vocational" or the MPA NSW "Bridging the gap" course to demonstrate their ability to succeed as an apprentice.

"We do this to fill in the transition period between school and work. It's to get the kids in and assess their motivation levels. We work out if



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they're going to hide at the back, or use their phone all the time. We look to see if they're chatty and boisterous or shy and timid. We score them every day on 6 different points. Again, it's not a pass or fail but if they do get through it they actually achieve 8 units out of the Cert 3," says Paul.

**5** Attend a medical examination. "We look for a range of things, but the main thing we look out for is a disease in the back called spondylolisthesis. It's a degenerative disease in the vertebrae. You can have it and not know that you do. It normally comes from the generation behind your current parents. And it can come from mother or father. If someone has it, they're at very high risk of injury. As an example, plumbers are going to dig and any type of repetitive manual labour like that will trigger it," says Paul.

"From 2003-2016 I can recollect seeing 4 cases. In 2017 we had 2, in 2018 there were 6 and already there's been one this year. I don't know what's in the water but it's something we're coming across more frequently."

**6** Attend a final interview with the Operations Manager/General Manager.

**7** Prior to commencing work, you will be required to complete an induction workshop and sign up to your apprenticeship.

You get very few that drop out at this point but some will bail half way through and attempt to get a job with someone else. The kids that do come in normally get through without any problems.

While this all sounds extremely positive, most contractors don't have the resources to conduct such a lengthy due diligence process when it comes to choosing an apprentice.

We caught up with a couple of contractors around the country to chat about their experience with hiring apprentices, as well as providing a platform for them to vent some of their frustrations with the system as a whole. We're sure some of their words will resonate loudly among others.

Stephen Dawber, Stephen Dawber Plumbing Director MP SA

"I've been in the plumbing industry for 35 years and have worked for myself for around 29, during which time I've probably employed 40-50 apprentices", says Stephen.

"My philosophy is pretty simple, yet different to a lot of other contractors around the country. I offer them a six year contract from the start and make it clear that I'm going to train them for that whole period. Anything after that, if they stay, is a bonus. You do invest a lot of time and money into them so you certainly appreciate if they stay on."

As Stephen explains, by the time apprentices go to school and have holidays, you only really see them for eight months of the year, so for those eight months it's your job to ensure they get as much hands-on experience as they can. But you can't expect them to be the finished article within the first 12 months.

"I generally find it's in the third year that you start setting them individual tasks and that's when you can expect to start earning a little money back. In my experience though, it isn't until the 5th and 6th year that you start earning a decent return.

Since Stephen introduced his six year contract 12 years ago, four have stayed beyond those formative six years. One has been with him for 15 years, another 9.5 and another 10. While the numbers may seem low, for anyone who has employed apprentices in the past will know that's an impressive return.

So how does he go about choosing them in the first place?

"I often ask them about their families and what their dad does. I like to find out if their dad is or was a tradesman or if he's worked with his hands, because that typically means he'll be more inclined to follow a similar path," says Stephen.

"We find our apprentices via a number of streams including Training and Placement Services (TAPS) and PEER. We've also used the Master Plumbers, from which we hired an apprentice on the group scheme."

Stephen now uses the local technical college from which he endeavours to poach the best student from each year.

Good ol' fashioned work experience provides Stephen with the best indication as to whether or not an apprentice will work out though, as he says, "They have to get on the same page with you and you can usually tell from work experience if that'll be the case."

Queensland maintenance plumber John Salmon also hires apprentices, but believes the Pendulum needs to swing further toward the way of the contractor.

"The system is flawed and needs review," says John.

"I think apprentices should do two years at college, then have block release, during which we don't have to pay them. It should be considered part of their education."

John also believes apprentices should come out of college with height and safety training endorsements because it's the first thing he ensures his apprentices accomplish once their three month probation has ended.

Similarly to Stephen, John is considering a contract that will encourage apprentices to stay onboard and provide a return of service once they have proven themselves during the formative years of service.

#### **John has two main tips for other contractors when choosing an apprentice:**

- Engage with their parents. John has noticed a strong correlation between attitudes among young male apprentices and the relationship they have with their father.
- Look at their social media to help determine they demonstrate the type of character you can see yourself working with.

So, if the thought of going through the interview process keeps you up at night, for fear of not knowing where to begin, hopefully this article has provided some hints and tips to set you up on the right path.

Happy hiring! ■



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# HOLMAN

## PLUMBING



### Holman Innovation

#### With Wally Edwards

*Managing Director, Holman Industries*

*Like many Australians I have always had a 'have a go' approach to most things in life. It has been said that I **definitely** had too much of a go when I opened the batting for Australia! Caught out hooking twice in 6 innings!*

In my business life I have always been keen to embrace new ideas and 'have a go'. I remember in my early years at Eden Irrigation supporting a small electronics company which had invented what was the first electronics based irrigation controller developed anywhere in the world. It was designed and manufactured in Perth. After using the product for 6 months I liked the idea so much I bought into

the business as a shareholder. I remember taking the product to a large US Irrigation company and they too liked the product. They kept us talking for about 18 months while they copied the product! A lesson learnt!

Since then I have been hooked on manufacturing irrigation controllers in particular, and plumbing fittings. Holman now employs a team of 5 engineers and a product designer. They are focussed on a range of products covering garden watering, lighting and weather stations in particular. A couple of these new ideas will become products that will be released in the next 12 months.

My head engineer and my industrial designer have played a big part in setting up our new moulding factory in Perth. Our aim is to create a





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modern manufacturing business that can succeed and thrive in Australia. To make this happen we have built new tooling for all the products to be manufactured here. As we have tooled the products we have taken the opportunity to add a couple of new design features. We have introduced square, even pipe stops and a 'Holman Measure Mark' which will allow plumbers to accurately measure the pipe length from pipe stop to pipe stop.

We have also purchased new state of the art moulding machines. These are fitted with robots which can handle the moulded products with care and barcode if necessary. The factory is close to starting production. The tools are being tuned for sizing and the machines are ready to go. We will discuss this more in the next edition of *Plumbing Connection*.



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# 10 TIPS FOR SUCCESSFUL RECRUITMENT

In building and construction, investing in a team of rock stars is by far the safest and most profitable investment you will ever make. Recruitment expert **Kara Atkinson** explains.

**L**et's dig into the 10 steps you can implement now to take the coin-flip out of your hiring process, and start attracting and landing rockstar employees consistently.

## STEP 1 – CREATE A ROCKSTAR SCORECARD

It's vital to take the time to define what you want. I'd like to make it clear that hiring rockstars, is ideally done across two axes: competencies and organisational fit. This is your rockstar scorecard. Competencies means their skills, abilities and characteristics required for excellence in a role. Organisational fit is a measure of a candidate's core personality and principles matching your organisation's culture and values.

## STEP 2 – DEFINE YOUR ROCKSTAR'S DNA

The DNA you are seeking is found in the personality traits that your current rockstars already share. It's their core personality traits that have been ingrained from childhood. There is a clear and fundamental difference between DNA and competencies. Competencies and skills can be improved. DNA rarely can.

## STEP 3 – DEFINE YOUR EMPLOYER VALUE PROPOSITION

The top 10 companies in Australia in 2018, according to LinkedIn, have one commonality – a highly compelling Employee Value Proposition. What you expect your team to deliver, to your clients and customers, is what you need to deliver to your employees.

## STEP 4 – CREATE AN INVITATION

Scary fact; most organisations I work with either have a job description that is 10 years old or it doesn't exist at all. So why do most companies take a standard job description template and post it online? The reason why rockstars typically never interact with these posts is because job descriptions do not speak to their PAIN; do not speak to their VISION. There is no compelling reason to act.

## STEP 5 – DESIGN A 5 STAR CANDIDATE EXPERIENCE (CE)

A poor candidate experience can create an environment where it becomes harder to attract good talent. Mistakes like failing to call candidates back, or misrepresentation around remuneration and other key aspects of the job can really put quality applicants off. Refine your CE and strive for excellence.



#### STEP 6 – IMPLEMENT A PREDICTIVE INTERVIEW STRUCTURE

Predicting a candidate's future performance comes down to risk assessment. What you're looking to do is de-risk the hiring decision by focusing on real predictors of success; not what most construction hiring managers actually do which is look at like a resume, education, interview ability and then hire on gut instinct. To help you create a five star candidate experience, you need four stages, including an Initial Assessment, Competency Interview, DNA Interview and Test Drive.

#### STEP 7 – THE BACKDOOR REFERENCE CHECK

People are perfect only twice in their lives - once when they are born and once when they apply for a role. References are no better than a list of paid endorsements. The worst you may hear is their weakness being an over-dedication to the job. Really? Locate the candidates previous employers and call them. I need to stress here the confidential nature of the candidate's job search. It is imperative that you do not put anyone at risk by talking to current employers.

#### STEP 8 – THE OFFER

I have seen countless hiring managers, right at the final siren, make the mistake of ending the courtship too early; taking too long to make an offer, making a low-ball offer, changing the job title, or forgetting that the candidate is a human being. This is a ghosting act that tells the candidate you're not sincere.

#### STEP 9 – ONBOARDING (ROLL OUT THE RED CARPET)

Don't crush your new hires excitement with a mountain of orientation checklists or throwing them in the deep-end with zero preparation. Too many times I've seen hiring managers who, once they've gotten their new hires butt to hit the seat, move on to the next thing. As any marriage counsellor will tell you, the real work starts when the ring goes on the finger, and yours starts on your new-hires' very first day of the honeymoon.

#### STEP 10 – RETENTION (HEADHUNTER PROOFING YOUR TEAM

Turnover is good. Or at least, the right turnover is good. What you really have to worry about, is turnover among quality staff. Those you worked so hard to recruit, wooing them from their current employers and enticing them with an Employer Value Proposition that is so on-the-money, it's a no-brainer. These people should be protected at all costs. ■

#### AUTHOR BIO

Kara Atkinson is an expert in recruitment with over 18 years in the industry. Kara created her own recruitment business 10 years ago, fuelled by the opportunity to help people continue to build and transform themselves through their career. Kara specialises in sales and marketing executive roles, recruiting across all industries (particularly in the manufacturing, industrial, B2B and FMCG) and business sizes. To find out more visit [www.karaatkinson.com](http://www.karaatkinson.com)



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# IMPROVE CASH FLOW AND REDUCE LOSSES FROM BAD DEBTS

In **Roger Mendelson's** recent experience the area of greatest increase in bad debts is in the construction and building services areas, so now is the time to introduce better systems.

**T**he greatest problem we find with plumbing debts relate to poor communication between the plumbing contractor and the client.

This is understandable because no-one teaches plumbers how to operate their businesses better. The focus of the work is on "being a better plumber" rather than "running a better plumbing business".

The following tips should help you. They are easy to implement and don't cost a cent.

## IMPROVE YOUR BACKROOM FUNCTIONS

Your business should have business trading terms in place and those trading terms should include a clause which provides for defaulting customers to pay all debt collection costs.

When quoting on a job, detail precisely the work which is to be carried out and make provision for contingencies.

Even for a relatively small job, use a standard questionnaire form so that when details are being taken from the client, you ask all the right questions.

The most important question will be the full name of the client. If the client is a company, you will need to know its full name, ACN and ABN.

## OBTAIN A DEPOSIT

The best sign of good faith from a new client is to obtain a deposit. I suggest between 10-15% and 15% of the expected cost of the job. If the client balks at this, be wary about proceeding.

## PAYMENT TERMS AND PROGRESS PAYMENTS

If the job is likely to require more than one visit, detail the progress payments which will be required and if a progress payment is not made by the due date, follow up immediately by phone. Be wary about continuing work on the job if a progress payment is in arrears.



As soon as the job or a progress step has been completed, get your invoice out and handle disputes as early as possible.

## PROGRESS REPORTS

The client will usually not appreciate the amount of work being carried out and the level of expertise you are applying to the job, simply because no-one tells them.

Provide a one or two paragraph email progress report at the end of each stage or at the end of each day. Detail the problems you have encountered and

the steps you have taken to solve those problems.

## GET YOUR INVOICE OUT EARLY

Each day of delay is costing you money.

As soon as either the job or a progress step has been completed, get your invoice out.

Your trading terms will have detailed the consequences for non-payment.



Handle disputes early.

A common tactic used by bad debtors is to raise issues about the job. After the job is complete and the invoice is outstanding, these people will come back with complaints about the quality of the work or the high level of the invoice.

Don't give them the opportunity to use this tactic.

Your progress emails to them should always invite them to come back to you if they have any concerns about the quality of the work.

Call the customer if the account is unpaid.

A common mistake is to keep sending out monthly statements and to take no real action until about 90 days.

This approach simply sends the message to your customer that you are not serious about collecting what

is owed to you. As a result, you will find that the customer pays other, more pressing creditors and you will go to the bottom of the pile.

Nothing beats talking to the customer on the phone and getting a promise to pay. The ideal result is to take credit card details over the phone.

**Nothing beats talking to the customer on the phone and getting a promise to pay.**

to collect the debt.

If you use an agency which operates on the NO RECOVERY – NO CHARGE basis and if you have a default clause in your trading terms, the agency will be able to add the debt collections costs onto the amount they collect and if they receive 100% collection, your debt collection costs will have been borne by the defaulting customer.

None of the above steps are difficult to implement and there is no cost to you in implementing them. You will see the benefit in improved cash flow and substantially reduced losses from bad debts. ■

#### DON'T WAIT TOO LONG

Any plumbing account which is unpaid after 30 days requires action.

At that stage, outsource the collection to a debt collection agency, which is much better resource than you

Roger Mendelson is CEO of Prushka Fast Debt Recovery Pty Ltd and is principal of Mendelsons National Debt Collection Lawyers Pty Ltd.



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# WHAT TO KNOW FOR NCC 2019

The Australian Building Codes Board (ABCB) talks about what you need to know to prepare for the adoption of the 2019 edition of the National Construction Code (NCC) on 1 May 2019.

## PREVIEW NCC 2019

On 1 February, NCC 2019 became available for preview ahead of its adoption on 1 May 2019. All three volumes, as well as the Guide to Volume One are now available to download as a pdf, or if you prefer the digital experience, you can navigate your way through with the enhanced NCC online.

You can access the preview of NCC 2019 or download previous editions of the NCC through the new dedicated URL, [ncc.abcb.gov.au](http://ncc.abcb.gov.au) and registering or logging into your NCC profile.



## KEY CHANGES

Some of the key changes from the 2016 edition include:

- more quantified performance requirements with the introduction of 20 new verification methods;
- introducing consistent governing requirements across all volumes;
- a new non-mandatory verification method for fire safety;
- new Deemed-to-Satisfy (DTS) Provisions for fire sprinklers to be installed in apartment buildings and other residential buildings 4 storeys and above and up to 25 metres in effective height;
- new requirements for condensation management;
- a package of measures for Volume One that focuses on reducing energy consumption;
- improvements to numerous Acceptable Construction Practices (ACPs), and new ACPs in Volume Two;

- new requirements for accessible adult change facilities; and
- new and consolidated requirements for heated water temperature control, cross-connection control and rainwater harvesting and use.

More information is available from the latest updates section of the ABCB website or the ABCB's online publication, ABCB Connect, at [abcb.gov.au](http://abcb.gov.au).

## KEY DATES

Whilst NCC 2019 will be adopted from 1 May 2019, energy efficiency changes are subject to a 1 year transition period and the adoption of the fire safety verification method will be delayed 1 year. The table below highlights the key dates related to NCC 2019.

## 'VIEW' THE NCC YOUR WAY

The ABCB has modernised the online

platform for NCC 2019. You'll be able to access relevant resources and guidance material, and navigate online much easier than ever before.

The ABCB's digitisation project is focusing on improving and enhancing NCC access and understanding through new and refreshed technologies in order to help you to understand the Code, whilst considering the range of abilities and needs of NCC users.

To help with this, the ABCB has improved the functionality, navigation and search-ability of the online Code. This means that whether you are reading Volume One, Two or Three you can easily find what you are looking for.

**The NCC's online platform offers intuitive functionality, ease of use, a favourites tab and 'share-ability'. Here are few things you should know about the enhanced NCC:**

- linking of relevant support materials, such as handbooks, calculators, infographics etc to the related section in each volume
- It has been built for mobility and accessibility requirements;
- includes visual improvements such as changing navigation links to

## KEY DATES

NCC 2019 PREVIEW	NCC 2019 ADOPTED	ENERGY EFFICIENCY TRANSITIONS ENDS	FIRE SAFETY VERIFICATION METHOD ADOPTED
Available now at <a href="http://ncc.abcb.gov.au">ncc.abcb.gov.au</a>	1 May 2019	30 April 2020	1 May 2020



remove title case for easier reading; and re-configuring explanatory and guidance information, including State and Territory variations to 'pop-up' windows which helps avoid navigating away from the main content;

- limited navigation levels to 2 clicks (in most cases);
- search improvements – including filtering of search results; and
- pre-set filtering of content for each volume to highlight governing and performance requirements.

This is just the start of the new functions. Next time you login at [ncc.abcb.gov.au](http://ncc.abcb.gov.au), select 'View' to experience these changes for yourself. You'll also notice that these changes have been rolled out for NCC 2016, which remains in effect until the adoption of NCC 2019. Also, keep an eye out for a YouTube clip

which the ABCB will be releasing shortly that provides an overview of the new NCC online features.

#### LOOKING FOR THE GUIDE TO VOLUME ONE?

With the new NCC online, one of the most significant changes you'll notice is that the Guide to Volume One is now part of the related resources within the Volume. It's also directly linked to the relevant section. Don't worry, there's still a pdf version if you prefer to use it this way!

#### DO YOU HAVE FEEDBACK?

Registered NCC users are invited to provide feedback on all aspects of the digital NCC. If you find a broken link, incorrect reference, or have a suggestion for how the ABCB can improve your experience, they want you to let them

know. You can email your feedback to: [NCCOnline-feedback@abcb.gov.au](mailto:NCCOnline-feedback@abcb.gov.au)

Please understand that this email address is for feedback on the operation and functionality of NCC online. If you have a proposal for change or a technical clarification, the ABCB has separate services dedicated to assist you with these suggestions or enquiries.

#### BUT WAIT, THERE'S MORE!

The ABCB has been busy working to develop over 40 new materials and updating even more existing resources to support NCC 2019. They'll be available for free over the coming months.

You can stay up to date with the release of NCC 2019 and other key ABCB releases through the ABCB website, [abcb.gov.au](http://abcb.gov.au), and by opting into 'Areas of Interest' as part of your NCC registration profile. ■

## NEW RELEASE



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# LOOKS LIKE A PLAN

A forward-looking strategy helps to avoid costly mistakes when pricing complex projects. **Brian Seymour** outlines the steps.

**A**s a young estimator many years ago I scored my first multimillion-dollar project, one of the largest in the country at the time.

My boss sat me down in his office and asked whether we would make a profit from the job. Full of bravado and confidence, I assured him that we could.

"Well then, you can manage it and I'll hold you responsible for the outcome," he said.

This was one of those moments when you wonder about getting a job in Abu Dhabi or the Republic of the Congo if the estimate turns out to be six figures short.

However, it was one the best training experiences I ever had. Because I was driven by the fear of ostracism from my company and the industry in general, the project remained with me 24/7.

I spent a great deal of time speculating how we could do better and, due to some rigorous supervision, the project made a healthy profit.

The most valuable lesson was to plan every aspect of the job well in advance. This included:

- material purchasing;
- sub-contractor programs;
- appropriate skilled labour teams;
- hours of work;
- productivity;
- tools and equipment;
- material storage;
- delivery schedules; and
- liaison with other trades and crucial personnel of the builder/developer.

So much of this information is at the fingertips of the estimator, who is the first person to consider these elements of the project and is therefore in a prime position to deal with them.

Although a manual estimating system can highlight these matters, there are many estimating software packages that will automatically include project management details such as project scheduling, financial management and customer management.



But it must be remembered that no matter how advanced the software, it will only be as good as the input.

## MATERIAL PURCHASING

This requires the best deal available for the project, and estimators have a list of preferred suppliers that they can rely on.

These relationships are of value only if you keep your dealings ethical. Make sure the suppliers that helped to win the contract get the orders. Don't engage suppliers that submit their tender after the closing date and expect to pick up the order.

Your preferred suppliers offer more than a quoted price – they usually give discounts if you place all your orders with them. They may do even better if you combine a few large projects when ordering cables, switchboards, light fittings, accessories, etc.

With this sort of relationship, I have enjoyed continuous supply in times of shortage and been able to specify delivery times. I've even been given access to suppliers' stores on weekends or in the wee small hours when desperate for components on emergency jobs.

Another consideration, after studying the contract documents early, is whether you can have elements of the project prefabricated to reduce installation time.

Material storage has a substantial influence on productivity. At the time of the estimate, you should consider how the site material will be stored. If an existing building is involved, is there a designated storage space? If so, how far is it from the workface? Walking time can have a huge effect on productivity. ➤





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On greenfield projects, do you need to allow for multiple job boxes throughout the site? If so, what arrangements must be made for restocking and relocating? Do you allow for mobile storage units, or can you rely on suppliers for just-in-time delivery?

### SUB-CONTRACTORS

These personnel are regarded by the customer as a part of the contractor's staff, and any poor performance by them is seen as a failure by your company.

It is in your interest to confirm sub-contractors' bona fides regarding licensing, insurance and performance on previous projects before they start work.

Your written contract with 'subbies' should state your expectations in a clear and enforceable manner. The project specifications must detail the payment terms and conditions, plus roles and responsibilities. You don't want to hear: "We thought you were covering that sector in your contract."

Regular meetings will ensure that sub-contractors have access to crucial information well ahead of schedule – especially variations. It's a good idea to keep a diary to track conversations and note any disputes.

### SKILLED LABOUR TEAMS

Apart from mandatory licensing, skilled electrical workers can offer innovative ideas and contribute to project productivity.

The estimator should be conversant with the team members' skills, talents and work ethic. It is a case of 'horses for courses' on difficult installations, and the question should be asked: "Can our workforce contend with this complex installation, or do we need to employ specialists?"

### HOURS OF WORK

Some intelligent scheduling may be necessary to achieve the greatest productivity

For instance, you might pay overtime to a team to pull in sets of rising mains on a multi-storey project out of hours. This could be more efficient than competing with construction workers for access during normal hours, and it would need to be factored into the estimate.

Access to the site can be a problem for large teams on high-security government projects or industrial sites with extensive security systems.

Work teams need to pass through security to the workplace, and few will arrive early enough to be at the workplace on time. The estimator should find out whether there are several security gates so that groups can go through different gates. Otherwise, start and finish times could be staggered to avoid congestion.

### TOOLS AND EQUIPMENT

Many construction projects have not achieved a profit due to insufficient plant, equipment and tools.

In addition, some contractors have poor inventory systems for tracking the location of such gear.

I've observed lots of construction sites on which hired equipment [scaffolding, scissor lifts, ladders, steps, etc] sit dormant for weeks while the hire cost goes crazy.

The estimator must determine when plant and equipment is required, and also the availability and possible other options.

Out-of-town projects with equipment sourced from a considerable distance will mean added mobilisation and demobilisation costs. If any of the equipment requires an operator, then the cost will increase.

### RELATIONSHIPS

A good rapport with the head contractor [builder/developer] is crucial for the smooth running of the project.

The quality of interactions between head contractor and sub-contractor often contributes to the success or failure of a construction project.

Without this relationship the likelihood of disputes is substantially increased.

### PRODUCTIVITY

The use of sub-contractors is more than just accepting the lowest price from an unknown subbie.

Without the detail mentioned above, the lowest price may turn out to be the most expensive element of the job. The project could end up being a financial disaster and a reputation killer.

The quality of your work teams has a big effect on productivity. We have all witnessed projects that were starved for labour and took on large numbers of itinerant workers.

They may well have been licensed electricians and were probably OK when pulling in cables or dealing with thousands of light fittings. However, such people can be lacking when it comes to using initiative to complete a quality installation.

Out-of-hours work can be a profitable move, but you may need to apply to various bodies for approval or a permit and, in some cases, you will be charged a fee.

Tools and equipment may need to be hired. In-house gear should be checked for OH&S compliance and maintenance issues. Also, the last calibration date of testing equipment must be checked.

The biggest drag on productivity is ineffective labour. Although it is the site management team's [leading hands, foremen, supervisor, project manager] responsibility to keep lost time to a minimum, the estimator should be aware of potential lost-time activities and allow for procedures to minimise them.

This is achieved by planning well in advance and putting systems in place before any labour goes on site:

#### Plan material deliveries and storage

- Establish *where* site materials can be stored
  - Builder or client providing secure storage space?
  - Supply own storage, and are areas nominated?
- Schedule major deliveries
  - Large deliveries of light fittings must match the builder's schedule
  - Book site crane, lift
- Handle heavy equipment [switchboards, generators, transformers]
  - Builder's crane – to be booked?
  - Supply own?
  - Forklift or other lifting device
- Equipment to position and fix this equipment
  - Require a plinth?
  - Specialised brackets?
  - Welding?



**Plan sub-contractor meetings; keep information and communication fresh**

- Deliver and receive progress reports
- Confirm scheduled activities
- Pass on relevant site meeting information

**Plan relevant placement of skilled labour – do key personnel need to be relocated to this project?**

- Deploy people with different skills to various sectors
- Schedule when these skills are required

**Plan work hours – do they need to be staggered, or at odd times?**

- Large teams to the workplace may need to be staggered
- Out of hours may be more productive with a clear site

**Plan and book specialised tools and equipment, and ensure all company-owned equipment is up to date and tested**

- Plan the requirements and maintenance of specialised equipment.

The most challenging project I've been involved in was a multi-storey site with plan dimensions of 300m square. The site sheds were up to 100m from the building, we employed 300+ electricians on site and the project ran for five years.

How much do you estimate for walking time? The answer is 'planning'.

- First, we planned to break up the 300+ into controllable teams.
- Then we planned staggered start and finish times.
- Planned and purchased three 'people movers' to transport teams working on the far side of the project.
- Planned and purchased multiple crib stations to be distributed throughout the site for tea, coffee, lunch breaks.
- Planned and purchased mobile job boxes for storing tools and materials throughout the site.
- Planned and commandeered each switch-room and plant room throughout the site for additional equipment storage.

There were too many other planning details to reiterate here, but the above items saved hundreds of hours in unproductive time.

The task of planning is not confined to multimillion-dollar projects: but it is just as relevant on small one-man jobs.

Yet it is common to see small contractors at a wholesaler picking up general installation materials that could be delivered without charge if planning was an integral process.

Nobody is paying you to visit the wholesaler unless it is an emergency breakdown job requiring a non-standard component and the cost can be passed on. ■

*Brian Seymour, MBE, is the author of Electrical Estimator's Labour Unit Manual, Starting Out, Electrical Contracting in Australia and 100 Years – Electrical Contracting in Australia.*

## ■ GEBERIT

# Innovative solution for multi-storey drainage

Specifically designed to meet the high demands placed on drainage systems in multi-storey buildings, the Sovent system from Geberit is a more cost effective and efficient alternative to conventional parallel vented-stack used in high-rise buildings.

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The system renders the installation of a separate ventilation line unnecessary, thereby contributing to guaranteed safe drainage even during peak loads and to achieving an economical installation.

[geberit.com.au](http://geberit.com.au) or search for **SOVENT**





# SAFETY AND COMPLIANCE IN THE PALM OF YOUR HAND

Keeping track of approved fire safety systems and registers has always been a drain on time and resources. Now there's a better way.

There has recently been a spate of high-profile cases of fires and other issues that have been caused or worsened by apartment buildings not meeting the building code. Each incident has been the result of multiple process failings and human error.

After the dust has settled, the questions remain. How did this happen? Who is to blame? How can it be prevented in the future? Quite rightfully, investors and residents are becoming more aware of the issues and asking questions about both existing buildings and future projects. Understandably, they want to feel safe in their homes and to protect their investments.

The safety concerns of building owners are now having an impact on regulations and compliance requirements and several state governments are increasing the compliance burden. More builders and developers are reviewing exactly what goes into their building and are demanding evidence that products are compliant, along with the appropriate documentation, prior to installation.

Safety should always be our number one priority but there are always other considerations for everyone involved in a building project. Each stakeholder may have very different or even competing interests. Architects may be more interested in appearance, developers in cost, builders and contractors in installation requirements and the ultimate buyer or resident in functionality. The issues of safety and liability come into play for each one at different points.

The newly released app Pentrack is an excellent demonstration of how the building industry can employ technology – both existing and emerging – to ensure greater peace of mind when it comes to safety and building code compliance.

## The App:

- Manages approved systems and products and removes the need for installers to make potentially costly decisions on which product to use
- Allows installers to document their installation in line with a predefined approved system list
- Monitors installations remotely with real time updates
- Creates a register that can be submitted to the builder with all the required test evidence.
- Manages multiple jobs across multiple sites
- Centralises data and product documentation

Even in these early stages, the system dramatically cuts down on paperwork. Three or four hours dedicated to



IMAGE: FREEPIK.COM

Pentrack dramatically cuts down on compliance paperwork.

a penetrations register is condensed down to 15 minutes for a project manager. More importantly, the app provides a level of assurance to the plumber, builder, developer and fire safety officer by documenting that the right product has been installed appropriately in the correct place. It is a form of insurance over and above the building code, safeguarding against human error and unanswered questions.

We can't foresee what issues the industry will face in the future but we can give ourselves peace of mind by ensuring that the products we use will perform as required. The construction industry has been slow to embrace digital technology but we now have an opportunity to use it to our advantage. Knowing that the right product for a job has been correctly installed, and that this can be checked and double-checked as required, is certainly an extra layer of peace of mind for everyone. ■

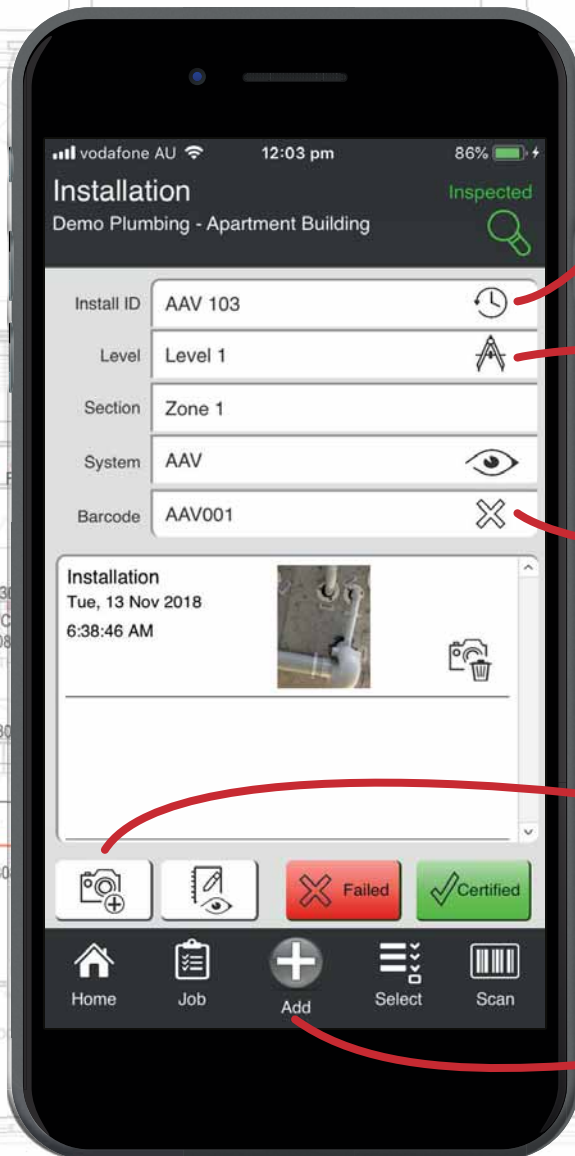
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# WHAT YOU DON'T KNOW

Rheem Australia national manager - commercial and service **Bruce Kemmis** addresses the veritable array of questions you may not consider when installing a commercial hot water system.

‘**W**hat you don't know won't hurt you'. It's a phrase that's been around for years, but in this ever-changing and regulation driven world, the opposite has already come true, 'What you don't know will come back to bite you'.

When it comes to the installation and operation of hot water plant in a commercial building of any kind, our team has come to know there's lots of idiosyncrasies that can trip up the designer, installer, certifier and/or the facility manager. And as the lead-times for design, construction, installation and commissioning get ever tighter, inevitably it's the plumber who has to be sure he's done everything correctly because he or she is often the designer, the installer, the self-certifier... or even the facility manager.

So what don't you know? That's a tough question to answer, but there is one thing we'd all say in response to a question like this, 'I'd like to know, before I start, what's likely to trip this job up'.

First of all, as the plumber on the job, you might be asking yourself where you can get sound advice on the design of the hot water plant for that aged care facility, as an example. You might have been issued with design drawings that were 50-75% complete and under the terms of the contract you are responsible for the design. It's these types of questions that we regularly get asked, including:

- The hydraulic design shows a hot water plant sufficient for 10 additional rooms, but since that was done the consent now allows for an additional 5 rooms. How do I size and design a revised hot water plant for the facility?
- The plant room space that was allowed for the hot water plant is now being encroached by a mechanical plant. How can I fit in sufficient equipment to meet the hot water load



Before starting any commercial installation it's worth asking as many questions as necessary to ensure you know what's likely to go wrong.

while complying with regulations for gas clearances?

- The client is the owner of the facility and has specified an energy saving target based on his/her previous energy bills. How can I practically demonstrate those energy saving calculations?

These issues can be time consuming to resolve if you haven't dealt with them previously. Perhaps you've sized a plant for a large residential house, but not for a reticulating hot water system in a set of 10 townhouses. Or maybe you have dealt with continuous flow gas water heaters and the regulations related to their installation, but this job requires storage gas water heaters because the peak flow rate is very high. Who

has the expertise to size these types of applications, answer the clearance questions and calculate the energy saving based on the previous bills?

For the purposes of this discussion let's assume you have the design knowledge and you're at the point of installation. There's a wide range of commercial hot water product in the market these days, and they all vary in terms of energy type and input requirements, the complexity of their onsite configuration, and the preparation required for installation to ensure the job takes you as little time as possible. After all, the less time you're on site, the more profit you make.

Good pre-installation advice, preferably from someone who deals in hot water plants every day and sees



hundreds of plant rooms year after year, could be the difference between a loss making job or a very profitable one. And ideally, that advice might come in the form of a face to face meeting in the plant room. So what don't you know?

Here's just some of the questions we regularly get asked:

- How can I flue this gas hot water plant safely, taking into the requirement for clearances to openings into the building?
- I've installed domestic heat pumps externally before, but what do I need to consider when I install a commercial heat pump inside a plant room, such as ventilation?
- The specification requires dual secondary circulating pumps for redundancy coupled with a Building Management System (BMS) interface. Where do I locate these in the plant room and how do I instruct my electrician on the BMS interface?
- Maybe it's a retrofit situation: I'm not sure what these existing boilers are supplying or how much hot water they produce, can you help?
- The client wants to combine the mechanical heating plant with the domestic hot water requirements. Can this be achieved?

Who has this pre-installation knowledge, the capability to meet you

onsite, and the understanding of both your trade and those you'll be working with onsite?

Again for the purposes of this discussion let's assume you now have the design and pre-installation knowledge and it's time to get the plant delivered to site. But what if the plant is located on the roof and it needs to be craned into location? And you may only have a two-day window so the plant needs to be 'plug and play'. Whatever the situation, you have limited time.

Does the product come with certification for crane lifts? Is there in-depth technical installation advice online that makes the 'plug and play' install go like a dream, with easy start pictorial guides for simple part identification and connection instruction? Does the manufacturer offer an on-site commissioning service with factory trained technicians to ensure the plant starts up first time?

You're after peace of mind at this stage and can't afford another two days in that plant room resolving issues with someone on the end of a phone that doesn't do this every day. You need a specialist that understands your situation.

So you've completed the install, coming all the way from design, through pre-installation, now with commissioning complete. So far,

so good. Then, in comes the private certifier with legitimate questions about fluing clearances, or ventilation into the plant room. Perhaps even the suitability of the equipment in terms of a standard, let's say it's WaterMark. The certifier hasn't seen an installation using coaxial flues before, so he or she is legitimately concerned about ventilation into the plant room. As for WaterMark, he or she has recently seen some plumbing fittings that were not suitable for potable water, so they request a certificate of compliance for that Tankpak Series 2 system you just installed.

'Who you gonna call?' as Ray would say! What information was included with the product that detailed the answers to these questions? Do the installation instructions, the product catalogue or the manufacturer's website contain the answers? Can you call your local representative for that Australian manufacturer and get the information you need direct from the horse's mouth?

If there's something you need to know about the design, pre-installation, installation or commissioning of a commercial hot water system, we can answer your questions. Whether that be face to face, over the phone, online, or in the product's installation instructions, we can help. ■

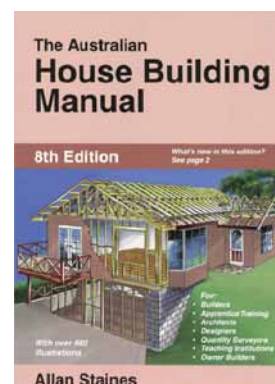
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## DELIVERED DIRECT TO YOUR DOOR



# KEEPING UP WITH CONSTRUCTION CONUNDRUMS

**Paul Cott** takes a look at some of the major issues currently being faced by the building industry.

**T**he Australian building and construction industry is in a constant state of flux and this is all the more so because of changes in economic conditions and the rapid and increasing rate of technological change in general.

The industry is also under pressure due to the recent issues surrounding alleged non-combustible cladding being installed on high rise buildings. At the time of writing, the fire at the Spencer Street Melbourne apartment building is only days old. This leads to a live issue which always exists in the industry which is quality control.

Other issues which will be explored in this article include the pace of regulatory change, productivity and profitability, labour and skills shortages, as well as safety. This are not a complete list as there are always issues which come and go or decrease and increase but these are arguably the main ones.

## REGULATORY CHANGE

All states in Australia are feeling the pressure mounting as a result of the issues to do with combustible cladding, especially due to the two well-publicised instances in Melbourne recently. Governments are clamouring to keep up and legislate in the area of which building materials are being used, particularly in high rise buildings.

The Victorian regulator, the Victorian Building Authority, is conducting a state-wide cladding audit, in order to work out the measure of the problem regarding allegedly combustible cladding being placed on relevant buildings. The problem may well be massive! In fact, there has been talk that hundreds of high rise buildings, apartments and residences may have suspect cladding installed. Quality control obviously dovetails into this issue.



In addition, and on a different issue, in Victoria we have had recent changes in respect of who can actually become a registered building practitioner.

Building practitioners are now required to register their company [i.e. not their individual names] with the Victorian Building Authority in order to enter into the majority of domestic building contracts. If the builder is a sole trader or runs their business through a partnership structure then they aren't affected by these changes.

A whole raft of further changes were added on July 1 2018 which are too numerous to list in full here. Other states also have a reform agenda; however, as of yet they have not been as active as the Victorian legislators.

## PRODUCTIVITY & PROFITABILITY

When it comes to productivity and profitability, it's obvious that in the construction industry, as they say, 'cash flow is king'.

There are many causes of poor cash flow in a business and those in the construction industry are no different. One is the slower rate of payment that seems to have slowly but surely 'crept up' over the years.

As I've been told myself, it is 'almost like they are treating me like a bank'. It's a vicious cycle in that the builder becomes slow to pay because his subcontractors become slow to pay and the subcontractors are slow to pay because people who owe them (often builders obviously) are slow to pay. You need to have adequate vigorous



invoicing systems in place, including timely follow-up of slow or non payers. You need regular progress payments coming in too as this assists greatly.

Another reason for lack of productivity and/or profitability is the slow but progressive rise in the cost of materials.

This issue is tied to the current economic conditions. The effects of such conditions can be offset to some degree, at least by streamlining processes, including better use of technology.

Professional advice can be sought in these areas but of course that costs money that may not exist at various times in the business cycle.

A lot of these issues do not have easy solutions but by way of example, digital invoicing apps and technology exists to enable a business to go paperless to some extent, which can create efficiencies and higher productivity and in turn, profitability.

### LABOUR & SKILLS SHORTAGES

It feels like labour and skill shortages have been a battle for many years. Anecdotally I am also hearing that it's extremely hard for those in the small building sector to find good staff.

Time and time again stories are being told of employees who seemed to have very relevant skills and experience at the interview, turning out to be anything but reliable, ethical and hard-working people as the course of the employment goes on.

Then of course is the constant struggle throughout the industry to find people who do in fact have the skills, qualifications and experience to do the job. This seems to be highlighted in regional areas across the country.

### SAFETY MATTERS

The final issue to discuss is that of safety in the building and construction field.

Arguably the burden on principals,

supervisors and business owners has increased gradually over time due to a number of factors. One is societal. There seems to be a trend towards letting the responsibility lie on someone else when one's interests are affected, whether they be financial, legal or health related.

On top of all these grappling issues, the construction industry, as most others, has to face technology issues, rising insurance premiums as a cost of business and the rising cost of raw building materials.

This is obviously not a comprehensive discussion, but rather a trigger for further thought and/or discussion. ■

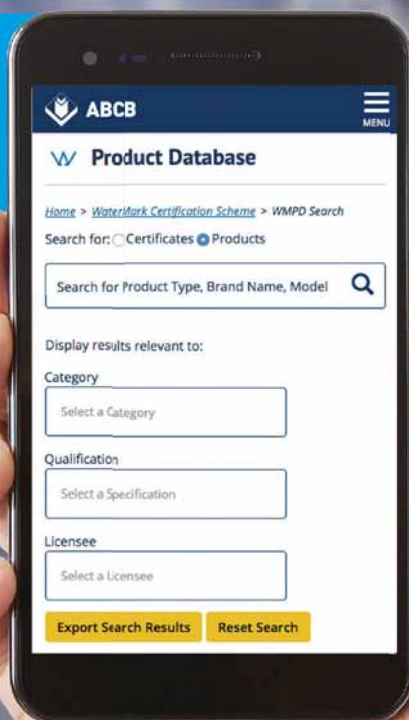
Paul Cott LLB (Hons), Grad Dip Legal Practice, LLM is a Senior Associate Lawyer with Ascot Solicitors focusing on building and construction litigation.



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# THE TROUBLE WITH TOILETS

**Terry Nguyen** details toilet testing requirements and the most common reasons for failure.

**H**ave you ever spent a Sunday morning pondering what ever happened to toilet flushing performance after your toilet's first flush attempt failed to remove the Saturday night curry? Do reduced flushes seem to be a bit too reduced to have enough effect? Do parts of the toilet bowl seem to always remain dry even when you hold the button to deplete the entire cistern? Do blockages seem to be a regular occurrence or does the toilet constantly seem to siphon the sump dry?

Toilets, and in particular the performance of a cleansing flush from a bowl, is an entire science in itself. There are many contributing elements which could affect the ability of a toilet to perform as it was designed and intended to. Some of these products often get forgotten when a plumber has been called out after hours to rectify a blockage. Initial assessments often see the pan itself taking mis-directed blame for a problem which it wasn't responsible for.

## NEW LEGISLATION = MORE TESTS

Toilets, like all plumbing products in the WaterMark certification scheme, are tested and assessed for their performance and integrity. The testing of a pan ensures that it is able to remove all the waste effectively. New WELS legislation now enforces that they must also perform in an efficient manner using less water.

The rigorous process involves tests for both full and reduced flush operations and covers all aspects of what an effective flush would need to achieve. Eight individual performance tests look at the ability to remove solids, liquids, paper[s], withstand leakages, static loads and also clean all serviceable areas. The tests needing to be performed using the controlled volumes allowed under the Standards for the respective star rating that the pan is seeking accreditation for.



There's usually a good reason a toilet blockage occurs with one prolific reason being the mis-match of pans and cisterns.

The tests published within the Australian Standards for testing of a toilet are quite unique to our country, but are extremely effective in ensuring correct flushing performance with our local infrastructure.

A perfect example of this is the solids discharge test which requires a minimum of 2.5 litres of water to follow the discharge of solids out of a pan. The 2.5 litres of trailing volume ensures that the waste is entirely carried out of the building into the town sewerage network. The volume has been carefully worked out based on years of research and testing performed by industry technical experts.

## PANS & CISTERNS

The final flushing performance of a pan though, is not only controlled by the toilet pan itself, but by many other peripheral components. The

largest contributor obviously being the matched flushing device – usually a cistern.

Pans and cisterns (or alternative flushing devices) need to be matched together to ensure that they can work together. The adverse effect of connecting pans and flushing devices that are not properly matched has become fairly well-known over the last few years. Deviations from designed flow characteristics can impact on final flushing performance.

Changes to flush pipe sizes, lengths, diameters or connecting fittings also change the dynamics between the pan and flushing device and how they work with each other. The flushing device however, is not the only product that can affect flushing performance.

The outlet side of the toilet pan can often go unnoticed when a plumber gets a call for a return visit for a toilet



that seemingly isn't working properly. P to S trap pan converters supplied with a pan are tested with the pan during the certification, which often means that the attachment of the product is accounted for, and should be fit for purpose. Any aftermarket products not supplied with the pan require their own individual certification to ensure performance is maintained.

Pan connectors are a necessary part of the connection between a pan and the drainage network. Requirements for pan connectors include leakage testing, but also prescriptive design requirements to ensure the waterway is large and relatively un-obstructive. A large open connector with steep angles allows the product to act as an integral part of the drainage network. Connectors with shallower offset angles or set out distances can often cause problems with discharging waste from the pan.

When the waste outlet is no longer a large free-flowing relatively straight connection piece, it means that the waste from the pan has a more difficult time navigating the restricted waterways. Offset pan connectors have become increasingly more popular due to the nature of how buildings are constructed.

Waste outlets set into slabs of concrete cannot be moved, and often

a small offset is required to ensure an S trap pan sits where it is supposed to. Traditional offset pan connectors in past years were all designed for a maximum angle of 30° (from vertical), and a minimum bore allowing a 72mm sphere to pass through ensuring a smooth and outlet from the pan with very minimal impact on a flush.

New offset pan connectors have seen larger offset distances, meaning shallower angles and smaller waterways. While these products are quite installation-friendly, they no longer meet the proven dimensional requirements. Offset pan connectors with steep angles and larger offset distances must now be assessed and WaterMark certified to WMTS-517. The new WaterMark Technical Specification includes a series of design criteria and performance based tests for assessing how the connector works when used with a toilet pan. Tests include the regular toilet pan paper and solids discharge tests to verify the pan is still able to function with offset pan connector attached to the outlet. There is also an additional flush test in the Specification for assessing the removal of a heavy load. It looks at the potential for the expelled waste to block in the choked outlet, and/or create a situation where the mass can siphon the trap dry.

Testing is then repeated on numerous

S trap pans to create a level of confidence that the pan connector performance is not limited to only a single pan. Similar to a waterslide carefully designed to channel water and occupants through a defined free flowing path, the waterways of a toilet bowl have also been designed to channel its contents down designated flow areas at particular flow rates. Introducing an obstruction to the passage way changes the dynamics of how the water moves and more importantly how it carries its media.

When using offset pan connectors, always check to ensure that it has been certified to WMTS-517. Not only is the certification of these products mandatory, it will also mitigate any dreaded future phone calls on Sunday mornings. ■

*For more information on how offset pan connectors are tested, please contact PROVE Standards & Engineering. [www.PROVeng.com.au](http://www.PROVeng.com.au)*

Terry Nguyen from PROVE Engineering is a key signatory for mechanical testing and measurement of plumbing, waterworks and solar hot water.



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# HANDHELD DANGER TO DRINKING WATER

**Peter McLennan** discusses how handheld ablution sprayers installed next to toilets can be dangerous to our drinking water.

**B**ackflow is a funny thing, it has the potential to pollute the drinking water and cause serious illness or death, but very few know it exists or the dangers lurking in their own home.

It is caused by a cross connection which creates an unintended link between the drinking water and a non-drinking or polluted source.

The largest causes of cross connections are hoses or temporary connections because these can be left dangling in potentially polluted water sources. This is the case with hand held ablution sprayers next to toilets.

Hygiene requirements, cultural backgrounds and greater freedom of access for disabled persons have resulted in the large uptake of hose attachments mounted walls beside toilets.

The issue is such that the Victorian Building Authority recently published a fact sheet that advises consumers of the dangers involved.

What people fail to realise is that should the hose be left dangling submerged in the toilet, the sewer is connected to the tap. That tap is on the same pipe that feeds the kitchen sink or the washbasin. Should a backflow event exist, the toilet water will be sucked into the tap and then distributed into the housing piping system. It could also be distributed into the water supply of the street.

So how often can a backflow event occur? Every time there is a negative supply in a water main in the street, backsiphonage occurs. Negative supply is caused by water mains breaks anywhere in the network. Across Australia, there are estimated to be 20,000 water mains breaks a year. That is over 50 per day, on average.

## So, what can be done so that this convenient cleaning option can be used safely?

1. Have a licensed plumber install the unit. They have the training to understand the dangers that exist and can suggest ways to break the vacuum so that in the event of a backflow issue, the cross connection remains safe.
2. Use a spring return device so that the hose always returns to the starting position and does not drop into the water. Similar products are available for disabled shower cubicles. See <https://www.architectureanddesign.com.au/suppliers/galvin-engineering/galvincare-aged-care-solutions-from-galvin-specia>

For more info contact the plumbing regulator in your state or get in touch with the Backflow Prevention Association of Australia Inc. and we can point you in the right direction. ■



Unfortunately more and more hardware outlets are 'dangling the proverbial carrot' in front of consumers by openly displaying hoses and encouraging the ill-informed DIYer. And not a word is mentioned about backflow.

*In the Backflow Prevention column of summer 2018, we included a table of backflow prevention devices with various specifications of each unit.*

*We published that the maximum working temperature of the Watts 009 to be 60C, when in fact it should have said 90 C.*

*For more information on this particular device, check out [www.hydroflowaus.com.au](http://www.hydroflowaus.com.au).*

Peter McLennan has been involved with backflow prevention since the late 1980s. He is president of the Backflow Prevention Association of Australia Inc.





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# CLEARING THE AIR

Fujitsu General Australia national product manager **Kyle Rafter** looks at how the AS/NZS 5141 Standard benefits air conditioning installers.

On 26 November 2018, Standards Australia published a new Standard for the air conditioning industry, reviewing the specification, design and installation process of air conditioning systems within residential buildings.

The Standard, AS/NZS 5141 *Residential heating and cooling systems – Minimum applications and requirements for energy efficiency, performance and comfort criteria*, has been created with a combined effort of industry representatives, consumer advocates, regulators and technical experts. The objective of the revisions is to improve the efficiency of systems after installation, which will assist manufacturer's energy efficiency retention after installation.

The Standard is the first in Australia focusing on the heat mode, zoning, configuration and installation of an air conditioning system.

## WHY THIS STANDARD?

While there is regulation in the industry around minimum energy performance standards (MEPS) and star ratings, there is little in place regarding design and installation, to ensure the energy efficiency claims of a system are actually achievable within a residential setting.

AS/NZS 5141 puts in place industry standards for design and installation, eliminating the risk of customers being provided with false information or incorrect air conditioning systems for their particular needs.

However, it doesn't just help a customer, it is also designed to assist the installer. The new Standard aims to improve the quality of workmanship carried out and assist with improving the level of expertise within the air conditioning industry.

It is the installer's responsibility to ensure the correct design, selection, installation, commissioning and maintenance of a residential air



AS/NZS 5141 puts in place industry standards for design and installation, eliminating the risk of customers being provided with false information.

conditioning system has taken place before handing over to a customer.

## WHAT IS REQUIRED FROM AN INSTALLER?

A customer should be provided with a heat load assessment at the residential property, allowing installers to ensure the correct air conditioning system is specified for the type, size and layout of the property.

Heat load assessments are an essential part of the installation process. A customer could initially present incorrect information about their property including room size or building positioning, leading to an incorrect system design. This will impact how the air conditioning system performs and its energy efficiency.

While the guidelines are already common practice, until now the level of standard at which the work has been carried out has not been regulated. From an industry perspective it will encourage better workmanship

and a greater customer/installer experience. For manufacturers, the new Standard will deliver a better process from design, selection, installation and commissioning. This will lead to optimum efficiency of the air conditioning system and greater consumer satisfaction.

## WHAT IF STANDARDS AREN'T FOLLOWED?

An air conditioning system should be performing at its best, when it's needed the most. If a customer feels the AC unit isn't providing ultimate comfort and efficiency, they can seek guidance online and compare manufacturer claims with real world figures. ■

Kyle Rafter has more than 10 years' experience as an air conditioning and refrigeration technician. In 2015 he joined Fujitsu General Australia.







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# A BIG YEAR AHEAD

Standards Australia is welcoming 2019 with enthusiasm and the thirst for another big, productive year ahead.

Standards Australia looks forward to another year of working with the plumbing sector as several big projects continue in their development with more set to get underway.

## A SMATTERING OF WATER SAMPLING STANDARDS

Standards Australia has received a proposal revising the standards around water sampling and testing methodology. The proposal refers to modifications to existing standards and the potential for new standards to be developed regarding sampling methods, particularly with the continuing discussion around lead levels.

A point has been made that current in-field water testing methods vary across each State as well as within individual projects. Due to this difference in water testing techniques the data collected may not be as adequate.

There is a view that the industry would benefit from a standard created to deal with the extraction of metals and in-field sampling and testing of drinking water directly. While this is a new standard aimed at addressing a gap, there are several modifications proposed dealing with drinking water for food and beverage processing.

In keeping with our commitment to International Standards, there has been comments made that the available International Standards are not detailed and prescriptive enough to give the consistency needed for issues associated with Australian drinking water.

## BACKFLOW PREVENTION

There is plenty happening in the backflow prevention space with a review of AS/NZS 2845.1 Water Supply



Standards Australia will be revising the standards around water sampling and testing methodology in 2019.

– *Backflow Prevention Devices Part 1: Materials, design and performance requirements* soon to be underway.

For those unfamiliar, this standard aims to promote the health, safety and protection of the environment, outlining requirements for the materials, design, performance and testing of mechanical backflow prevention devices.

Part 3 of AS 2845 is also under the microscope with public comment having recently been completed. Part

3 of this standard is an important one for work one in the field as it focuses on the requirements for field testing and maintenance of testable backflow prevention devices in the field.

Open communication with the plumbing sector has been the reason for these updates to guidance for the industry, and it is only with continued engagement with end users of standards can Standards Australia deliver the guidance needed.



## DISTRIBUTION OF STANDARDS

In late December 2018, an independent arbitration determined that any extended distribution agreement with SAI Global will be non-exclusive. This means that Standards Australia can now take steps to move beyond the exclusive distribution arrangements that have been in place with SAI Global since 2003.

A process is continuing in relation to how the arbitrator's decision will be implemented with Standards Australia committed to getting to the end of this process as quickly as possible, sometime later this year.

In the meantime, Australian Standards® will continue to be distributed through SAI Global.

Standards Australia holds every aspect of its work, from connecting with contributors, to fostering innovation

and distribution of content, as a key focus. However, as the world of publishing changes, this nearly 100 year old institution must also change to continue the strong, positive contribution to the community and empower those who use its content.

The exploration of additional distribution channels is the first stage of this fundamental transition, with the second stage being an open process of consultation with stakeholders to understand how the current and future distribution models can deliver easier access for those who use standards.

"Operating an open and transparent process is our core business. This is an opportunity to design a Standards Australia of the future that relies on all interested stakeholders, whose support and contribution will be vital in the improvement and innovation in the

distribution of Australian Standards®," said CEO of Standards Australia, Dr Bronwyn Evans.

"We strongly believe we can deliver better solutions by working together."

Details on consultation will be shared in coming months.

## MONTHLY PROPOSALS

As part of our implementation plan from the Technical Governance Review, Standards Australia is excited to be working with industry and broader stakeholders in reducing the proposal assessment time.

Proposals for new work to be assessed and approved will happen monthly rather than through the old six-month cycle.

This new monthly assessment will speed up the process for projects to reach the 'project kick-off' stage of standard development. ■



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# REMEDIAL WATERPROOFING – DOING HALF A J..!

**Andrew Golle** discusses the pros and cons of remedial waterproofing, and how best to implement the technique in various situations.

**R**emedial waterproofing techniques are considered a specialist set within the construction waterproofing trade. Remedial techniques form part of the current Certificate III trade qualification CPCC 31411, along with internal waterproofing, external waterproofing and below ground waterproofing.

Some consider remedial practices as the 'black arts of waterproofing'. Many do not have faith in remedial techniques where they have been applied to problematic water ingress defects and failed.

**Top:** Negative pressure membrane fail through salt crystals behind membrane.

## THE RIGHT REMEDY

We are called upon to apply remedial techniques where a leak or defect detected cannot be addressed by standard orthodox waterproofing practices. Inability to excavate behind basement walls, loss of amenity to occupants or disturbing sound structure prevents the application of normal methods. Even the cost to do so may be prohibitive and outweigh the benefits of rectification.

Some remedial techniques only rely on localised repairs which can transfer the original leak further down the line, only for it to appear somewhere else. Remedial practices can be perceived as band-aid measures, where the accepted

proper rectification methods could have been used.

There are some remedial practices that are not acceptable and do not satisfy National Construction Code (NCC) performance provisions. For example, the practice of applying topical or densifying sealers to grout joints in order to rectify leaking showers and decks, without removal of tiling or addressing substrate degradation.

AS/NZS 4858:2004 Wet Area Membranes Part 6 requires that ALL classifications of waterproofing membranes cater for up to and including 5mm of movement at junctions and joints. These topical sealers do not perform to these requirements. ➤



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AS 3740 -2010 Waterproofing of Domestic Wet Areas under the Scope 1.1, specifically states that this standard does not recognise topical or penetrating sealers; additives; or decorative coatings. The reasoning is that hydrophobic sealers and additives do not accommodate incidences of cracking in concrete or thermal differential cracking between the tile edge and grouting.

Any such statements of NCC compliance by these operators should be accompanied by a Code Mark Certificate, documenting compliance with the NCC and being recognised by the Australian Building Codes Board (ABCB). If this certificate of compliance cannot be produced, then the use of such practices is at the client's risk.

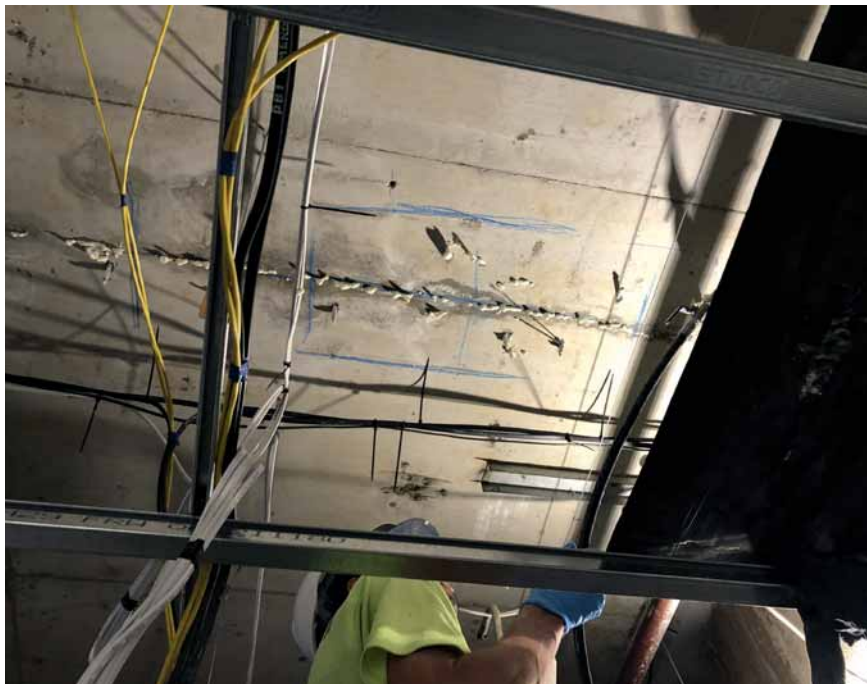
Other accepted remedial techniques have been given a bad name by misapplication and incomplete scoping at the outset. Often these jobs are only half done. Additional remedial steps are added only when initial attempts to rectify a water leak fail. This common practice gives otherwise acceptable remedial techniques a bad name, where only half a job is done.

Let's have a look at three accepted remedial techniques that can be applied successfully but fail when only half the job is done.

### NEGATIVE PRESSURE MEMBRANES

Negative pressure membranes are applied onto the internal face of the floor or wall where water movement through the wall is trying to push the membrane off the substrate from behind. These specialised membranes are used to resist hydrostatic pressure from the external side of the wall, where water is trying to move through the wall and equalise, due to the effects of gravity.

Negative membranes are also used to resist rising damp and some minor salt resistance. These membranes are generally a hydrostatic epoxy or a cementitious membrane that forms a crystallised matrix into the substrate as hydration occurs. Some people feel that negative membranes are not effective and cannot be guaranteed as there may be increases in the hydrostatic pressure



Crack injection foam acts as a water stop to active leaks.



**Left:** Crack injection foam degraded by UV exposure. **Right:** Crack injection into rusty drip tray. Packers still in place, holes not plugged, crack to sealed over.



or other influences on the structure.

They can be very successful as a remedial technique when all site specific factors are taken into account and where a systematic approach is engaged and not just the application of the membrane.

The expected retained hydrostatic pressure must first be quantified in order to select the appropriate

membrane. Once this is done, pressure relief must be established. This may take the form of in-situ external drainage at the footing; changing external ground levels facilitating relief of built up water behind the wall; or internal and cavity drainage systems, where water is drained through the base of the wall and diverted to a sump to be pumped out to an outfall. ➤



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Most negative membranes do not tolerate excessive movement or aggressive mineral salts forming behind the membrane. Hydrophilic seals at penetrations and structural joints can be incorporated to allow for movement at critical areas. Densifying sealers can be employed as part of the hydrating process of the membrane to arrest salt crystal formation from within the substrate.

All negative membranes should be protected with an isolation coat or topical lining. This is often not done as part of the remedial system, subjecting the membrane to abrasive damage or degradation from the elements, such as exposure to UV.

### CRACK INJECTION

Crack injection techniques have been around for many years and are a viable

remedial technique where topical repairs are not practical. Crack injection techniques are subject to failure where the wrong product is selected for the task, or where only half the process is carried out.

Crack injection application is and always should be a complete process, and not just about drilling and pumping into a hole. Many applicators will apply only part of the process by: drilling around the crack; injecting foam into the open crack; walk away leaving the packer sleeves in the holes. This can result in ongoing leaks where water eventually bypasses the injection foam, as it is only to be considered as a waterstop, and therefore only part of the waterproofing system.

Many specifiers and waterproofers rely on crack injection as a single application solution. Consideration

should be given to entrapment of water within the slab; moving the leak to another crack; and identifying and sourcing the entry point of the leak. A complete process should be adopted, using injection as part of a system, such as:

1. Identify the crack as static/active/leaking and select the appropriate injection materials.
2. Identify appropriate size packer sleeves according to slab thickness and packer spacings.
3. Clean salts and other contaminants from the crack.
4. Seal the face of the crack. This assists in ensuring the injection material tracks through the complete depth of the crack and not just spilling out of the crack face.
5. Drill holes through the crack, clean holes and insert packers.
6. Inject with water to clear the crack, to prime for hydrophilic reaction and establish the injection process.
7. Inject with hydrophilic foam, following the same injection process as established with the water injection.
8. REMOVE PACKERS! How can you expect the injection to be successful if open holes are left behind with non-integral metal sleeves poking out?
9. Plug the holes.
10. Water test.
11. Upon successful water test, apply a negative pressure membrane spanning over the crack.

### DAMP PROOF COURSE INJECTION

Chemical damp proof course injection is employed where there has been an absence of DPC in older buildings, or where there is an event of external water ingress at the base of the building. Older buildings constructed with a stone plinth or masonry directly into the ground can draw moisture up into the walls through capillary action. This can result in salt degradation of external and internal finishes.

Some people do not put much faith in DPC injection and failures can occur where only half a job is done. Three main factors need to be considered when scoping a DPC injection remediation: ➤



Rising damp and salts coming through wall.



**Left:** Hayden drilling damp injection holes into 400mm of bluestone wall.



**Right:** Damp injection densifier into 400mm of bluestone wall.





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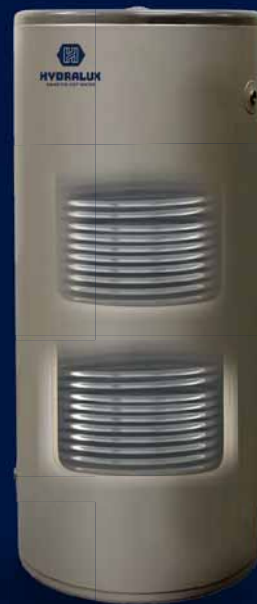


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## 1. WHAT IS THE SOURCE OF THE WATER INGRESS?

DPC injection does not address where the water ingress is coming from. Has a pipe ruptured? Has the neighbour built up a garden against your property or re-directed runoff against your building? Has a French drain become blocked or sub-floor ventilation become ineffective?

Addressing the source or compilation of sources should be treated as the primary remedial concern with chemical DPC used as part of the rectification scope. These may include the installation of cut off drains; clearing out blocked or the establishment of new French drains; installing effective sub-floor ventilation; installing insulation and venting rooms to external outflows.

## 2. DENSIFYING AGENTS USED IN DPC INJECTION WILL NOT ARREST WATER FLOW.

Trapped water within the walls or active water flow through cavities will not be effectively restrained by a densifier. DPC densification works as the product soaks into porous surrounding materials but does not fill or breach cavities or fissures. This is especially relevant where internal walls are below ground and DPC injection will only restrict capillary movement from floor level but not seepage through the wall, as active water leaks. Water entrapment can be relieved and excess water restrained with the application of a negative pressure membrane to the affected walls as part of the DPC injection process.

## 3. WHAT ABOUT THE SALTS?

Rising damp can bring mineral salts through porous masonry resulting in spalling of face bricks or delamination of rendered and plastered finishes. Aggressive mineral salts are water borne, where the salt attaches to the water molecule and crystallises at the masonry surface as the water evaporates. These salt crystals become larger and exhibit a point load that even a negative pressure membrane cannot withstand.

Imagine a negative membrane as a rubber balloon stretched over a brick wall. This will resist a body of water under hydrostatic pressure. Now



Hydrostatic epoxy membrane to bluestone wall against seepage.



**Left:** Steve applying densifying sealer to wall prior to negative membrane against salt crystal formation. **Right:** Hydrostatic epoxy membrane after densifier sealer.



imagine sticking a pin through the wall into the balloon. This is the salt crystal exhibiting a point load behind the membrane and rupturing it. Possible aggressive salts should be analysed. A designated densifier applied to the wall prior to negative membrane application. This will restrict the salt from crystallising and therefore no point load behind the membrane.

Each remedial waterproofing task will vary according to site conditions and the expected result required. Assessing these requirements will steer the applicator in selecting a waterproofing system to suite the requirements. This may require a crack injection to active leaks; hydrophilic plug or seals to penetrations; densifying sealers or DPC injection; and, finally a negative pressure membrane to encapsulate the area, as a complete system.

Each process should be scoped as a complete system and not just partial application. Don't forget to water test what you have fixed and be open to further investigation and incorporating additional processes if required.

Doing half a job will only result in ineffective remedial attempts. Scoping and following a complete process incorporating multiple remedial techniques and site factors will ensure greater success in remedial waterproofing. ■

Andrew Golle is a registered builder in Queensland, NSW and Tasmania, and a Certificate III construction waterproofer.





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# ATT

WINTER 2019

ACROSS THE TRADES

## HANDLING THE HEAT

SURVEYING THE IMAGING MARKET



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## COVER STORY



# THE HEAT IS ON

THE THERMAL IMAGING SECTOR HAS A LOT OF POTENTIAL, SO WHY DOES THE AUSTRALASIAN THERMOGRAPHERS ASSOCIATION CHAIRMAN CALL IT THE WILD WEST? **AINSLEIGH OATES** INVESTIGATES.

**A**s an emerging industry in Australia thermal imaging has not attracted much media attention.

Because of its relative newcomer status the sector is not covered by regulations, standards or compliance codes. This is a concern for the Australasian Thermographers Association (ATA), which predicts catastrophe if the industry is left unregulated.

ATA says standards are critical in establishing a fair and safe industry. However, implementing a set of standards is difficult, as ATA chairman David Rice explains.

"The purpose of doing a scoping study is to get to a point where people will understand all the crucial requirements

for operating a thermal imaging camera – such as industry-wide competence-based training."

The ATA engaged an independent consultancy, The Haystack Group, to analyse the use of thermal imaging cameras in all industries, the aim being to introduce a national standard of competence.

David publicised the study via almost 2,500 emails to organisations that had some connection with thermal imaging. He says the support has been substantial, especially from insurance companies. There are about 200 participants and the ATA is appealing for more, as the study is ongoing.

New standards will deal with such areas as lack of camera skills, poor or improper interpretation of thermograms

and protection for customers – who expect trained people to do the work.

The process began in 2014 when the ATA had a meeting with Standards Australia to outline the proposal.

David says that submitting an application and gaining approval was the easiest part, but due to unforeseen circumstances not everything went to plan. It has taken another four years for the process to recommence and changes to be planned.

"Because we're setting completely new standards, we would be able to run the competence-based training courses even without the regulations being implemented.

"However, we want to adopt the two original standards configured to what the industry needs before





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commencing the courses."

The Haystack Group representative Anthony Stiff says the scoping study is necessary because of the lack of training Standards.

"There is a huge need for competence-based training, and for it to be easily available to the market. The training needs to be in tune with each industry-based sector."

David relates his experience with training years ago.

"In 2002, when the industry standards came out initially, you had to be a level three thermographer to do training. When I trained there wasn't one person who was a level one, two or three."

He started to see many complications in the industry. Different kinds of certificates and qualifications showed up on his desk, and it began to annoy him. Colleague and friend Martin White had experienced the same issues and the two decided to take action.

The ATA came into being when David and Martin went to Standards Australia and gained approval to start the organisation.

"Industry-offered training for thermography is all over the place," David says.

"A lot of people don't even know that Australian Standards exist. Because of that, a lot of people go overseas to learn. You might find out about thermal imaging courses only when you buy a camera."

The provided training in Australia is nowhere near optimum. However, most distributors of thermal imaging cameras offer courses.

"Granted, our provided training is all over the place, but it's all there," he says.

"The Standard AS ISO 9712 *Non-destructive testing - Qualification and certification of NDT personnel* states that the minimum training requirements are 40 hours at level one, 80 hours at level two and 40 hours at level three.

"Candidates must have a graduate certificate in relevant studies at a technical college or university to complete the training. Yet that's not even half of it - there's a whole other Standard to complete before you can be registered."

Within a couple of years of the ATA



**Apps can be downloaded to a smart phone that claim to be thermal imaging cameras despite having no thermal imaging software or infra-red receptors.**

being established both men hadn't seen much of a change in the complications surrounding certification. This was when The Haystack Group and the scoping study were introduced.

Anthony says the scoping report should be finalised towards the end of March - and there will be a lot of unhappy people in the industry.

"There will be some recommendations

in the report that people might not agree with, and these will go through Standards Australia for debate. Then we hope they will go about setting the required Standards for the industry."

David says there are two thermal imaging Standards at the moment.

"The first is AS ISO 9712. The other is AS ISO 18434.1:2014 *Condition monitoring and diagnostics of machines*



- *Thermography General procedures.* They are designed for the engineering sector, not general industry, and that's the issue."

He says people are employed under the AS ISO 9712 Standard who are qualified in areas such as x-ray and ultrasound. This incorporates thermal imaging under the same qualification.

"The problem is that these skills are engineering based and thermography is not."

However, employing engineers that don't know how to operate a thermal camera is not the greatest concern.

There are no licensing considerations involved in buying, hiring or using a thermal imaging camera. Anyone can buy or hire a camera no matter what

they may be using it for.

There are apps that can be downloaded to a smart phone that claim to be thermal imaging cameras.

---

**Manufacturers sell cameras based on the price range, not on the type of equipment the purchaser needs.**

---

Without any thermal imaging software or infra-red receptors, these apps claim to achieve professional day/night imaging and thermographic capabilities in a device small enough to fit in your pocket.

Anthony says untrained people generally don't

realise that there are consequences when using such equipment - including personal harm if the results are wrong or even misread.

David says anyone planning to use thermal imaging should do an introductory course to discover the best

piece of equipment for the job.

"Manufacturers sell cameras based on the price range, not on the type of equipment the purchaser needs."

Thermal imaging cameras can be much harder to operate than many people realise. Incompetent use introduces many risks, such as false readings or diagnostics, leading to mistakes in building and construction.

An introductory course will be implemented, with the new standards, within a year. The aim of industry-wide competence-based training is to create a level playing field so that all thermographers are in sync with terminology and thermal imaging practices.

ATA and The Haystack Group are making this a reality. In the meantime, David, Anthony and Martin want all thermal imaging users to be aware of the risks and dangers, and to do their research before hiring or buying a camera. ▲



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## LEGISLATION

# FAIR ENOUGH

AUSTRALIA IS AMONG THE EARLY JURISDICTIONS TO ACT AGAINST UNJUST PRACTICES, BUT JUST HOW WILL THIS AFFECT THE TRADES SECTOR? **ESTHER RIVERS** REPORTS.

**M**odern slavery, the contemporary form of institutional slavery, covers a wide range of exploitative behaviour in industries including building, plumbing and electrical supply.

Otherwise known as neo-slavery, the practice is exactly what it sounds like. It includes corrupt practices such as human trafficking, forced labour, child labour, servitude and bonded labour.

The term includes slave labour in the supply chains of all global industries, ranging from hospitality to agriculture and construction.

Under the *Modern Slavery Act* passed by federal parliament in December 2018, larger distributors and suppliers will have to adhere to new policies that include updating company codes of conduct and investigating supply chains.

These larger entities, with more than \$100 million in annual consolidated revenue, must identify all high-risk areas and ensure compliance with all legal guidelines.

This includes internal audits and processes for dealing with non-compliant supply chain practices. Frankie Muskovic is policy manager, sustainability and regulatory affairs, at the Property Council of Australia. She says one thing is certain.

"Any company with more than \$100 million dollars in revenue is going

to have modern slavery in its supply chain."

Frankie says the Property Council of Australia has a strong interest in the *Modern Slavery Act* after its work alongside community groups such as the Salvation Army.

"This legislation is very much about making things safe - encouraging people to discover and remediate rather than conceal."

She says the Property Council of Australia is an established adopter of best practice, including for senior living, housing and infrastructure, and main streets.

The Salvation Army has been advocating for the *Modern Slavery Act* for up to 15 years, pinpointing construction as an industry that needs development.

Its national policy and advocacy co-ordinator, Heather Moore, says: "I

challenge any company that says 'we have rigorous processes in place and we haven't found anything'. If they did have rigorous processes in place, they would have found something." The *Modern Slavery Act* puts Australia on the front line when it comes to tackling the global issue of slavery at a parliamentary level.

The Australian Government's 2017 inquiry *Hidden in Plain Sight* highlighted a worldwide problem affecting more than 40 million people. The estimated number of Australians affected by modern slavery is about 15,000.

Mills Oakley lawyer Luke Geary says the abuses in Australia include underpayment, inhumane living conditions for workers and exploitation of subcontractors.

"Supply chains (wholesalers, distributors) and subcontractors are particularly vulnerable to mistreatment due to a lack of regulation, a lack of auditing and a lack of accountability."

The legislation requires designated companies to publish an annual modern slavery statement. The revenue threshold is based on such entities being best equipped to respond to legislation of this nature.

"The statement will be published in a publicly available central repository administered by the Department of Home Affairs," Frankie says.





"It also must be published on the entity's website. It needs to be in a prominent place and accessible, it also needs to be approved or signed off by the governing body for that entity. The legislation is very high level in terms of what must be addressed in the statement."

The statement has to be submitted in the relevant reporting period, whether that is the financial year or calendar year. It will include four mandatory points:

- a description of the entity's operations and supply chains;
- what the entity actually does;
- where it operates; and,
- what its focus is.

The statement should identify where the risk of modern slavery might occur in its operations and supply chains. It should also describe the type of materials sourced from certain areas of the world.

"We're not talking about pointing at specific suppliers – for example 'roof tiles sourced from this country by this company are a risk factor'," Frankie says.

"Rather, we're saying 'this kind of material sourced from this part of the world is a risk factor'. We need to consider who we partner with and who we contract for, and how we procure those goods and deliver services."

The entity will then need to spell out what it is doing to address the risks. Questions such as: Does the entity have a human rights policy, or what kind of risk management practices is the organisation putting in place?

The legislation exists as somewhat 'penalty free'. However, the principle is that a statement legally bound for public consumption will create a 'race to the top'.

Contractors and suppliers with overlapping supply chains and distributors will have to work together to achieve positive outcomes, so as not to overwhelm suppliers with the new system.

Sydney law firm Clayton Utz says the construction sector is noted as being a key concern. Low-skilled manual labour on poor wages is a common condition in under-developed countries where job opportunities are few.



**Contractors sourcing building materials from high-risk areas must be prepared to investigate long and complex supply chains.**

Luke Geary says the new legislation is likely to involve at least 3,000 entities, including trade businesses, and all will be publicly responsible for their share in establishing better practices.

"Managing supply chains in large organisations that often source goods and services globally is a complex and involved task. It requires analysis of business conduct at every level.

"Organisations will be required to undertake extensive audits of all their suppliers to ensure they are identifying and remedying risks in order to provide comprehensive, well-informed and transparent statements."

The *United Kingdom Modern Slavery Act*, though slightly different, is a similar bill that was brought to fruition in the UK in 2015. The outcome has been generally positive, with a 63% increase in victims speaking out and seeking assistance.

"Since the *UK Modern Slavery Act*'s inception, over 6,300 modern slavery statements have been produced," Luke says.

"They provide insight into business structures, operations and supply chains, and demonstrate the change and action the legislation has prompted."

The statement creates a sense of moral duty and gives suppliers and distributors under the \$100m revenue threshold an opportunity to improve working conditions.

Contractors sourcing building materials from high-risk areas must be prepared to investigate long and complex supply chains stretching through several countries. For example, uniforms and workwear are potentially sourced from high-risk areas.

Large-scale infrastructure projects will need special attention, as will training for new and existing employees.

"It's a new conversation for companies in Australia," Frankie says.

"We don't expect this problem to be dealt with overnight, and it certainly won't be solved just by the introduction of this legislation.

"But you've got to start somewhere." ▲





## LEGISLATION

# NO REGISTRATION? BAD REPUTATION.

THE FIRST ROUND OF PERSONAL PROPERTY SECURITIES REGISTER (PPSR) REGISTRATIONS IS DUE TO EXPIRE IN EARLY 2019. **CAMERON GRIMES** TAKES A LOOK AT THE CONSEQUENCES THAT ARISE IF COMPANIES FAIL TO RE-REGISTER OR REGISTER INCORRECTLY.

**E**stablished in January 2012 through the *Personal Property Security Act 2009* (PPSA), the PPSR is a national registry designed to provide information regarding a business' security interests, as well as the complexities with purchasing assets and any associated financial security interests.

Personal property that can be listed on the PPSR can include cars, boats, machinery and various inventories. Non-material items such as accounts and shares can also be listed on the register.

Costs to register an asset's financial statement are \$6 for durations of seven years or less, \$25 for registrations between seven and 25 years, and \$115 for registrations with no stated end time.

The seventh anniversary of the PPSR is quickly approaching and all businesses that completed seven-year registrations (the most common registration period) will be facing expiration on those registrations.

Companies who fail to renew their registrations can seriously impact their position in the industry, as they will no longer have protection over goods for which they have not been paid.

Equifax general manager of commercial risk solutions Ian Hadwen says that small and medium-sized enterprises (SMEs) are most at risk, due to a lack in understanding of how the register functions and what's involved in both renewing and registering assets.

"It was a bit of a difficult start for the PPSR," Ian says.

"When it comes to getting money back from insolvent companies, it tends to be SME's in particular that do the worst simply because they haven't been participating properly, or at all."

While PPSR renewals are the prime focus of companies like Equifax, it is important for companies to ensure that any new or existing registrations have accurate and up-to-date information.

Since its inception, over 80% of businesses registered on the PPSR have made an error, which can invalidate registrations and result in a loss of protection on any personal property.

For example, an earth-moving equipment company who registered assets on the PPSR made errors that could have resulted in significant losses. These errors included incorrect vehicle serial numbers being registered, as well as registering equipment weeks after being hired out to a customer.



Entering incorrect information can be solved through an amendment of the original registration, though the delaying of registrations may require companies to seek alternative solutions to recover any potential losses.

"The PPSR is very complex. It introduced new terminology and concepts and wasn't well delivered from an educational standpoint in the market," Ian says.

"Given there's 800,000 small businesses in Australia, many of whom deal in small goods, there isn't a lot of understanding surrounding the implications of what the Act is and how to go about performing an effective registration.

"In my experience there has only been one company that perfected its portfolio on the PPSR."

Another common error on current registrations is grantor identification, which refers to the business or individual who owns or has an interest in the assets to which the protection is attached.

"Grantors and the identification of said grantors has been a perennial problem for the PPSR from the beginning," Ian says.

"If you've incorrectly registered on a company's name, its ABN etc., those registrations are likely to be considered imperfect and ineffective, according to the PPSR Act."

Because of this, it is important that companies have procedures in place to ensure that all grantors are identified before registrations.

Removing a grantor, discharging or shortening a registrations duration is free of charge, but adding a new grantor to a registration carries the same fee as the original registration duration costs.

A thorough knowledge of how the PPSR works is recommended, beyond what is offered on the surface. The federal government's National Service Centre can provide assistance with the rules, procedures and practices, but cannot offer advice or register assets on a user's behalf.

Companies like Equifax offer PPSR solutions that include advice, registration and maintenance of registrations for both lenders and suppliers of assets.

"The reality is, you can't easily perform a registration and expect to get it correct just by reading the material on the website. You've got to do a bit more research than that," Ian says.

"We routinely tell our customers that you need to get specialist help on filling out the PPSR. Whilst you may have a registration in place if you do make a change, it can often result in a major error.

"Getting the terminology and phrasing right is pretty important and it's definitely not an easy thing to do.

"We advise our customers to take a step back and assess everything before completing any registrations." ▲

**Personal Properties Securities Register**

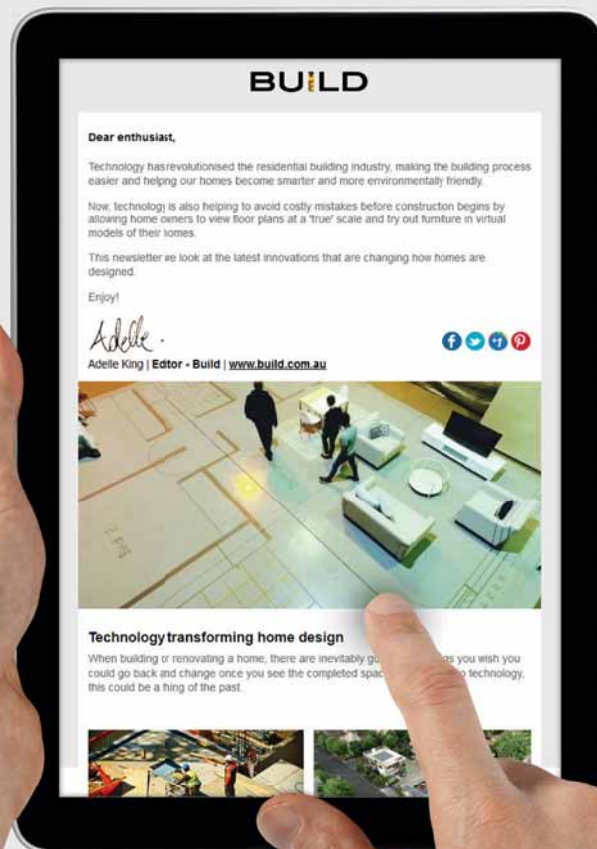
[www.ppsr.gov.au](http://www.ppsr.gov.au)

**Equifax Australia**

[www.equifax.com.au/ppsr](http://www.equifax.com.au/ppsr)

# ARE YOU GETTING YOUR REGULAR **BUILD** NEWSLETTER?

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# IN THE LINE OF FIRE

FIRES ON WORKSITES AREN'T UNHEARD OF, BUT DO YOU KNOW WHAT TO DO IN THE EVENT OF AN EMERGENCY? WORMALD NATIONAL MANAGER **MATT SULLEY** OFFERS THIS UPDATE TO SAFETY IN THE FACE OF FIRE.

**C**onstruction sites are busy environments where numerous trades and contractors work side-by-side, often with heavy, powerful equipment and vehicles.

There are also a number of hazards inherent to construction sites, including an increased risk of fire occurring as a result of daily activities, such as demolition and excavation works, welding, cutting, steel grinding and the application of torches in an environment where packaging, timber formwork and other materials are commonly found.

The Building Code of Australia (BCA) mandates that firefighting equipment must be available to assist construction workers and emergency services with putting out a fire as quickly as possible. It is the responsibility of the primary builder to ensure this occurs on all construction sites throughout the entirety of the project.

In a construction environment, compliance can be complex with each new work site likely to vary in size, location, lay out and environment. This can make fire safety particular challenging for the building industry.

To assist with achieving compliance in a range of settings, it is vital for construction workers to keep abreast of legal requirements, as well as recent developments in fire safety, both in terms of new regulation and next generation equipment and products.

## **Fire safety requirements in construction**

Firefighting equipment such as portable fire extinguishers, fire hose reels and fire blankets form the first line of defence in a fire. A potential fire can often be controlled before it really takes hold, if the right fire equipment is close at hand.

Fire precautions in a building under construction must include at least one fire extinguisher on each storey to suit



**A potential fire can often be controlled before it really takes hold, if the right fire equipment is close at hand.**



different fire types that are classified as Class A, Class B and Class C fires. They are as follows:

- Class A (wood, paper, plastic)
- Class B (flammable and combustible liquids)
- Class C (flammable gases) fires and electrical fires

Fire protection equipment must remain adjacent to each required exit or temporary stairway or exit, at all times.

Once the building increases in size, so do the fire safety requirements. When a building under construction has reached an effective height of 12m, the required fire hydrants and fire reels as specified by the BCA must be operational and any required booster connections must be installed.

### Further fire protection

Depending on the site, additional fire protection equipment may also be deemed appropriate, such as:

- Fire blankets.
- Advanced vehicle fire suppression systems designed to protect heavy mobile equipment from fire damage.
- Adaptable portable units which can be suited to a range of different fire scenarios.
- Specialist solutions for chemical fires and emergency equipment such as breathing apparatus for heavy industrial sites where fuel terminals and chemicals are used.

### Differences in fire extinguishers

A fully functional fire extinguisher can mean the difference between a minor incident and a devastating full scale fire on a construction site, which is why it is absolutely crucial to ensure all fire extinguishers and fire hose reels are serviced every six months.

When it comes to portable fire extinguishers, there are important differences. The type of fire extinguisher required for a building site will depend on the class of fire and fire risk. For example, dry chemical powder (DCP) extinguishers are well suited for most fire types, including fires involving oil.

Different extinguisher types can be distinguished by a coloured band

around the top of the cylinder, making identification quick and simple.

- **ABE extinguishers** are suitable for Class A, B and C fires, as well as those involving electrically energised equipment, and distinguished by a white band around the top of the cylinder.
- **Foam fire extinguishers** are suitable for Class A and B fires and these are marked with a blue band. Foam extinguishers work by covering a burning flammable liquid with a blanket of foam, cutting off the fire's air supply and preventing the release of flammable vapours.

### Fluorine-Free Foam

Fluorine-free foam products are now available in response to global concerns about the environmental impact of Aqueous Film Forming Foams (AFFFs).

AFFFs have been used around the world since the 1970s, to rapidly suppress and extinguish fires. AFFFs are water-based firefighting foam products that address flammable liquid fires by cooling the fire and coating the fuel, preventing its contact with oxygen.

However, in recent years AFFFs containing fluorine have been identified as having adverse impacts on the environment. This is because many AFFFs contain fluorinated surfactants that form part of a broader group of chemicals called PFAS, identified as having adverse impacts on the environment.

The use of solvents in fire-fighting foams represents risks to the environment due to their significant organic load composition. Solvent-containing foams have a high Chemical Oxygen Demand (COD) that can overload water treatment plants or, if released into a river or lake, contribute to the phenomenon of asphyxiation resulting in oxygen consumption. Removing solvents reduces COD by up to 75%.

### Upgrading existing fire protection systems

Wormald is proactively expanding its range of Fluorine-free foam in partnership with 3F, a recognised leader in products that do not use fluorinated compounds.

3F's Freedol SF is a fluorine and solvent free foam agent that has a significantly lower COD compared to typical AFFF's. The foam complies with Queensland's *Fire Fighting Foam* policy, which was announced in 2016 and requires full compliance by July 2019, and the recently amended South Australian Government's *Environment Protection (Water Quality) Policy 2015*.

Existing AFFF systems can be easily upgraded to use 3F's fluorine and solvent free foam through minor system modifications, after which, the new concentrates essentially become a 'drop in' replacement.

The Wormald

fluorine-free foam vehicle suppression system is approved by Global-Mark and meets the performance requirements of the revised Australian Standard AS5062-2016 *Fire protection for mobile and transportable equipment*. AS5062-2016 specifies the minimum requirements for the design, installation, commissioning and maintenance of vehicle fire suppression systems.

### Other ways to ensure your site is fire safe

The key factor in any hazardous situation or environment is human reaction. Knowing what to do, and when to do it, can save lives. With so many products to choose from, it is essential that the right equipment is used correctly, appropriately and safely. Training for construction site workers is recommended as a safety measure. ▲

*For more information on fire suppression solutions, including the legislation in Queensland and South Australia, visit [www.wormald.com.au](http://www.wormald.com.au).*

**Fire protection equipment must remain adjacent to each required exit or temporary stairway or exit, at all times.**





# IN UP TO YOUR EYES

WORKSITES CAN BE DANGEROUS PLACES, AND YOUR EYES PARTICULARLY SUSCEPTIBLE TO INJURY. **ALL PRO SAFETY GEAR** LOOKS AT THE IMPACT PROTECTION YOU NEED FOR YOUR SAFETY EYEWEAR.

**A**ustralians suffer around 50,000 eye injuries every year even though many of them were wearing eye protection at the time of their injury.

Safety eyewear is often incorrectly fitted, is not rated appropriately for the task at hand or does not provide adequate protection, according to a 2008 report from Safe Work Australia.

Ordinary eyewear such as prescription glasses, sunglasses or contact lenses do not offer appropriate eye protection and can actually increase the severity of injuries in the event of an incident.

Eye injuries can lead to permanent vision loss, contributing to depression and negatively affect work and social relationships, as described in a Comcare guide, *Eye Health in the Workplace*.

The most dangerous injuries for the eyes are construction, mining, agriculture, forestry and fishing industries, in which 60% of all eye injuries in Australia occur.

It is therefore critical you have the appropriate eye protection. That means knowing when to use medium, high or extra high impact-rated eye protection and when to use safety glasses, safety goggles, face shields or a combination of these.

## Choosing your impact rating

Eye protection impact ratings are determined by the PPE's ability to withstand an impact from a specifically-weighted ball without cracking, detaching



**Table 1: Choosing your impact rating**

Impact Rating	Rating Requirement	Suitable Tasks
Low Impact	Can withstand impact from an object moving at 12m per second.	Chipping, riveting, spalling, hammering and managing a strap under tension. Choose safety glasses with a Standards mark.
Medium Impact	Can withstand impact from an object moving up to 45m per second.	Scaling, grinding and machining metals, some woodworking tasks, stone dressing, wire handling and brick cutting. Choose safety glasses with a Standards mark 'I or F'.
High Impact (visor only)	Can withstand impact from an object moving up to 120m per second.	Metal chipping, hydraulic nailing or any mechanical procedure involving high velocity machinery.
Extra High Impact (visor only)	Can withstand impact from an object moving up to 190m per second.	Any mechanical procedure involving very high velocity machinery.

or dislodging, breaking or coming into contact with the eye or the head (see Table 1).

## The difference between glasses, goggles and face shields

While impact resistance is critical you should also consider whether you need safety glasses, safety goggles, a face shield, or a combination of these.

Safety glasses allow air in and around the eye area while safety goggles fit tight against the face, offering protection against dust and splashes. Face shields provide further protection and can also be worn over spectacles or goggles.

In determining suitable safety eyewear, a risk assessment should be carried out by a qualified WHS professional to choose what suits your work environment.

Also consider the type of lens, the shape of your head and if anti-fog lenses for use in humid conditions are required.

## Impact-resistance certification

All Pro Safety Gear protective eyewear is rated medium impact or higher, has polycarbonate lenses, 99.9% UV protection and is certified to AS/NZS 1337.1:2010 Standards.

This certification means you have quality assurance that the product will perform as stated. Check your safety eyewear to see if it has the Australian Standards logo which indicates they conform to tests for impact resistance.

Finally, also consider UV protection. The sun's ultraviolet radiation can cause a range of debilitating health conditions, from mild irritation to cataracts and cancer of the conjunctiva. All Pro Safety Gear protective eyewear - even those with clear lenses - provide 99.9% UV protection. ▲

**All Pro Safety Gear**  
[www.prochoice.com.au](http://www.prochoice.com.au)





## TOOLS



### Grab handle

Introducing the Pioneer Grab Handle: designed to aid in loading, unloading and securing your gear onto all Rhino-Rack Pioneer systems.

We've all been there, shifting item upon item up onto roof racks, tying your load for the trip ahead and being left with nothing to hold onto while you make your descent... but those days are over! With the new Pioneer Grab Handle, its large and sturdy form factor allows for a sturdy grip when used as a handle and a strong anchor point when securing gear.

Made from diecast aluminium that is powder coated to prevent rust and corrosion, the Rhino-Rack Pioneer Grab Handle has a 120kg load capacity, while keeping it super simple with a quick and easy installation process.

### Rhino-Rack

[www.rhinorack.com.au](http://www.rhinorack.com.au)

### 5,000psi hydro-blaster

Australian Pump Industries has developed a new 5,000psi diesel drive heavy duty hydro-blaster designed specifically for tough duties on construction sites.

Built to the same standard as the existing Aussie Predator Mine Boss, the machine qualifies under Australia's new safety standards for water jetters as a Class A unit.

By fitting into that class the new machines can now be by operators without the need for RTO certification. This provides contractors and maintenance managers access to efficient, powerful machines that facilitate faster cleaning, rust removal and paint stripping.

### Australian Pump Industries

[www.aussiepumps.com.au](http://www.aussiepumps.com.au)



### Bedrock floor liner

The Bedrock all-weather floor liner is geared for working vehicles, utes and 4WDs.

The result of more than two years of customer feedback, Bedrock is the first 'bucket style' floor liner available. It stops/catches more mud, liquid, etc. from hitting your floor and means there's one less thing to clean at the end of the day.

The design is broken up into two parts. The first part is the wave, which represents the coasts of Australia, while rocks represent the broken earth and rocky parts of central Australia.

Bedrock is made in Australia by FitMyCar using Australian material and comes with a lifetime warranty and fitment guarantee.

### FitMyCar

[www.fitmycar.com/au/](http://www.fitmycar.com/au/)



# RENT-A-BOB

A NEW PEER-TO-PEER ASSET SHARING PLATFORM AIMS TO PROVIDE A MORE PROFESSIONAL SOLUTION FOR THE TRADE SECTOR. **CAMERON GRIMES** REPORTS.

**P**eer-to-peer asset hiring between individuals and businesses is nothing new to the trade sector, with a range of platforms available that cater to the rental and hire of assets, but the safety and quality of equipment advertised and used on these platforms has long been a concern.

Launched in late 2017, peer-to-peer marketplace operator Collaborate's Mobilise platform aims to provide a more comprehensive solution for asset owners. Designed for tradies and sub-contractors in the construction industry, the platform aims to provide an affordable hiring service for equipment such as bobcats, excavators, diggers, etc.

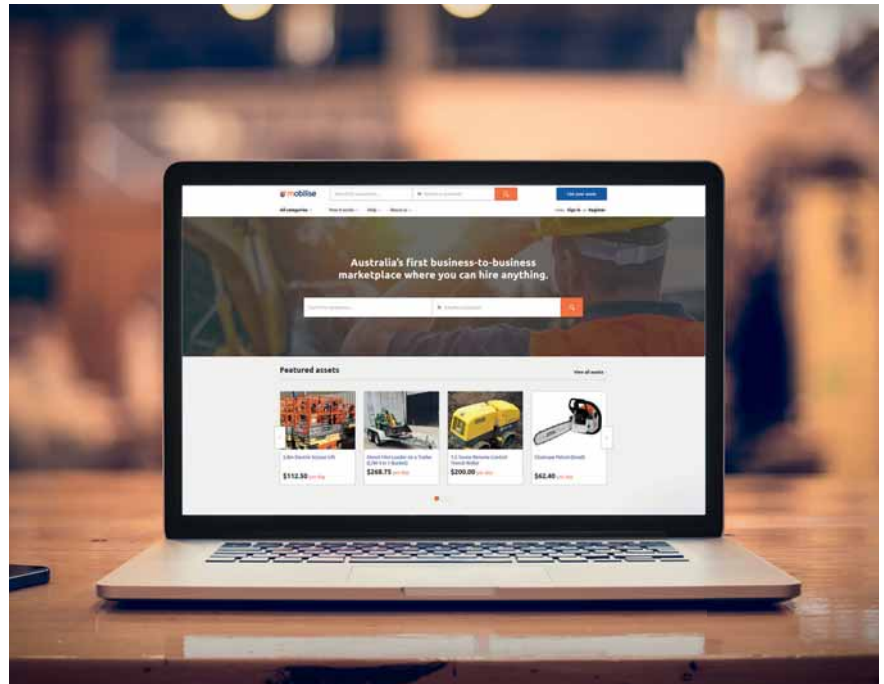
Mobilise is Collaborate's latest venture in peer-to-peer trading, which also operates platforms that focus on car and caravan rental services.

Chief executive Chris Noone says that Mobilise was born out of a gap in the market.

"We saw that a lot of contractors and builders and companies held a lot of assets, but they weren't using them for most of the year, only sporadically on certain projects," Chris says.

"We saw the opportunity to develop a marketplace where these assets could be listed, and other operators within that industry could be taking advantage of them. It's the only platform that allows owners of assets to rent them out and earn a financial return.

"The first thing owners need to look at is how often they're using an asset. If they're only using it 30 days of the year, it would make a lot more sense to rent it."



**Mobilise aims to provide an affordable hiring service to sub-contractors for equipment such as bobcats, excavators, diggers, etc.**

**"If firms begin sharing resources ... they can actually help each other to be more efficient."**

Mobilise has 3,500 assets currently listed on its website. Listing an asset on the platform is free, with a number of protections available for both the owner and renter, including public liability insurance and rental agreements.

Liabilities are also placed on the owner to ensure that assets are in good, safe and serviceable condition, as well as the renter being able to provide appropriate licenses and experience to operate the equipment.

"If firms begin sharing resources, with the benefit of insurance and terms and conditions, they can actually help each other to be more efficient," he says.

"Not every company needs to own their own bobcat or forklift. They can now share these assets and still maintain the competitive edge on the customer side. On the supply side, they can now gain cost savings from equipment hire.

"The world is shifting from ownership to access, which is very much what our company facilitates.

"It's something that not only happens in personal lives, but in businesses as well, and now we're looking at assets potentially being liabilities and looking at ways to maintain the use of assets but not have to take the burden of owning those assets." ▲

**Mobilise**  
www.mobilise.com





## TOOLS



### Lufkin Fluorolok tape measure

The Australian-made Crescent Lufkin Fluorolok tape measure is designed to be seen, no matter the backdrop. Whether it's a jam-packed toolbox, busy workshop or cluttered site, trust that you'll never have to rummage for a measuring tape again.

Boasting a bright hi-vis coloured casing, available in green, yellow and orange, the Fluorolok features a 90° case for high-functionality and taking measurements against a wall or stud frame without bending the tape line.

The Fluorolok comes in 5, 8 and 10m models with metric graduations on both edges, as well as a 10m/33' model; graduated in metric on one edge and imperial on the other.

**Crescent Tool**

[www.crescenttool.com.au](http://www.crescenttool.com.au)

### FLIR ONE, ONE Pro thermal imagers

The third generation FLIR ONE and FLIR ONE Pro thermal imaging cameras are now available for pre-order with product deliveries starting in late June.

Both new FLIR ONEs come equipped with a thermal and a high-definition visible camera. Using FLIR's patented multispectral dynamic imaging (MSX) technology, both models emboss high fidelity, visible-light details onto the thermal imagery to dramatically improve image quality.

With a distinctive ruggedised design that is drop tested to 1.8m, the FLIR ONE Pro combines FLIR's MSX with the company's video signal processing technology, VividIR, the FLIR ONE Pro also offers advanced FLIR ONE App features, including multiple spot temperature meters and selectable onscreen temperature tracking regions.

**FLIR Systems**

[www.flir.com](http://www.flir.com)



### Trimble XR10 with HoloLens2

Trimble has announced a new wearable hard hat compatible device that enables workers in safety-controlled environments to access holographic information on the worksite – the Trimble XR10 with HoloLens 2.

In addition, an expanded set of Trimble software and services will be available to provide field-oriented workflows that leverage constructible 3D models and mixed reality to solve daily work tasks.

The Trimble XR10 with HoloLens 2 is the first device created with the Microsoft HoloLens Customisation Program and integrates the latest spatial computing technology into a certified solution for use with a hard hat for worker safety.

**Trimble**

[www.trimble.com](http://www.trimble.com)





## TRANSPORT

with Terry Martin



# MITSUBISHI TRITON

**M**itsubishi has launched its heavily updated new Triton one-tonne utility range in Australia, which brings a dramatic new look, various mechanical improvements, a big increase in safety and cabin convenience features and, for a limited time, an extended warranty that runs to seven years or 150,000km.



The overhaul comes midway through the lifecycle of the fifth-generation MQ-series Triton, which continues with a comprehensive 20 variants spanning single, extended (Club) and dual cab body styles, cab chassis and pick-up rear ends, petrol and diesel engines, 4x2 and 4x4 drivelines and model grades based on GLX, GLX+, GLS and new GLX Premium lines - all now looking more aggressive with the wide 'dynamic shield' front styling planted in front of the higher (by 40mm) bonnet.

Under-the-skin highlights include a new six-speed automatic transmission on the '4N15' 2.4L four-cylinder turbo-diesel engine, replacing the previous five-speed unit and bringing a variety of benefits including reduced noise, vibration and harshness (NVH).

The diesel engine, which

has Mitsubishi's MIVEC valve timing system and a variable geometry turbocharger, carries over largely unchanged, producing 133kW of power at 3,500rpm and 430Nm of torque at 2,500rpm. Fuel consumption has increased slightly, though, due to factors such as the revised gearing and extra equipment on board.

A six-speed manual remains available on the diesel, while the 4x2 single cab at the entry level of the range sticks with the 94kW/194Nm 2.4L four-cylinder petrol/five-speed manual combination.

Mitsubishi is promising improved all-terrain performance in Triton 4x4 diesel models - both manual and auto - that have the Super-Select 4WD-II system, owing to the addition of a new 'Off-road Mode' selector that offers specific settings for gravel, mud/snow, sand and rock conditions.



There are no wholesale changes to chassis hard points such as the double wishbone front and leaf spring rear suspension and front disc/rear drum brake configuration; however, Mitsubishi Australia did play a role in the new Triton's engineering development and the suspension tuning.

The company says adjustments at the rear end have brought more comfort on bitumen roads and improved directional stability on dirt, while models with 18" wheels were targeted for a lift in braking performance and brake pedal feel.

Extra reinforcements have been applied in the engine compartment surrounds and in the chassis frame, cab and cargo bed joins to improve the Triton's rigidity, while new sound-proofing materials (absorbing noise and vibration) have been installed, with the result being a quieter and more comfortable cabin environment.

On the safety front, the new Triton ushers in a number of advanced driver-assist systems, including forward collision mitigation that can detect pedestrians as well as other vehicles, blind spot warning (with lane change assist) to help when changing lanes, rear cross traffic alert that checks for cars and pedestrians behind the vehicle, and an ultrasonic miss-acceleration mitigation system that will automatically halt the ute in its tracks if it detects that the driver has accidentally hit the accelerator rather than the brake.

Right from the base model, all Triton models come with seven airbags - dual front, driver's knee, side and head-protecting curtain airbags - as well as a speed limiter, electronic stability and traction control, trailer stability assist, hill-start assist, emergency stop signal function, a brake override system and ABS brakes with electronic brake-force distribution and brake assist.

There is also now an 'ADAS' grade on select GLX variants, denoting the Advanced Driver Assistance System that includes a number of the new driver-assist functions and



other equipment like dusk-sensing headlights, rain-sensing windscreen wipers, an auto-dipping rear-view mirror and front fog lights.

In the cabin, Mitsubishi has left almost no stone unturned, updating the interior to provide a more upmarket feel with improved comfort and functionality. Depending on the variant, there are new soft-touch materials, thicker-gauge laminate, metallic trim elements, a sportier colour scheme and fine detailing such as double stitching on the doors, console lid, knee touchpoints and park brake lever.

Trays are now used at the bottom of the centre stack and at the rear of

the console, where a USB charging socket is also now installed as part of a range of measures in the dual cab designed to improve rear-seat passenger comfort.

Prices have increased on most model variants in line with the extra equipment, but Mitsubishi is confident buyers will be drawn to the wide-ranging improvements made across the range.

The 4x2 petrol manual GLX single cab chassis still opens proceedings at \$22,490 plus on-road costs, while the 4x4 diesel auto GLS Premium double cab pick-up - which replaces the Exceed - sits at the top of the pile at \$51,990 plus on-roads. ▲



# JEEP GLADIATOR

**F**or something a little bit different on the jobsite, Jeep has finally revealed its long-awaited new ute - known as the Gladiator - which is the legendary off-road brand's first tray-backed model in two decades and has a heritage stretching all the way back beyond past episodes of *M\*A\*S\*H* to the 1947 Willys-Overland Jeep Pickup.

Expected on sale in Australia in the first half of next year, the Gladiator will come with all of Jeep's rugged off-road credentials and tick plenty of boxes as a workhorse with a 3.5t towing capacity and circa-725kg payload for the dual cab.

Built on a long-wheelbase version of the Wrangler SUV's body-on-frame chassis, and using the same five-link coil spring suspension front and rear, the Gladiator measures 5,537mm long - stretching further than a HiLux or Ranger dual cab from end to end - and has a reinforced steel tray with heavy duty integrated tie-downs, under-rail bed lighting and various options including a covered 400W (115V) external power socket, spray-in bed liner, bed divider and tonneau cover.

The tailgate is capable of stopping in three positions and is integrated with

the central locking system.

An attractive proposition for mixing work with weekend recreational pursuits, the Gladiator makes a major departure from its mid-size ute rivals with Wrangler-style features such as a soft-top roof (a removable hard top is optional), fold-down windscreen, removable doors and fold-up rear seats that offer extra storage and can be swapped out for an optional lockable container - most of this enabling 'open-air freedom' for the occupants.

Also setting the Jeep apart is its rock-hopping ability courtesy of Command-Trac and Rock-Trac 4x4 systems (with 'unmatched crawl ratios'), third-generation hardcore Dana 44 axles, Tru-Lock electric front and rear axle lockers, Trac-Lok limited-slip differential and, not least of all, segment-exclusive electronic sway bar disconnection.

Australian specifications are still to be revealed, but in the US the Ohio-built Gladiator will be offered in Sport, Sport S, Overland and Rubicon model grades with a choice of petrol or diesel engines: a 213kW/352Nm 3.6L Pentastar V6 with six-speed manual or eight-speed auto; and a 194kW/600Nm 3.0L EcoDiesel V6 with eight-speed auto only.

For all its ruggedness, the Gladiator will come with plenty of mod-cons such as a fourth-generation Uconnect infotainment system (including Apple CarPlay and Android Auto connectivity) and the choice of 7" or 8.4" touch screens.

We like the weather-proof detailing on switchgear such as the push-button start, while Jeeps says the ute is packed with more than 80 safety and security features - not all of which will be fitted standard - including a forward-facing off-road camera, blind spot monitoring, rear cross path detection, adaptive cruise control and electronic stability control with electronic roll mitigation.

All this equipment and the heavy duty nature of the vehicle - big steel bumpers, thick-gauge tubular steel rock rails on the bed corners (and elsewhere) and four undercarriage skid plates and bars are all noted - sees kerb weight come in at around 2.2t, which is about par for this category.

To keep weight down, Jeep engineers have applied lightweight (but high strength) aluminium on the doors, hinges, bonnet, fenders, windshield frame and tailgate. ▲







## RENAULT TRAFIC TRADER LIFE

**R**enault has launched a 'Trader Life' version of its Traffic medium van with sub-\$30,000 pricing and plenty of equipment included as standard.

The Trader Life is based on the three-seater short-wheelbase (3,098mm) model and uses a detuned version of the 'R9M' 1.6L four-cylinder common-rail single-turbo diesel engine available further up the model line.

In this case, the engine produces 66kW of power at 3,500rpm and 260Nm of torque from just 1,500rpm, driving the front wheels through a six-speed manual gearbox and returning fuel economy of 6.2L per 100km on the official combined cycle.

Renault says the specification is aimed at minimising the cost of ownership, with headline items such as air-conditioning (with pollen filter), cruise control (with speed limiter) and Bluetooth mobile phone connectivity all fitted and supported by the company's three-year/unlimited-kilometre warranty (with roadside assistance) and three capped-price services across the term.

Like the SWB 85 model, the Trader Life has a 1,665kg kerb weight, 2,000kg braked towing capacity, 2,900kg gross vehicle mass and 1,235kg payload. The load volume is 5.2m<sup>3</sup> and the cargo bay measures 2,537mm long, 1,662mm wide (1,268mm between the wheel arches) and 1,387mm high. The area has 16 anchorage points and LED strip ceiling lighting, while access is made via a sliding door on the left-hand side and a lift-up tailgate.

Standard safety features include four-wheel disc brakes with ABS, electronic brake-force distribution and brake assist, electronic stability control with 'load adaptive control, rollover mitigation, the 'Grip X-Tend' traction aid, hill-start assist and dual front airbags. Curtain airbags and reverse parking sensors are not included. ▲

## WARRANTY BOOSTER SHOTS

**C**ompetitive pressure applied by leading automotive brands on the length of new-vehicle warranties in Australia has prompted several others to fall into line and up the ante from the previous industry standard - three years or 100,000km - to a higher level of assurance for light-commercial vehicle owners.

Among them, Toyota Australia has finally moved to five years and unlimited kilometres for private buyers, while fleet customers have cover for up to 160,000km.

Toyota's 'Warranty Advantage' also includes a money-back guarantee on vehicles that break down and cannot be driven in the first 60 days of ownership, while as an added incentive to take the vehicles back for regular maintenance at a Toyota dealership, the warranty can be extended to seven years on the engine and transmission for vehicles that undergo scheduled logbook servicing.

Other brands making similar moves recently include Volkswagen and Mazda, both of which now offer cover of five years/unlimited kilometres, and SsangYong, which with its relaunch to Australia has gone as step further with a seven year/unlimited warranty.

The five-year/unlimited cover matches the coverage introduced earlier last year by Ford and Holden - for private buyers and ABN holders, at least, with some restrictions placed on fleets by certain brands - while Hyundai and Mitsubishi were early adopters of the five-year term.

As a temporary measure, Mitsubishi Motors Australia Limited is also including seven-year/150,000km coverage for its upgraded Triton ute until at least the end of the 2018/19 financial year, which might be extended if it proves to be a hit among buyers.

Renault recently extended its warranty cover for its LCV range to unlimited kilometres, but the three-year period remains, while Peugeot/Citroen last year moved to five years/unlimited for its passenger cars but left LCVs at three years/100,000km. ▲





# CUTTING METAL HAS NEVER BEEN EASIER

**THE METAL PECKER®** is specifically designed to cut penetrations in profiled metal roofing for in-situ vent pipe and skylight installation ...as well as air-conditioning duct, furring channel and other straight or formed metal sheet. The tool's precisely engineered slot-shear cutting action eats up folded sheets, seams and joints, like no other hand or power tool, you've ever used. The more you use the tool, the more uses you will find for it onsite.

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The Metal Pecker's bolt-cutter sized handles provide far greater cutting leverage than other metal cutting hand tools.

Its precision cutter blade shears the metal between the anvils and pushes out a 1.7" (43mm) x 0.24" (6mm) slug with each cutting stroke. There is no blade face to blunt.

To cut, you simply punch a pilot opening in the metal sheet, poke the beak of the Metal Pecker's cutting jaw into the opening and commence cutting.

## A MULTITUDE OF USES

The Metal Pecker compliments other tools that do their best work on single thickness profile cutting at ground level, or on flat sheet.

However, when the going gets tough with in-situ penetrations and other tools pass up under-folds or have difficulty cutting through a profile, reach for the Metal Pecker.

Its extended handles keep you away from the sheet's sharp edges and provide greater reach and leverage in hard to access places - reducing your work time.

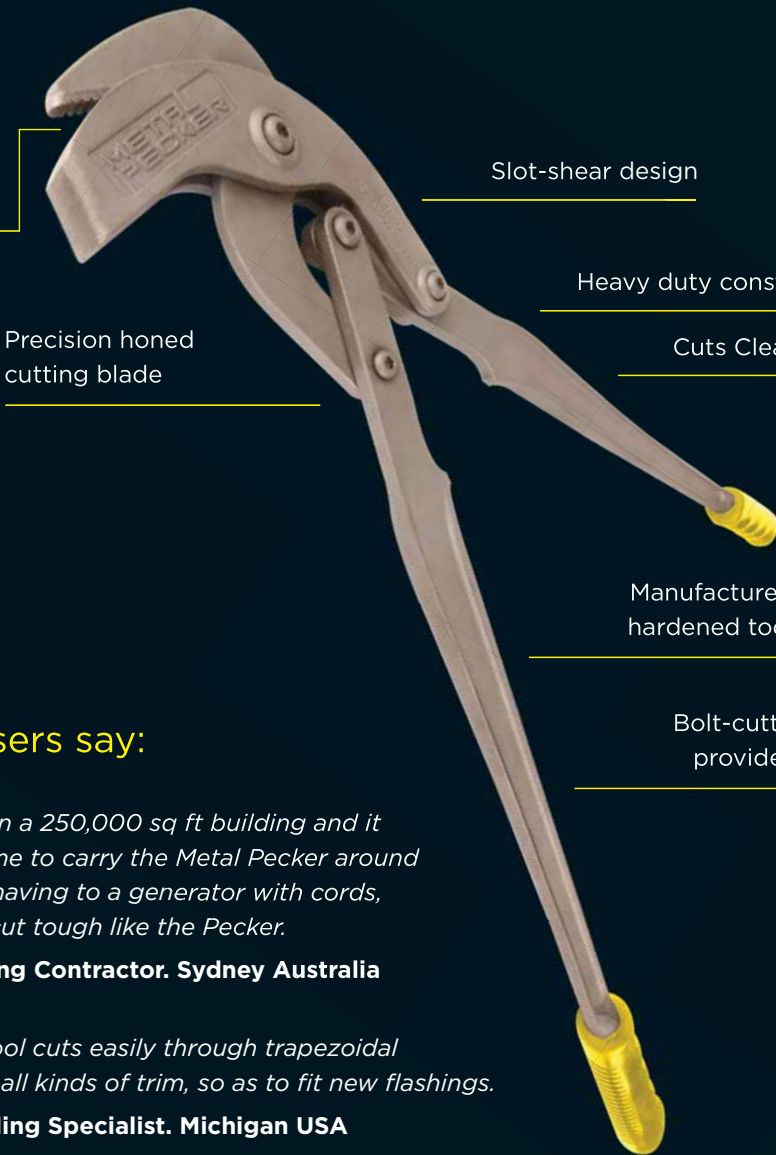
Cutter blade shears the metal between the anvils







## Every tool kit needs a Metal Pecker The tool with 1001 deconstruction uses



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Slot-shear design

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cutting blade

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Bolt-cutter length handles  
provide greater leverage

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*I've just finished work on a 250,000 sq ft building and it was more efficient for me to carry the Metal Pecker around than any other tool, or having to a generator with cords, as cordless tools can't cut tough like the Pecker.*

Barney Smethers **Roofing Contractor. Sydney Australia**

*I like the fact that the tool cuts easily through trapezoidal standing seam ribs and all kinds of trim, so as to fit new flashings.*

James Gunnerson **Building Specialist. Michigan USA**

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[www.metalpecker.com](http://www.metalpecker.com)



# SSANGYONG MUSSO

**S**sangYong's Musso dual cab ute is back on the market, offering buyers a value-laden proposition across its sub-\$40,000 four-model launch line-up that starts at \$30,490 drive-away for the manual EX and tops out at \$39,990 for the Ultimate auto.

In between, the EX auto is priced at \$32,490 and the auto-only ELX carries a \$35,990 sticker price - both drive-away figures in a range that has a lot of bases covered in terms of equipment, specification and warranty assurance.

All models are 4x4, using a part-time four-wheel drive system with low-range gearing, in concert with a six-speed manual or Aisin-sourced six-speed automatic transmission option and the sole powertrain on offer: a 2.2L four-cylinder turbo-diesel engine.

Producing 133kW of power at 4,000rpm and 400Nm of torque from 1,400-2,800rpm, the Euro 6-compliant e-XDi220 diesel engine returns fuel economy of 7.9 litres per 100km in the manual and 8.6L/100km in the auto.

Other noteworthy numbers include a maximum payload of 790kg across the range - onet carrying capacity is coming soon with a long-wheelbase variant - and maximum braked towing capacity on the auto of 3,500kg. Kerb weight is 2,177kg (manual) or 2,192kg (auto), while gross vehicle mass is

2,880kg and gross combination mass 5,980kg.

The tub measures 1,300mm long, 1,570mm wide and 570mm high - enough room for a full-size Euro pallet, SsangYong says - and is fitted with a load liner, 12V power outlet and rotating tie-down hooks. Ground clearance is a handy 215mm.

All models come with an automatic locking centre differential and a limited-slip rear diff. The chassis is a traditional body-on-frame design, with the suspension using coil springs at both ends in a double wishbone set-up at the front and a multi-link arrangement down back. The forthcoming long-wheelbase model will have rear leaf springs.

Four-wheel disc brakes are welcome, along with a supporting cast of electronic aids including electronic stability and traction control, anti-rollover production, brake assist, emergency stop signal, hill-start assist and hill descent control.

Driver-assist systems include autonomous emergency braking, forward collision warning and lane departure warning across the range (from December 2018 production); however, more advanced functionality with blind spot detection, lane change assist and rear cross traffic alert only kicks in at ELX level. A 360°

surround-view camera is reserved for the Ultimate.

All models have six airbags, air-conditioning, cruise control, Bluetooth connectivity, a fully adjustable multi-function steering wheel, central locking and electric windows.

The ELX adds daytime running lamps, rear fog lamps, a 7" instrument cluster, 8" multimedia screen, reversing camera, Apple CarPlay and Android Auto support, tyre pressuring monitoring system, front/rear park assist and thermoplastic polyurethane (TPU) seat covers with heating and ventilation for front occupants.

At the top end, the Ultimate has HID headlights, a sunroof, rear deck pillar, auto-dipping rear-view mirror, leather seat upholstery, seat heating front and rear, electric front seat adjustment (eight-way driver/six-way passenger) and a speed-sensitive steering system.

The EX comes standard with 17" steel wheels and 235/70-section tyres (including full-size spare), with an alloy rim available as an option. The ELX ups the ante to 18" alloys with 235/70 rubber, while Ultimate has 20" alloys with chrome-like sputtering and 255/60 tyres.

A seven-year/unlimited-kilometre warranty with seven years of roadside assistance is also part of the standard package. ▲







## SSANGYONG MUSSO LWB

**S**sangYong Australia is set to bolster its Musso dual cab utility range with a long-wheelbase model that brings a host of benefits - extra length, yes, but also more torque and a higher payload.

Local specification and pricing were still to be released at the time of writing, but the South Korean manufacturer had confirmed that the LWB version would be available in three trim levels - EX, ELX and Ultimate - as seen on the short-wheelbase range, so count on comparable features on each respective grade.

Known as the Rexton Sports Khan in overseas markets, the LWB model is 310mm longer overall - wheelbase length extends an extra 110mm - and increases total length to 5.4m.

SsangYong claims this hands the stretched Musso one of the biggest load spaces on the market, while payload increases 30% to 1,020kg - an important point, considering the SWB variants do not make it to the tonne.

A leaf spring rear suspension replaces the SWB's coil spring set-up "to meet the heavy-duty demands expected by target customers, including tradespeople".

The LWB model also offers more pulling power with torque on the 2.2L turbo-diesel engine uprated to 420Nm - 20Nm more than on the SWB, and arriving at the same 1,400rpm. ▲

## TOYOTA HIACE

**T**oyota Australia is preparing to launch its sixth-generation HiAce mid-size van.

The lifecycle of light-commercial vans typically stretches much further than passenger vehicles, and this is the first fully redesigned HiAce in some 15 years, bringing with it claims of major improvements in key areas such as safety, performance, ride and handling, practicability and cabin comfort.

A more rigid structure and new driver-assist technology such as autonomous emergency braking and pedestrian and cyclist detection have been developed, leading Toyota to expect a maximum five-star safety rating from the Australasian New Car Assessment Program (ANCAP) - up from the four stars it managed when last tested in 2011.

Full specs were still to be revealed ahead of the local launch, but two new powertrains will be offered - a 2.8L four-cylinder turbo-diesel and a 3.5L normally aspirated petrol engine, both with either a six-speed manual or automatic transmission. The current HiAce offers a 100kW/300Nm 3L diesel and 118kW/243Nm 2.7L petrol.

Maximum braked towing capacity increases 500kg to 1,900kg on most models, while the dynamic improvements stem from structural modifications and revised suspension, the latter switching from a double wishbone set-up to MacPherson struts at the front. It sticks with leaf springs at the rear but with an overhaul that aims to improve ride, handling and refinement.

Other detail changes brought with the new HiAce generation include improved cabin access via redesigned doors and wider steps, while visibility is said to be better with a lower 'beltline' and larger expanses of glass on the front doors.

The range will continue with two-seater vans in long-wheelbase (LWB) and super-long wheelbase (SLWB) format, and as a five-seater LWB crew van. Load capacity is listed at 6.2m<sup>3</sup> for the LWB and 9.3m<sup>3</sup> for the SLWB, while Toyota says longer wheelbases and revised packaging have increased internal width by 215mm and height by 5mm - without altering overall exterior width. ▲







# FORD-VW UTE, MITSUBISHI-RENAULT VAN ALLIANCE

**T**wo important new joint-venture programs were announced recently that will have a major impact on some of the key light-commercial vehicles sold in Australia.

Ford and Volkswagen have entered into a wide-ranging agreement that will see the two companies develop commercial vans and mid-size pick-ups together - meaning the next-generation VW Amarok ute will be closely related to the Ford Ranger and developed in Australia at the Blue Oval brand's Asia-Pacific product development centre in Victoria.

The deal will also see Ford engineer and manufacture large vans and cab chassis models for Volkswagen, with the German brand now in the frame to have future versions of its Transporter and

Crafter based on the next-generation Transit models, while Volkswagen will maintain responsibility for the Caddy compact van.

Prior to the announcement, Volkswagen Group Australia was playing a role in the development of the next Amarok - which is expected to be available here by 2022 - and now expects the Ford deal and, importantly, the Australian connection to only be of benefit as the next-generation ute takes shape.

Production facilities are also likely to be shared, so the fact that Ford also builds the Ranger in Thailand for Australia - compared to the Amarok, which is sourced from Germany and Argentina, depending on the variant - means VW should be able to take full advantage of the close proximity of the factory to this market and the free-trade agreement between Thailand and Australia.

In other major news, Mitsubishi Motors Australia has struck a deal with alliance partner Renault to rebadge the French auto-maker's mid-size Trafic van so it becomes a member of the Japanese brand's light-commercial stable.

Essentially a 'badge engineering' exercise, with the triple-diamond logo replacing



the single diamond on the front, the new model will serve as a successor to the Express van - which was discontinued in 2013.

Details such as local specification and pricing were still being negotiated between the parties at the time of writing, and the launch date was also looking as though it would be pushed out until early 2020 - a few months later than first anticipated.

Renault Australia recently introduced a new 'Trader Life' version of the short-wheelbase (3,098mm) Trafic, providing a new entry point of \$29,990 drive-away - something Mitsubishi will certainly look to match. ▲





## DRAINAGE: PLUMBING SERVICES SERIES, 3RD EDITION:

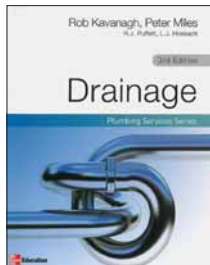
Drainage – Plumbing Services Series 3rd edition is an important entry into the world of drainage and sanitation history and maintenance.

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This latest edition is an update of earlier editions prepared by Bob Puffet and Len Hossack and brings the text into the 21st century. The basis for this lies in AS/NZ3500 and references maximum lengths, grades and depths from this document.

The update includes wide ranging revisions to meet the requirements of the CPC08 Construction, Plumbing and Services Training Package. New features include sustainable plumbing practices, case studies, new and revised illustrations, technical drawings and resources, a competency grid aligned to the training package, and Australian Standards grid and worksheets for each chapter.

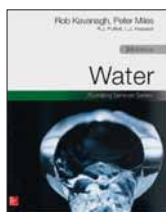
This is a must have for students and those who wish to update their skills and knowledge.



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## WATER: PLUMBING SERVICES SERIES, 3RD EDITION:

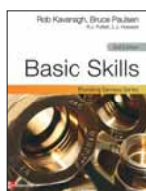
Water has been completely revised and updated to meet the requirements of the CPC08, Construction, Plumbing and Services Training Package. This is an in-depth guide to the storage and transmission of water, water materials, hardware, services and installation of hot and cold systems. This is one of the most comprehensive guides to water and water management in the country.



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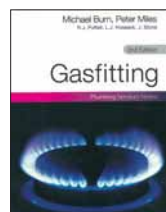
The third edition of Basic Skills has been completely updated to incorporate the wide ranging revisions that meet the requirements of CPC08. New features include a trade maths chapter for applied plumbing, chapters on sustainability, communication and OHS in the workplace, a competency grid to the Training Package, worksheets and interviews with plumbers.



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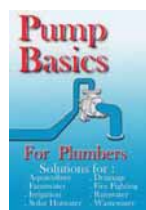
This text assists the licenced gasfitter to understand and correctly interpret the Standards laid down in the current code for the installation of gas burning appliances. This new second edition incorporates thorough and wide ranging revisions to bring it up to date with the requirements of the Plumbing and Services Training Package.



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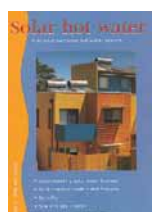
This handbook covers broad topics such as pump types and suitability. Emphasis is directed mainly on centrifugal pumps and their characteristics including capacity, head speed, power and efficiency, supported by charts, tables, formulas and graphs.



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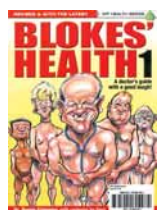
This is a very small book with a lot of big information and will help you with many applications. Plan your own solar hot water system. It gives you an understanding of solar water heaters and the most common models and their features. It also covers retrofits, size and site locations, including mains pressure versus low pressure, collectors, tanks, boosting and freeze protection, warranties, rebates and Standards. A very helpful booklet.



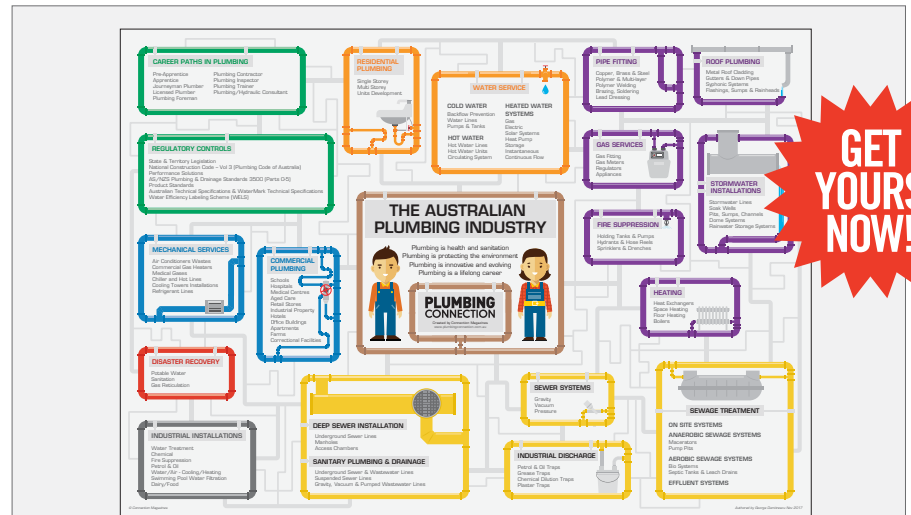
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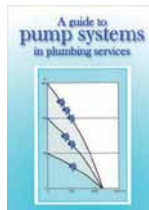


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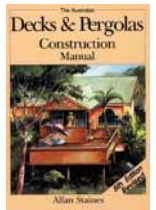
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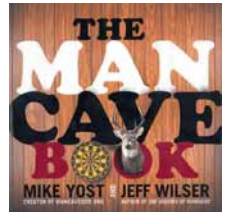
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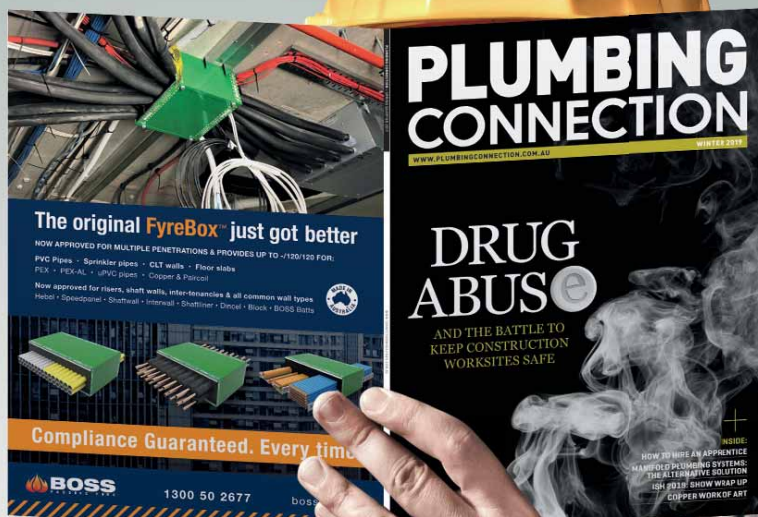


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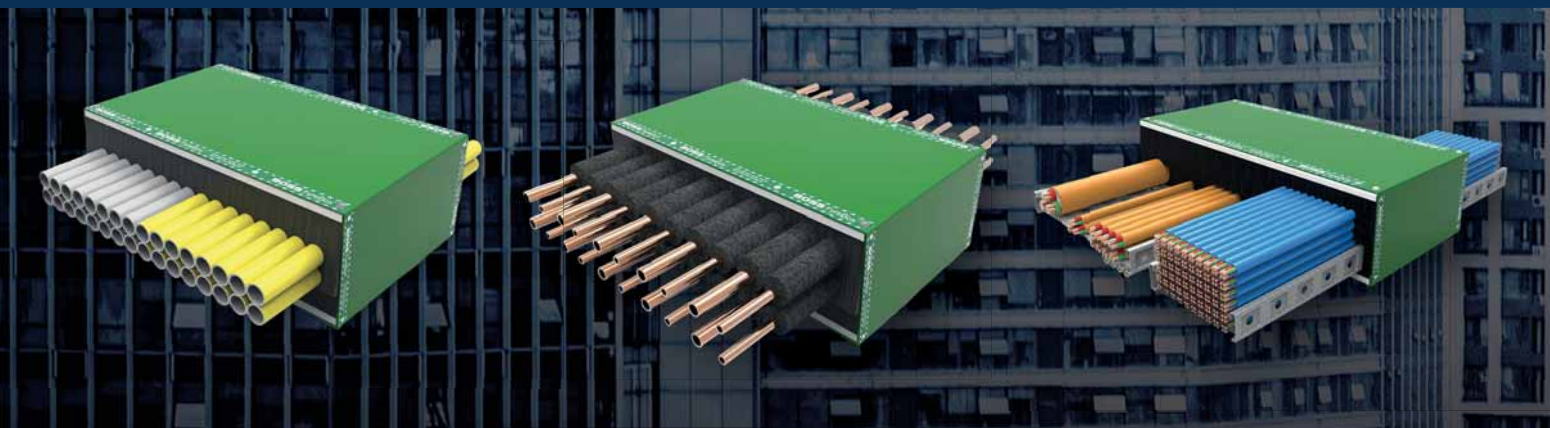


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